

ภาคผนวกที่ 37
เอกสารสอบเทียบเครื่องมือ



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
Ambient									
1	Sound Level Calibrator (Acoustic Calibrator)	Calibrate Sound Level Meter	Svantek	SV35A 73249	Innovative Instrument Co.,Ltd.	22-ACT-406	1 Jul 22	30 Jun 23	-
2	Sound Level Meter	L _{Aeq} 24 hr, L _{Amax} , L _{A90} , L _{Adn}	Larson Davis	LxT2	Innovative Instrument	22-ACT-035	21 Jan 22	20 Jan 24	-
		ระดับการรบกวน		0005398	Co.,Ltd.				

Certificate of Calibration

Customer

Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD. Certificate No : 22-ACT-035
 Address : 81 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Prakanong, Bangkok Request No : Req-2022-0094
 10260

Unit Under Calibration Details

Measurement item : Sound Level Meter Microphone Class : 2
 Manufacturer : LARSON DAVIS Microphone Model : 375A04
 Model : LxT2 Microphone S/N : 328675
 Serial Number : 0005398 Preamplifier Model : PRMLxT2C
 ID : UAE.EFM.035/2564 Preamplifier S/N : 073793
 Resolution : 0.1 dB Intrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
 Humidity : 50 %RH ± 20 %RH
 Barometric Pressure : 1013 hPa ± 10 hPa
 Received Date : 14 January 2022
 Calibrated Date : 21 January 2022
 Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
 Location of Calibration : Lab Acoustic


Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Tracebility
Standard Microphone	GRAS	40AN	188273	15 September 2022	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	14 June 2022	TSI
Audio Generator	SvanteK	Svan401	131	18 October 2022	WK Electric


Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %.

Calibrated By :


 Mr. Noppadon Luangart
 Calibration Officer

Approved By :


 Mr. Pacit Mathavorn
 Calibration Engineer Supervisor

Issue Date : 21 January 2022

Certificate No : 22-ACT-035

Request No : Req-2022-0094

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		Adjust		UNCERTAINTY	Acceptance
FAST / A / 37-139	Level	UUC	ERR	UUC	ERR	(± dB)	Limit
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)		
1000 Hz 114.00 dB	113.85	114.0	+0.15	113.9	0.05	0.20	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN.58079

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139	(dB)	(± dB)
UUC Weighting		
A	28.1	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139	(dB)	(± dB)
UUC Weighting		
A	27.9	0.10
C	27.3	0.10
Z	31.9	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Responce curve			UNCERTAINTY	Acceptance
FAST / 37-139	A	C	Z	(± dB)	Limit
STD Setting	(dB)	(dB)	(dB)		
125 Hz	0.0	0.0	0.0	0.50	2.0
1000 Hz	0.0	0.0	0.0	0.60	1.0
4000 Hz	0.4	0.3	0.3	0.60	3.0
8000 Hz	-0.1	-0.2	-0.1	0.70	5.0

Certificate No : 22-ACT-035

Request No : Reg-2022-0094

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
FAST / A / 37-139	UUC		
STD Setting	(dB)		
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.3

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY	Acceptance
FAST / A / 37-139	REF	UUC	ERR	0.3	Limit
STD dB	(dB)	(dB)	(dB)		(± dB)
139.00	139	139.0	0.0	0.3	1.1
134.00	134	134.0	0.0		1.1
129.00	129	129.0	0.0		1.1
124.00	124	124.0	0.0		1.1
119.00	119	119.0	0.0		1.1
114.00	114	114.0	0.0		1.1
109.00	109	109.0	0.0		1.1
104.00	104	104.0	0.0		1.1
99.00	99	99.0	0.0		1.1
94.00	94	93.9	-0.1		1.1
89.00	89	88.9	-0.1		1.1
84.00	84	83.9	-0.1		1.1
79.00	79	78.9	-0.1		1.1
74.00	74	73.9	-0.1		1.1
69.00	69	69.0	0.0		1.1
64.00	64	63.9	-0.1		1.1
59.00	59	59.0	0.0		1.1
54.00	54	54.0	0.0		1.1
49.00	49	49.0	0.0		0.8
44.00	44	44.1	0.1		1.1
39.00	39	39.3	0.3	1.1	
38.00	38	38.3	0.3	1.1	
37.00	37	37.5	0.5	1.1	

UUC Setting	STD	Measured		UNCERTAINTY (± dB)	Acceptance
37-139 / A	REF	UUC	ERR		Limit
UUC Time Response	(dB)	(dB)	(dB)		(± dB)
Fast	114.00	114.0	0.0	0.2	0.1
Slow	114.00	114.0	0.0		0.1
Leq	114.00	114.0	0.0		0.1

Certificate No : 22-ACT-035
 Request No : Req-2022-0094

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / A	REF	UUC	ERR		
UUC Range	(dB)	(dB)	(dB)		
37-139	43.2	43.4	0.2	0.3	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
A / 37-139	Toneburst	Ref	UUC	ERR		
UUC Time Response	(ms)	(dB)	(dB)	(dB)		
Fast	200	135.0	135.0	0.0	0.3	1
	2	118.0	117.9	-0.1		+1.0, -2.5
	0.25	109.0	108.7	-0.3		+1.5, -5.0
Slow	200	128.6	128.5	-0.1		1
	2	109.0	108.9	-0.1		+1.0, -5.0
SEL	200	129.0	129.0	0.0		1
	2	109.0	109.1	+0.1		+1.0, -2.5
	0.25	100.0	99.9	-0.1		+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / C / 95-142	REF	UUC	ERR		
STD Setting	(dB)	(dB)	(dB)		
Complete cycle	137.4	136.8	-0.60	0.2	3.0
Positive half cycle	136.4	136.1	-0.30		2.0
Negative half cycle	136.4	136.1	-0.30		2.0

Certificate No : 22-ACT-035
 Request No : Req-2022-0094

12. Overload indication

UUC Setting	Measured	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / A / 37-139	UUC		
STD Setting	(dB)		
Positive one-half cycle	142.3		
Negative one-half cycle	142.0		
Deviated	0.3	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / A / 37-139	UUC		
STD Setting	(dB)		
Initial	138.0		
Final	138.0		
Deviated	0.0	0.1	0.3

End of Certificate

Certificate of Calibration

Customer

Name : UNITED ANALYST AND ENGINEERING CONSULTANT
 CO.,LTD.

Certificate No : 22-ACT-406

Request No : Req-2022-1080

Address : 81 Soi Udomsuk 41, Sukhumvit Road, Bangchak,
 Prakanong, Bangkok 10260

Unit Under Calibration Details

Measurement item : Acoustic Calibrator

Class : 1

Manufacturer : SVANTEK

Range : 94 , 114 dB / 1000 Hz

Model : SV 35A

Intrument Status : Used

Serial Number : 73249

ID : UAE.EFM.105/2561

Calibration Environment and Details

Temperature : (23 ±2 °C)

Humidity : (50 ± 20 %RH)

Barometric Pressure : (1013 ±10.0 hPa)

Received Date : 15 June 2022

Calibration Date : 1 July 2022

Location of Calibration : LAB 1 Acoustic

Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Sound Calibrator	SV 35A	58079	EEI	31 May 2023
THD Multimeter	2015	1047765	NIMT	2 February 2023

Traceability : This certificate provides traceability of measurement to recognized national standard, and to the realization of the international System of Units (SI).

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor k=2, providing a level of confidence approximately 95 %.

Calibrated By : me
 Mr. Noppadon Luangart
 Service Calibration Engineer

Approved By : ๗๓๓
 Mr. Pacit Mathavorn
 Calibration Engineer Supervisor

Issue Date : 1 July 2022

Certificate No : 22-ACT-406

Request No : Req-2022-1080

Sound pressure level

Calibration Results : Without Adjustment

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty (± dB)	Acceptance limit Class 1 (± dB)
	Measured	Error	Measured	Error		
94 dB / 1000 Hz	93.82	-0.18	-	-	0.11	0.25
114 dB / 1000 Hz	113.81	-0.19	-	-	0.11	0.25

Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)	Acceptance limit Class 1 (± %)
	Measured (Hz)	Error (%)	Measured (Hz)	Error (%)		
94 dB / 1000 Hz	1000.00	0.00	-	-	0.10	0.70
114 dB / 1000 Hz	1000.00	0.00	-	-	0.10	0.70

Total Harmonic Distortion plus Noise of Sound pressure level (THD+N %)

Calibration Range (Hz)	Without Adjustment	Adjustment	Uncertainty (± %)	Acceptance limit Class 1 (± %)
	Measured (%)	Measured (%)		
94 dB / 1000 Hz	0.17	-	0.40	2.5
114 dB / 1000 Hz	0.04	-	0.40	2.5

Note :

- Acceptance limit was IEC60942:2017 Class 1

- The calibration results exclude the calibrator pressure correction

- The calibration results exclude the microphone volume correction

End of Calibration

แผนการติดตามตรวจสอบคุณภาพสิ่งแวดล้อม
โครงการผลิตปิโตรเลียมแหล่งหนองผักชี และแหล่งหัวไผ่ซุง แปลง L54/43 จังหวัดสุพรรณบุรี (ฐานหลุมผลิตหนองผักชี – ตี) ระยะเจาะหลุมปิโตรเลียม ของ บริษัท ปตท. สผ. อินเตอร์เนชั่นแนล จำกัด
ประจำเดือน มีนาคม-เมษายน พ.ศ. 2566

รายการใบรับรองสอบเทียบ/ทวนสอบ เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์สำหรับวิเคราะห์คุณภาพสิ่งแวดล้อม

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์คุณภาพน้ำ และดิน									
1	pH Meter	อุณหภูมิ (Temperature) ความเป็นกรด-ด่าง (pH)	Mettler-Toledo	Seven Easy S20 / 1231155210	National Food Institute, Ministry of Industry, Thailand	2301846-001-01	24 Feb 23	23 Feb 24	-
2	pH Meter		Mettler-Toledo	Seven Easy S20 / 1230525212	National Food Institute, Ministry of Industry, Thailand	2302181-001-01	24 Mar 23	22 Mar 24	-
3	Conductivity Meter	ความนำไฟฟ้า (Conductivity) ความเค็ม (Salinity)	SI Analytics	Lab955 / 16300356	SPC Calibration Center Co.,Ltd.	C24230059	16 Mar 23	14 Mar 24	-
3	Analytical Balance (Readability 0.01 mg)	ของแข็งแขวนลอย (ss) ของแข็งละลายน้ำทั้งหมด (TDS)	Mettler-Toledo	XSR205DU / C210685394	Technology Promotion Association (Thailand-Japan)	23MM113	26 Apr 23	24 Apr 24	-
4	Hot Air Oven		Memmert	UF55 / B216.1666	Technology Promotion Association (Thailand-Japan)	22TM1490	19 Oct 22	18 Oct 23	-
5	Analytical Balance (Readability 0.1 mg)	ปิโตรเลียมไฮโดรคาร์บอน (TPH)	Mettler-Toledo	XSR204 / C117635043	National Food Institute, Ministry of Industry, Thailand	2302827-001-01	10 May 23	8 May 24	-
6	Atomic Absorption Spectrophotometer (AAS)	(Cd) , โครเมียมทั้งหมด (Total Cr) ตะกั่ว (Pb), ปรอททั้งหมด (Total Hg) , นิกเกิล (Ni) ,	Agilent Technologies	System ID:G8432A AA240FS / MY13160001	Thailand Institute of Scientific and Technological Research(TISTR)	MTC. ACL. No. 387/66	2 Feb 23	1 Feb 24	-
7	Inductively Coupled Plasma (ICP)	ซีลีเนียม (Se) , แบเรียม (Ba), ทองแดง (Cu) สังกะสี(Zn) เหล็ก (Fe) และ แมงกานีส (Mn)	Agilent Technologies	System ID:G8015A G8015AA / MY18030001	Agilent Technologies (Thailand) Co.,Ltd.	Preventive Maintenance Checklist	30 Nov 22	29 Nov 23	-
8	BOD Incubator	บีโอดี(BOD)	Arco	UC4-1320 / (UAE.WAO.015/2561)	Technology Promotion Association (Thailand-Japan)	23TM249	15 Feb 23	14 Feb 24	-
9	BOD Incubator		Arco	UR-1320 / (UAE.WAO.018/2551)	Technology Promotion Association (Thailand-Japan)	23TM375	12 Apr 23	10 Apr 24	-
10	Cold Vapor Atomic Absorption (CVAAS)	ปรอท(ดิน)	Milestone	DMA-80 / 11030982	Sithiporn Associates Co.,Ltd.	Service Protocol Report	18 Nov 22	17 Nov 23	-
11	Incubator	ฟิโคลโคลิฟอร์มแบคทีเรีย (FCB)	Binder	KB400 / 20200000015535	Technology Promotion Association (Thailand-Japan)	23TM726	27 Apr 23	25 Apr 24	-

แผนการติดตามตรวจสอบคุณภาพสิ่งแวดล้อม

โครงการผลิตปิโตรเลียมแหล่งหนองผักชี และแหล่งหัวไผ่ขุข แบลง L54/43 จังหวัดสุพรรณบุรี (ฐานหลุมผลิตหนองผักชี - ตี) ระยะเจาะหลุมปิโตรเลียม ของ บริษัท ปตท. สผ. อินเตอร์เนชั่นแนล จำกัด

ประจำเดือน มีนาคม-เมษายน พ.ศ. 2566

รายการใบรับรองสอบเทียบ/ทวนสอบ เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์ สำหรับวิเคราะห์คุณภาพสิ่งแวดล้อม

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
12	Incubator		Memmert	IPP 260 / V616.0066	Technology Promotion Association (Thailand-Japan)	23TM728	27 Apr 23	25 Apr 24	-
13	Water Bath	ฟิโคลโคลิฟอร์มแบคทีเรีย (FCB)	Memmert	WNE 14 / L416.0606	Technology Promotion Association (Thailand-Japan)	23TM193	15 Feb 23	14 Feb 24	-
14	Water Bath		Memmert	WNE 14 / L416.0612	Technology Promotion Association (Thailand-Japan)	23TM194	15 Feb 23	14 Feb 24	-
15	Analytical Balance		OHAUS	PX623 / C236754745	DKSH (Thailand) Ltd.	C01223732	9 Dec 22	8 Dec 23	-
16	Auto Clave		ALP	CL-40L / 808763	Technology Promotion Association (Thailand-Japan)	23TM763	27 Apr 23	25 Apr 24	-
17	UV-VIS Spectrophotometer	โครเมียมชนิดเฮกซะวาเลนท์(Cr6+)	Agilent Technologies	Cary60 G6860A / MY15410009	DQE Services Co.,Ltd.	SP23-021	20 May 23	18 May 24	-
18	UV-VIS Spectrophotometer		Hitachi	U-1900 / 2021-064	DQE Services Co.,Ltd.	SP23-007	6 Jan 23	5 Jan 24	-
19	Gas Chromatography - Mass Spectrometer (GC-MS)	BTEX	Agilent Technologies	System ID: CN17100005 Intovu 9000 (G3950A) / CN17100005 5977B MSD (G7077B) / US1715M030	Agilent Technologies (Thailand) Co.,Ltd.	Certificate of System Qualification GSMS-OQ	24 Apr 23	22 Apr 24	-
20	Gas Chromatography (GC)	Polycyclic Aromatics Hydrocarbon (PAH)	Agilent Technologies	System ID:CN11021007 7890 / CN11021007	Agilent Technologies (Thailand) Co.,Ltd.	Certificate of System Qualification GC-OQ	23 Feb 23	22 Feb 24	-

Due Date of Calibration* : Based on the annual calibration plan. At least 1 time per year.

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 Page 2 of 5

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	Fluke	22E1959	17 June 2023	
2.2 Digital Thermometer	2709007	Fluke	CC 650577-01	30 October 2023	
2.3 Thermo-Hygro Meter	NFI.BTH 007/18	PONPE 490	QR22-0586	26 April 2023	
Certified Reference Material		Lot No.	Manufacturer	Ref No.	Expiry Date
2.4 pH buffer 4.008 (Primary pH buffer Solution)		832006	CPAchem	PH216.L5	8 August 2024
2.5 pH buffer 6.865 (Primary pH buffer Solution)		832007	CPAchem	PH217.L5	8 August 2024
2.6 pH buffer 10.01 (Primary pH buffer Solution)		832009	CPAchem	PH220.L5	8 August 2023
2.7 pH buffer 7.00 (Standard pH buffer Solution)		832010	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-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0008
3.2 Instruments No.2.2	through	NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0061
3.3 Instruments No.2.3	through	NSC-TISI-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 nanovoltmeter. 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	BIM RefN HI-27 LotN 04.06.2021; BIM RefN HI-28 LotN 28.05.2021; BIM RefN HI-27 LotN 04.06.2021; BIM RefN HI-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

Calibration Results:
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	414.129	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	97.88	0.0075	2.00
10.008	10.01	-180	97.29	0.0095	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

Calibration Report

Certificate No.: 2301846-001-01
Equipment: Digital Thermometer with RTD
Resolution: 0.1 °C Model: SevenEasy TM 520 pH
Serial No.: 1231155210 ID No.: UAE.WAT.010/2553
Manufacturer: Mettler Toledo
Date of Calibration: 24 February 2023

Page 5 of 5

Calibration point: 15.0, 25.0 and 35.0 °C

Calibration result:

- The probe was immersed in liquid bath or dry bath to a minimum depth of 120 mm.
- Description of probe, model: - S/N: -
- Dimension of probe: Diameter 9 mm., Length 120 mm.,
- Sheath material: Stainless Steel

UUC* Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.1	15.015	- 0.1	0.11
25.0	25.014	0.0	0.11
35.1	35.016	- 0.1	0.11

Note

- UUC* : Unit Under Calibration

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

----- End -----

F-CS-012 Revision: 01 Date: 20-04-65



เอกสารไม่ควบคุม

Calibration Certificate

Certificate No.: 2302181-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 5

Equipment: pH Meter

Manufacturer: METTLER TOLEDO

Model: SevenEasy pH

Serial No.: 1230525212

ID No.: UAE.WAS.003/2553

Order No.: 2302181

Operation No.: 2302181-001

Date of Receipt: 14 March 2023

Date of Calibration: 24 March 2023

Calibrated by Mr.Pheraphat Tuanjit
Scientist

Approved by N. Niyomchart
(Mr.Nuttapol Niyomchart)
Specialist, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 24 March 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 National Food Institute. 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



เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2302181-001-01
Equipment: pH Meter
Resolution: 0.01 pH : 1 mV
Manufacturer: METTLER TOLEDO Model: SevenEasy pH
Serial No.: 1230525212 Type: Bench top
ID No.: UAE.WAS.003/2553

Date of Calibration: 24 March 2023

Location: Chemical Calibration Laboratory, National Food Institute

Environment Condition: Ambient Temperature: (23.4 ± 1.5) °C Relative Humidity: (52 ± 3) %

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	Fuke	22E1959	17 June 2023
2.2 Digital Thermometer	2709007	Fuke	CC-650557-01	30 October 2023
2.3 Thermo-Hygro Meter	NFLBTH003/17	PONPE	TE 650555-01	21 September 2023
Certified Reference Material	Lot No.	Manufacturer	Ref No.	Expires Date
2.4 pH buffer 4.008 (Primary pH buffer Solution)	873608	CPAchem	PH216.L5	16 February 2025
2.5 pH buffer 6.865 (Primary pH buffer Solution)	873609	CPAchem	PH217.L5	16 February 2025
2.6 pH buffer 10.01 (Primary pH buffer Solution)	873611	CPAchem	PH220.L5	16 February 2024
2.7 pH buffer 7.00 (Standard pH buffer Solution)	873612	CPAchem	PH107.L5	16 February 2024

3. This calibration is traceable to The International System of Unit (SI Unit)

- 3.1 Instruments No.2.1 through NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0008
- 3.2 Instruments No.2.2 through NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0061
- 3.3 Instruments No.2.3 through NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0061
- 3.4 Certified Reference Material No. 2.4 to 2.6 traceable to Primary measurement method- Harned cell using calibrated thermometer, barometer, and nanovoltmeter. 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 BIM Refn H-13 Lot# 25 05 2022; BIM Refn H-16 Lot# 02 06 2022; BIM Refn H-13 Lot# 25 05 2022; BIM Refn H-16 Lot# 02 06 2022, 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



เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2302181-001-01
Equipment: pH Meter
Resolution: 0.01 pH : 1 mV
Manufacturer: METTLER TOLEDO Model: SevenEasy pH
Serial No.: 1230525212 Type: Bench top
ID No.: UAE.WAS.003/2553

Date of Calibration: 24 March 2023

Calibration Results:

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	9.00	0.58	2.00
2	296.814	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	-296.811	-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.: 1156883 **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	187	-	0.0071	2.00
6.865	6.86	22	97.86	0.0075	2.00
10.010	10.01	-180	97.86	0.0066	2.00
6.985	6.99	14	-	0.0093	2.00

F-CS-012 Revision: 01 Date: 20-04-65



เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2302181-001-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: SevenEasy pH
Serial No.: 1230525212 ID No.: UAE.WAS.003/2553
Manufacturer: METTLER TOLEDO

Date of Calibration: 24 March 2023 Page 4 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature 25 °C ± 1 °C
Relative Humidity 55 % ± 5 %

Condition of this results of Calibration:

- 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	1521	A85997	TE 660039-01	10-Dec-23	NATIONAL FOOD INSTITUTE
Platinum Resistance Thermometer (PRT)	385	509201			

Support Equipment : - Low Temperature Bath (ISOCAL-6), Model: Europa-6 Plus Basic, S/N: 341592/2

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good
- Result of Calibration : ☒ Without adjustment ☐ After adjustment

F-CS-012 Revision: 01 Date: 20-04-65

N. Nigro

Calibration Report

Certificate No.: 2302181-001-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: SevenEasy pH
Serial No.: 1230525212 ID No.: UAE.WAS.003/2553
Manufacturer: METTLER TOLEDO

Date of Calibration: 24 March 2023 Page 5 of 5

Calibration point: 15.0, 25.0 and 30.0 °C
Calibration result:

- The probe was immersed in liquid bath or dry bath to a minimum depth of 120 mm.
- Description of probe, model : N/A S/N : N/A
- Dimension of probe : Diameter 3 mm., Length 120 mm., Sheath material : N/A

UUC* Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.2	14.999	- 0.2	0.12
25.2	24.999	- 0.2	0.12
30.2	29.999	- 0.2	0.12

Note

- UUC* : Unit Under Calibration

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

----- End -----

F-CS-012 Revision: 01 Date: 20-04-65

N. Nigro

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



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 Udomsuk 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. Nitinun 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 is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

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

บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 สุขุมวิท 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/certifto-thailand

เอกสารไม่ควบคุม

CAL-FM-C24-09: 12 Sep 2022

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

เอกสารไม่ควบคุม

บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 สุขุมวิท ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
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Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/certifto-thailand

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CAL-FM-C24-09: 12 Sep 2022

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: KSPR2304472

ชนิดเครื่องมือ: CONDUCTIVITY METER

รุ่น: Lab 955

หมายเลขเครื่อง: 16300356

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		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. สวิทช์ 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. อินดิเคโทรด (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. ขาจับอินดิเคโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
		Turbidimeter			
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่องสว่างของแสง (≥ 2.5 ไม่นเกิน 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
		Automatic titrator			
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาพ Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ: Electrode วัดอุณหภูมิได้ 25.1°C โดย Control Waterbath ที่ 25.0 \pm 0.1°C

Mr.Atachai Ngamchanat

Service Engineer

เอกสารไม่ควบคุม

DKSH Technology Limited
2533 Sukhumvit Road, Bangkok, Phrakhanong, Bangkok 10260
Phone: +66 2336 7000 Email: info.calibration@dksh.com Website: www.dksh.com/certification-thailand

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CAL-FM-R31-03: 20 Jul 2022



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



Cert.No.: 23MM113
Page: 1 of 3

Certificate of Calibration

Equipment : Electronic Balance
Manufacturer : Mettler Toledo
Model : XSR205
Serial No. : C210685394
ID No. : UAE.WAO.0102565
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phakhanong,
Bangkok 10260
Location : Balance Room
Received order : 26 April 2023
Calibration Date : 26 April 2023
Ambient Temperature : 15 °C to 40 °C
Relative Humidity : 30 % to 90 %
Calibrated by : Man Pattanapongpaiboon
Approved by :
() Pornthipha Tameyakul
() Maloo Butkruea
() Suwit Imjai
Issue Date : 2 May 2023

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2304-0459OC-2
Procedure used :-
Calibration was conducted using in-house calibration procedure CP-OB01 according to direct measurement method against standard weight.
Condition of this result of calibration
1. Reference standard instruments:-
Instruments Model Serial No. ID No. Test report No. Due date
1) Standard Weight Set (E2) 15884 24053 70RC007 MM-0010-22 20 Jan 2024
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This result of calibration was made on requested at the point specified by customer.
4. This certificate is not certified for any commercial transaction.
5. This certification is traceable to the International System of Unit.
Result of calibration () Without Adjustment (*) After Adjustment by Internal Calibration
Range capacity : 0 g to 81 g Resolution 0.00001 g
81 g to 220 g Resolution 0.0001 g
Before Adjustment :
Applied Weight Balance Reading Correction Measurement Uncertainty Coverage Factor
(g) (g) (g) (\pm mg) (k)
80 79.99992 +0.00008 0.15 2.00
200 199.9995 +0.0005 0.29 2.00
After Adjustment :
1. Determination of the standard deviation of weighing machine (n = 10)
Applied Weight Standard Deviation of Reading (g)
(g)
80 0.000007
200 0.00004

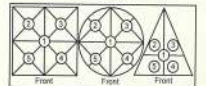
Cert.No.: 23MM113
Page: 2 of 3

เอกสารไม่ควบคุม



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2304-0459OC-2
Result of calibration
2. Effect of off center loading
A mass of 100 g was placed to various position on the pan.
The weighing machine reading error obtained is given in the table
Position 1 Position 2 Position 3 Position 4 Position 5
(g) (g) (g) (g) (g)
-0.0001 -0.0001 0.0000 -0.0001 -0.0001
3. Departure from nominal value
Applied Weight Balance Reading Correction Measurement Uncertainty Coverage Factor
(g) (g) (g) (\pm mg) (k)
Unload 0.00000 0.00000 0.014 2.11
0.05 0.04999 +0.00001 0.015 2.09
0.1 0.09999 +0.00001 0.015 2.07
1 1.00000 0.00000 0.018 2.04
5 5.00000 0.00000 0.026 2.00
20 20.00002 -0.00002 0.045 2.00
50 50.00002 -0.00002 0.080 2.00
80 80.00002 -0.00002 0.15 2.00
100 100.0000 0.0000 0.17 2.00
150 150.0000 0.0000 0.29 2.00
200 199.9999 +0.0001 0.29 2.00
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 %.

Cert.No.: 23MM113
Page: 3 of 3



Maximum difference between off-center and central loading (g)
0.0001

เอกสารไม่ควบคุม



Cert. No.: 22TM1490
Page: 1 of 3

Certificate of Calibration

Equipment: Hot Air Oven
Manufacturer: Memmert
Model: UF 55
Serial No.: B216.1666
ID No.: UAE.WAO.027/2559
Submitted by: United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location: Lab Floor 2
Received Order: 19 October 2022
Calibration Date: 19 October 2022
Ambient Temperature: (26 ± 10) °C
Relative Humidity: (50 ± 30) %
Calibrated by: Preecha Hiahib
Approved by:
() Pornthippa Tameyakul
() Malee Butkruea
(✓) Suwit Imjai

Issue Date: 31 October 2022

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม

A 0046800



Equipment: Hot Air Oven
Condition As-Received: Used Item
Reference: 2210-0575OC-1

Cert. No.: 22TM1490
Page: 2 of 3

Procedure Used :-

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY41021843	22LM4	10 Jan 2023

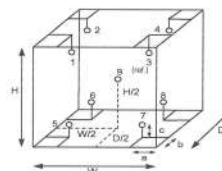
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- () Without Adjustment

Function of UUC*: Temperature Source

Fresh air setting: Close



Probe Installation Details:

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

Dimension of Chamber:

D = 0.33 m
W = 0.40 m
H = 0.40 m
Capacity = 0.053 m³

Environment during calibration		
	Beginning	Finished
Temp. (°C)	29	30
REL.Humid. (%)	47	40
AC Supply (Volt)	221	220

Ref. Std. ID No.: @ Calibration Point		
Position:	(104) °C	(140,180) °C
1	18-04RTD-01	21-04TC-01
2	18-04RTD-02	21-04TC-02
3	18-04RTD-03	21-04TC-03
4	18-04RTD-04	21-04TC-04
5	18-04RTD-05	21-04TC-05
6	18-04RTD-06	21-04TC-06
7	18-04RTD-07	21-04TC-07
8	18-04RTD-08	21-04TC-08
9 (ref.)	18-04RTD-09	21-04TC-09

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a 1133252



Equipment: Hot Air Oven
Condition As-Received: Used Item
Reference: 2210-0575OC-1
Result of Calibration:- () Without Adjustment
Function of UUC*: Temperature Source
Fresh air setting: Close

Cert. No.: 22TM1490
Page: 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
104.0	104.0	104.0	0.061	1.3	1.7	0.42	2
140.0	140.0	140.0	0.14	2.3	2.4	1.1	2
180.0	180.0	180.0	0.21	3.5	3.6	1.3	2

Calibration Point (°C)	Measured Temperature (°C)								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
104.0	103.076	103.876	103.777	104.124	104.667	104.426	104.012	103.928	104.370
140.0	138.199	139.189	138.808	139.550	140.266	139.622	139.293	139.385	140.369
180.0	177.930	179.267	178.643	179.753	181.011	180.093	179.496	179.743	181.278

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

Temperature stability: One-half of the greatest maximum difference of measured temperature at any one sensor

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

Overall Variation: The Difference of the maximum and minimum measured temperatures throughout observation UUC* : Unit Under Calibration

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

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

-o0o-

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a 1133251



อุตสาหกรรมพัฒนาผลิตภัณฑ์อาหาร
ศูนย์บริการข้อมูลและวิชาการอุตสาหกรรมอาหาร
Foundation for Industrial Development National Food Institute
Food Industrial Laboratory Service Center



Calibration Certificate

Certificate No.: 2302827-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong, Bangkok 10260

Page 1 of 4

Equipment: Electronic Balance

Manufacturer: METTLER TOLEDO

Model: XSR204

Serial No.: C117635043

ID No.: UAE.WAS.012/2564

Order No.: 2302827

Operation No.: 2302827-001

Date of Receipt: 10 May 2023

Date of Calibration: 10 May 2023

Calibrated by Mr. Manas Somsak
Specialist

Approved by
(Mr. Pheraphat Tuanjit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 18 May 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

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Request No. 25-66 / 0323

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MTC. ACL. No. 387 / 66

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	0.0001	-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

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

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	0.2235	0.2235	0.2231	0.2251	0.2240	0.224	0.0007	0.33
	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
Cr	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
	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
Cu	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	0.63
	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	0.0441	0.0446	0.0444	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
	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
Mn	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
	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
Ni	1.00	0.0997	0.1006	0.1006	0.0996	0.0996	0.0998	0.1007	0.1000	0.1013	0.0999	0.100	0.0006	0.55
	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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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

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Request No. 25-66 / 0323

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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. Dani Srithongkum

(Mr. Danai Srithongkum)

2. Atipat

(Mr. Atipat Ratana)

Approved by Sal Suttadde Deawong

(Miss Suttadde 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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Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist

Agilent Preventive Maintenance provides factory recommended service for your analytical systems to assure reliable operation and the accuracy of your results. Delivered by highly-trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak.

For more information about Agilent Technologies services please visit our web site using the following URL: <http://www.agilent.com/en-us/services/analytical-instrument-services>

Customer Information

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

Service Engineer's Responsibilities

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

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Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist

System Information

Instrument system name and ID	ICP 5110 VDV
Instrument system site and location	UAE / 3rd Floor Laboratory
List system component product numbers	List the serial numbers of each component
1. G 8015 A	1. MY 18030001
2. G 8015 A	2. 1801-01988
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

ICP-OES Configuration table	Circle the type or write in the type if other
Nebulizer Type	SeaSpray (OneNeb) other
Spray Chamber	Cyclonic Single Pass Cyclonic Double Pass other
Torch	Radial (Dual View) other
Injector Diameter	2.4mm 1.8mm 1.4mm 0.8mm other
Injector Material	Quartz (Ceramic) other

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Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist

General Preparation

- Discuss any specific questions or issues with the customer prior to starting.
- Review the instrument logbook.
- Perform general external inspection of system for cleanliness.
- Check for proper installation of safety-related parts, assemblies, sensors etc.
- Check for required firmware/software updates and verify with customers if they would like it installed.
- For HF application systems, if standard sample introduction system was not installed, ask the customer to install it. *N/A*
- Run Instrument Performance test and record results in Instrument Performance Test Results Table - Pre PM.

Inspect and clean the 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. *N/A*
- Remove and clean instrument water inlet filter.

G8481A Cooling water system

- Section NOT Applicable
- Drain cooling fluid and remove any particles from the chiller reservoir
- Remove, clean and reinstall water inlet metal mesh filter.
- Re fill with Polyclear cooling fluid.
- Clean the cooling system Air filter and the condenser by compressed air or vacuum cleaner.

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Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

SPS 3 Auto Sampler

- ☒ Section 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

- ☒ Section 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

AVS 4, 6, 7

- ☒ Section 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

Instrument Adjustment

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.
- ☒ Run Instrument Performance Test and 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 and record the result in the Instrument Test Results Table
 - ☒ Subsystem Communications Test
 - ☒ Air Flow

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Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

- ☒ Water Flow
- ☒ Gas Flows
- ☒ RF Generator
- ☒ Camera Test
- ☒ Optics Test
- ☒ Nebulizer Test

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	4100.6	8364.8	4375.0	8400.8
Mn 257.610 nm SRBR	11064.7	31842.1	12801.7	30946.2
Al 396.152 nm SBR	7.5	14.9	9.9	16.8
K 766.491 nm SBR	5.1	36.8	6.4	29.7

* 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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Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

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	224.540	VAC	217.913	VAC
Mains Current	0.204	A	0.184	A
Instrument Temperature	22.8	°C	22.7	°C
RF Air Flow (sensor speed)	15.0	Hz	13.0	Hz
Plasma Exhaust Temperature	No measurement		26.7	°C
Water Flow Oscillator	No measurement		1.64	L/min
Water Flow Detector	1.06	L/min	1.06	L/min
Water Inlet Temperature	18.0	°C	18.0	°C
Polychromator Temperature	35.0	°C	35.0	°C
CCD Temperature	-33.8	°C	-33.8	°C
Thermal Stabilizer	35.0	°C	35.0	°C
Argon Supply Pressure	671.34	kPa	627.33	kPa
Purge Gas Supply Pressure*1	674.30	kPa	645.40	kPa
Option Gas Supply Pressure*1	N/A	kPa	N/A	kPa
Nebulizer Flow	No measurement		0.70	L/min
Nebulizer Back Pressure	No measurement		164.63	kPa
Plasma Gas Flow	No measurement		11.92	L/min
Auxiliary Gas Flow	No measurement		1.00	L/min
RF Power	No measurement		1200	W
RF Supply Current	No measurement		8.663	A
RF Supply Voltage	No measurement		184.660	V

*1 If option installed

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เอกสารไม่ควบคุม

Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

ICP-OES Parts List Table

Part description	Part Number	Product /Model # where used	Quantity Consumed
Axial Pre-Optic Window	G8010-68014	G8010A, G8011A, G8014A/G8015A	1
Radial Pre-Optic Window	G8010-68015	All	1
Polyclear Cooling Fluid	G3292-80010	G8481A	
Purge Gas Filter	G8010-680136	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 engineers 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	

Restore system

For HF applications, ask the customer to reinstall their sample introduction system.

Leave system in an idle state: on and purging.

Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section below if there are additional comments.

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**Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist**

- ☒ Review the service and any test results with the customer.
- ☒ If the Instrument firmware was updated, record the details of the change in the Service Engineer's Comments box below or if necessary, in the customer's IQ records.

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.

Other Important Customer Web Links

How to get information on your product:

- ☒ Literature Library - <http://www.agilent.com/en-us/products/icp-oes/icp-oes-systems/5110-icp-oes#literature>
- ☒ Need to know more? - <http://www.agilent.com/crosslab/university/>
- ☒ Need technical support, FAQs? - <http://www.agilent.com/en-us/support/landing/icp-oes>
- ☒ Need supplies? - www.agilent.com/chem/supplies

Service Completion

Service request number 6005625287 Date service completed 30 Nov 2022

Agilent signature Woravit T. Customer signature [Signature]

Document part number: G8014-90075

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เอกสารไม่ควบคุม

Report Summary

Instrument Model Agilent 5100/5110 VDV ICP-OES
Instrument ID G8011A/G8015A
Instrument Serial Number MY18030001
Software Version 7.3.1.9507
Firmware Version 3442
Tested By Test Before PM
Test Completed On 11/30/2022 9:35:32 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	Pass
Precision Test	Pass

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เอกสารไม่ควบคุม

Resolution Test Pass

Element Wavelength	Specification	Width
N (174.213 nm)	≤ 9.40	6.62
As (188.980 nm)	≤ 8.20	6.20
C (193.027 nm)	≤ 11.50	8.35
Mo (202.032 nm)	≤ 8.20	6.41
Cr (206.158 nm)	≤ 13.40	9.04
Zn (213.857 nm)	≤ 8.70	6.62
Pb (220.353 nm)	≤ 9.50	7.13
Co (228.615 nm)	≤ 17.20	11.71
Ba (230.424 nm)	≤ 9.40	7.21
Mn (257.610 nm)	≤ 13.30	9.50
Mn (260.568 nm)	≤ 20.30	14.33
Cr (267.716 nm)	≤ 11.00	8.14
Cu (324.754 nm)	≤ 25.00	18.98
Cu (327.395 nm)	≤ 14.20	11.24
Sr (338.071 nm)	≤ 33.50	24.47
Ba (455.403 nm)	≤ 44.00	33.88
Sr (460.733 nm)	≤ 36.00	17.22
Ba (493.408 nm)	≤ 36.00	25.48
Ba (614.171 nm)	≤ 42.00	25.47
Ar (675.283 nm)	≤ 74.00	59.82
K (766.491 nm)	≤ 80.00	64.94

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เอกสารไม่ควบคุม

Sensitivity Test Pass

Radial					
Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 46.0	SRBR	147.7	1156.5	55.5
Se (196.026 nm)	≥ 41.0	SRBR	111.1	1195.3	97.7
Zn (213.857 nm)	≥ 1421.0	SRBR	4100.6	51959.5	159.6
Pb (220.353 nm)	≥ 46.0	SRBR	192.5	2808.6	185.7
Mn (257.610 nm)	≥ 3518.0	SRBR	11064.7	264165.0	567.6
Al (396.152 nm)	≥ 3.4	SBR	7.5	49047.9	5770.5
Ba (493.408 nm)	≥ 34.0	SBR	107.4	1887710.3	17407.5
K (766.491 nm)	≥ 1.8	SBR	5.1	100805.9	16626.4
Axial					
Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 208.0	SRBR	234.9	3056.4	152.9
Se (196.026 nm)	≥ 159.0	SRBR	218.1	3865.1	271.6
Zn (206.200 nm)	≥ 234.0	SRBR	1306.5	15850.4	144.5
Zn (213.857 nm)	≥ 1743.0	SRBR	8364.0	183037.8	476.4
Cd (214.439 nm)	≥ 4227.0	SRBR	7718.5	143240.2	342.8
Pb (220.353 nm)	≥ 320.0	SRBR	576.3	14465.2	580.4
Mn (257.610 nm)	≥ 10625.0	SRBR	31842.1	1411257.3	1958.9
Cr (267.716 nm)	≥ 1048.0	SRBR	4492.1	183110.6	1632.2
Cu (324.754 nm)	≥ 19.0	SBR	46.2	371487.5	7862.9
Al (396.152 nm)	≥ 6.0	SBR	14.9	278447.4	17552.6
Ba (493.408 nm)	≥ 60.0	SBR	190.6	10061527.3	52519.8
K (766.491 nm)	≥ 24.0	SBR	38.8	1922163.4	50858.1

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เอกสารไม่ควบคุม

Precision Test			Pass
Radial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 2.60	0.82	
Se (196.026 nm)	≤ 2.60	0.71	
Zn (213.857 nm)	≤ 1.50	0.43	
Pb (220.353 nm)	≤ 2.60	0.76	
Mn (257.610 nm)	≤ 1.50	0.60	
Al (396.152 nm)	≤ 1.50	0.48	
Ba (493.408 nm)	≤ 1.50	0.89	
K (766.491 nm)	≤ 1.50	0.42	
Axial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 1.50	0.57	
Se (196.026 nm)	≤ 1.50	0.76	
Zn (206.200 nm)	≤ 1.50	0.61	
Zn (213.857 nm)	≤ 1.50	0.51	
Cd (214.439 nm)	≤ 1.50	0.55	
Pb (220.353 nm)	≤ 1.50	0.52	
Mn (257.610 nm)	≤ 1.50	0.54	
Cr (267.716 nm)	≤ 1.50	0.54	
Cu (324.754 nm)	≤ 1.50	0.69	
Al (396.152 nm)	≤ 1.50	0.91	
Ba (493.408 nm)	≤ 1.50	0.85	
K (766.491 nm)	≤ 1.50	1.22	

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เอกสารไม่ควบคุม

Report Summary		
Instrument Model	Agilent 5100/5110 VDV ICP-OES	
Instrument ID	G8011A/G8015A	
Instrument Serial Number	MY18030001	
Software Version	7.3.1.9507	
Firmware Version	3442	
Tested By	PM Functional test	
Test Completed On	11/30/2022 11:43:36 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)	75% Air Flow (relative speed)	
14.00	19.00	
Water Flow Test	Pass	
RF Water Flow(L/min)	Camera Water Flow (L/min)	Water Inlet Temperature (°C)
1.44	1.05	18.51

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เอกสารไม่ควบคุม

Gas Flows Test			Pass		
Nebulizer Target Flow	Actual Flow	Back Pressure	Auxiliary Target Flow	Actual Flow	Back Pressure
0.70	0.70	163.37	2.00	1.99	108.49
Makeup Target Flow	Actual Flow	Back Pressure	Plasma Target Flow	Actual Flow	Back Pressure
2.00	2.00	112.85	18.00	17.91	23.46
RF Generator Test			Pass		
RF Power Supply Test	Passed				
RF Power Supply (V)	147.437				
RF Oscillator Test	Passed				
RF Oscillator Frequency (MHz)	0.000				
Work Coil Current (A)	45.069				
RF Power Supply Current (A)	1.997				
Camera Test			Pass		
	Integration Time (ms)	Standard Deviation	Status		
Electronic Offset Test	1000	5.305	Passed		
Dark Current Test	6000	0.578	Passed		
Array Test	5	0.024	Passed		
Linearity Test		0.118	Passed		

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เอกสารไม่ควบคุม

Report Summary	
Instrument Model	Agilent 5100/5110 VDV ICP-OES
Instrument ID	G8011A/G8015A
Instrument Serial Number	MY18030001
Software Version	7.3.1.9507
Firmware Version	3442
Tested By	PM Performance test
Test Completed On	11/30/2022 12:10:42 PM
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	Pass
Advanced Valve System Test	Skipped
Resolution Test	Pass
Sensitivity Test	Pass
Precision Test	Pass
Optics Test	Pass

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เอกสารไม่ควบคุม

Resolution Test			Pass
Element Wavelength	Specification	Width	
N (174.213 nm)	≤ 9.40	6.79	
As (188.980 nm)	≤ 8.20	6.09	
C (193.027 nm)	≤ 11.50	8.29	
Mo (202.032 nm)	≤ 8.20	6.30	
Cr (206.158 nm)	≤ 13.40	9.05	
Zn (213.857 nm)	≤ 8.70	6.77	
Pb (220.353 nm)	≤ 9.50	7.02	
Co (228.615 nm)	≤ 17.20	11.67	
Ba (230.424 nm)	≤ 9.40	7.39	
Mn (257.610 nm)	≤ 13.30	9.48	
Mn (260.568 nm)	≤ 20.30	14.25	
Cr (267.716 nm)	≤ 11.00	7.94	
Cu (324.754 nm)	≤ 25.00	18.99	
Cu (327.395 nm)	≤ 14.20	11.33	
Sr (338.071 nm)	≤ 33.50	24.44	
Ba (455.403 nm)	≤ 44.00	33.86	
Sr (460.733 nm)	≤ 36.00	17.51	
Ba (493.408 nm)	≤ 36.00	25.56	
Ba (514.171 nm)	≤ 42.00	24.96	
Ar (675.283 nm)	≤ 74.00	59.38	
K (766.491 nm)	≤ 80.00	65.63	

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เอกสารไม่ควบคุม

Sensitivity Test						Pass
Radial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 46.0	SRBR	147.8	1149.3	54.8	
Se (196.026 nm)	≥ 41.0	SRBR	111.6	1222.8	101.0	
Zn (213.857 nm)	≥ 1421.0	SRBR	4375.0	52592.3	143.7	
Pb (220.353 nm)	≥ 46.0	SRBR	199.8	2744.4	166.5	
Mn (257.610 nm)	≥ 3518.0	SRBR	12801.7	285591.3	496.0	
Al (396.152 nm)	≥ 3.4	SBR	9.9	52888.6	4873.6	
Ba (493.408 nm)	≥ 34.0	SBR	154.6	2287291.6	14698.1	
K (766.491 nm)	≥ 1.8	SBR	6.4	106701.6	14350.9	
Axial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 208.0	SRBR	242.4	3170.1	154.8	
Se (196.026 nm)	≥ 159.0	SRBR	226.1	4134.5	289.3	
Zn (206.200 nm)	≥ 234.0	SRBR	1126.6	13782.0	146.5	
Zn (213.857 nm)	≥ 1743.0	SRBR	8400.8	177166.3	442.5	
Cd (214.439 nm)	≥ 4227.0	SRBR	7001.9	125884.2	321.6	
Pb (220.353 nm)	≥ 320.0	SRBR	536.3	12909.3	532.6	
Mn (257.610 nm)	≥ 10625.0	SRBR	30846.2	1287989.0	1738.8	
Cr (267.716 nm)	≥ 1048.0	SRBR	4396.0	167335.6	1424.4	
Cu (324.754 nm)	≥ 19.0	SBR	52.1	373690.7	7033.1	
Al (396.152 nm)	≥ 6.0	SBR	16.8	268357.7	15112.4	
Ba (493.408 nm)	≥ 60.0	SBR	225.2	10173441.5	44971.7	
K (766.491 nm)	≥ 24.0	SBR	39.7	1874136.2	46055.7	

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Precision Test			Pass
Radial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 2.60	0.60	
Se (196.026 nm)	≤ 2.60	0.84	
Zn (213.857 nm)	≤ 1.50	0.29	
Pb (220.353 nm)	≤ 2.60	0.59	
Mn (257.610 nm)	≤ 1.50	0.28	
Al (396.152 nm)	≤ 1.50	0.28	
Ba (493.408 nm)	≤ 1.50	0.59	
K (766.491 nm)	≤ 1.50	0.23	
Axial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 1.50	0.71	
Se (196.026 nm)	≤ 1.50	0.43	
Zn (206.200 nm)	≤ 1.50	0.46	
Zn (213.857 nm)	≤ 1.50	0.37	
Cd (214.439 nm)	≤ 1.50	0.48	
Pb (220.353 nm)	≤ 1.50	0.48	
Mn (257.610 nm)	≤ 1.50	0.74	
Cr (267.716 nm)	≤ 1.50	0.26	
Cu (324.754 nm)	≤ 1.50	0.51	
Al (396.152 nm)	≤ 1.50	0.45	
Ba (493.408 nm)	≤ 1.50	0.81	
K (766.491 nm)	≤ 1.50	0.84	

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เอกสารไม่ควบคุม

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
334/4 PATTANAKARN ROAD SOI 18, SUANLIANG, SUANLIANG BANGKOK 10250
TEL. 0-2717-3000-29 FAX. 0-2719-9484

Cert. No.: 23TM249
Page : 1 of 3

Certificate of Calibration

Equipment :	BOD Incubator
Manufacturer :	Arco
Model :	UC4-1320
Serial No. :	13URC4S013201
ID No. :	UAE.WAO.015/2561
Submitted by :	United Analyst and Engineering Consultant Co., Ltd. 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Location :	Lab Floor 2
Received Order :	15 February 2023
Calibration Date :	15 February 2023
Ambient Temperature :	(26 ± 10) °C
Relative Humidity :	(50 ± 30) %
Calibrated by :	Preecha Hiahib
Approved by :	 Approved Signatory
	() Pornthippa Tameyakul (✓) Malee Butkrusa () Suwit Imjai
Issue Date :	24 February 2023

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม

A 0051476



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2302-0297OC-1
Procedure Used :-

Cert. No.: 23TM249
Page : 2 of 3

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY57013711	22LM93	02 Jul 2023

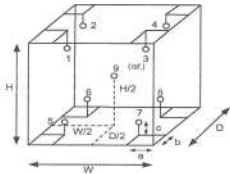
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available



Probe Installation Details :

Dimension of Chamber :	
a = 10 cm	D = 0.62 m
b = 10 cm	W = 1.2 m
c = 10 cm	H = 1.2 m
	Capacity = 0.89 m ³

Environment during calibration		
	Beginning	Finished
Temp. (°C)	29	31
REL.Humid. (%)	63	67
AC Supply (Volt)	220	220

Position :	Ref. Std. ID No.:
1	22-18RTD-2/1
2	18RTD-2/2
3	18RTD-2/3
4	18RTD-2/4
5	18RTD-2/5
6	18RTD-2/6
7	18RTD-2/7
8	18RTD-2/8
9 (ref.)	18RTD-2/9

เอกสารไม่ควบคุม

a 1149547



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2302-0297OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 23TM249
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
20.0	20.0	19.3	0.32	0.57	1.0	0.60	2

Calibration Point (°C)	Measured Temperature (°C)								
	1	2	3	4	5	6	7	8	9 (ref.)
20.0	20.086	19.916	20.386	19.976	19.973	19.838	19.837	19.821	19.949

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

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

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

UUC* : Unit Under Calibration

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

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

-o0o-

เอกสารไม่ควบคุม

a 1149512



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



Cert. No.: 23TM375
Page : 1 of 3

Certificate of Calibration

Equipment : BOD Incubator

Manufacturer : ARCO

Model : UR-1320

Serial No. : -

ID No. : UAE.WAO.018/2551

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

Location : Lab Floor 2

Received Order : 11 April 2023

Calibration Date : 12 April 2023

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Krisda Malee

Approved by :
Approved Signatory

() Pornthippa Tameyakul

(✓) Malee Butkruea

() Suwit Imjai

Issue Date : 24 April 2023

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม

A 0053360



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2304-0156OC-2
Procedure Used :-

Cert. No.: 23TM375
Page : 2 of 3

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY59003411	22LM165	26 Nov 2023

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

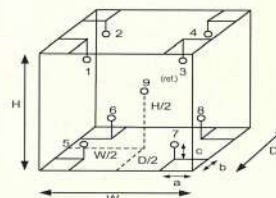
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	28	27
REL.Humid. (%)	42	45
AC Supply (Volt)	219	220



Probe Installation Details :

Dimension of Chamber :	
a = 10 cm	D = 0.62 m
b = 10 cm	W = 1.2 m
c = 10 cm	H = 1.2 m
	Capacity = 0.89 m ³

Position :	Ref. Std. ID No.:
1	20RTD-2/1
2	20RTD-2/2
3	20RTD-2/3
4	20RTD-2/4
5	20RTD-2/5
6	20RTD-2/6
7	20RTD-2/7
8	20RTD-2/8
9 (ref.)	20RTD-2/9

เอกสารไม่ควบคุม

a 1158259



Equipment : BOD Incubator
 Condition As-Received : Used Item
 Reference : 2304-0156OC-2
 Result of Calibration : () Without Adjustment
 Function of UUC* : Temperature Source
 Fresh air setting : Not Available

Cert. No.: 23TM375
 Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
20.0	20.0	20.0	0.48	0.42	1.2	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	20.040	20.170	20.263	20.093	19.749	19.704	19.920	20.191	20.020	0.66

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

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

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

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

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

-000-

เอกสารไม่ควบคุม

a 1158258

DMA-80 Direct Mercury Analyzer SERVICE PROTOCOL REPORT

To be filled in before service visit (1st page)

Customer information:

Company: บริษัท อุตสาหกรรม อุตสาหกรรม จำกัด
 Department: Lab
 Person in charge: นาย อดิศักดิ์
 Address: 2 หมู่ 10 ถนนสาย 42 km 1 นครราชสีมา
 Tel.:
 E-mail:

Technical data:

Unit Serial Number: 11020992
 Terminal type or USB-640 Gateway: Terminal 640 SN 1012000001
 Software, type and revision: Easy control Rev. 02.0
 Air Compressor (if present): - SN -
 Gas system pump (if present): - SN -
 Installation and last maintenance dates: Inst on: Maint on:

NOTE: after achievement of the following protocol a filled and signed copy of this report has to be sent to Milestone srl at: service@milestonesrl.com

For the best result of the test below we recommended to use the Milestone DMA-80 Service Kit (PN DMA-SKIT).

1

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1. VISUAL INSPECTION

	Good	Damaged	Corroded/Dirty
External chassis	✓		
Inside	✓		
Electric parts	✓		
Screws	✓		

2. ELECTRICAL SAFETY TEST

Using a suitable testing device check the below reported parameters and take note of the results.

Parameter	Result	OK	Not OK
Insulating resistance: $R_{iso} \geq 0.5 M\Omega$	Actual value: 22.1 MΩ	✓	
Grounding resistance: $R_{RE-S} < 100 m\Omega$	Actual value: 0.6 MΩ	✓	

3. PRESSURE CHECK

	Oxygen (purity O ₂ > 99.95%)	Milestone air compressor
Gas carrier	Oxygen Purity: 99.99%	-

The pressure at the supply source manometer should be approx. 4.0 bar
 The flow rate depends by type of cuvette installed on the DMA-80 unit.



	Correct value	Actual value	Final value	Correct value	Actual value	Final value	Correct value	Actual value	Final value
Inlet pressure	3.1 bar	-	-	3.1 bar	-	-	3.1 bar	3.1 bar	Pass
Flow rate	10-12 l/h	-	-	8-10 l/h	-	-	6-8 l/h	7.1 l/h	Pass

Check all possible leakage points and their conditions:

	Good	Damaged	Corroded
Tubing	✓		
Silicon joints	✓		
O-rings	✓		
Cuvette sealing O-rings	✓		
Gas connections	✓		
Valves	✓		
Sample boat carrier	✓		
Catalyst flange	✓		

2

เอกสารไม่ควบคุม

4. AUTOSAMPLER SYSTEM

	OK	Not OK	Re-Adjusted
Calibration of autosampler motor	✓		
Cylinders alignment	✓		

	Fast	Slow	Normal
Speed of pneumatic cylinders			✓

Using the maintenance grease, periodically lightly lubricate all exposed steel rods of the horizontal and vertical cylinders.

5. COMPONENTS CHECK

Conditions of the different parts used/installed on DMA unit:

	OK	Not OK	Replaced	Cleaned
Catalyst tube	✓			
Amalgamator	✓			
Quartz boats	✓			
Nickel boats	-			
Autosampler plate	✓			
Gas kit accessories	-			

6. TEMPERATURES

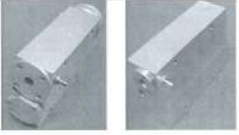

	Correct value	Actual value	Final value
Drying/ Decomposition furnace	If controlled by Infrared sensor 850°C ± 10°C If controlled by thermocouple 650°C ± 10°C	-	-
Catalyst furnace	615°C ± 10°C	650 d	Pass
Amalgamator stand by temperature	170°C ± 10°C	170 d	Pass
Amalgamator heating temperature	850°C ± 10°C	850 d	Pass
Cuvette	125°C ± 5°C	125 d	Pass

7. SPECTROMETER

3

เอกสารไม่ควบคุม

The spectrometer can be equipped with a single beam system (ducon lamp) or with a dual beam system (tricon lamp)

Old cuvette type						Actual cuvette type					
											
Gain			Offset			Gain			Offset		
Correct value	Actual value	Final value	Correct value	Actual value	Final value	Correct value	Actual value	Final value	Correct value	Actual value	Final value
3.96VDC	-	-	0.015VDC	-	-	3.96VDC	2.0V	3.96VDC	0.015VDC	0.015VDC	0.015VDC
	-	-	0.005VDC	-	-		-	-		-	-

(*)The recommended Hg lamp operating signal should be around 3,96VDC (for detector 2) and 3,93VDC (for detector 1).

	OK	Not OK
Conditions of the spectrometer system	✓	
Alignment between lamp, cuvette and detector	✓	
Cuvette cleaning (glass windows, sealing O-rings...)	✓	
Lamp intensity	✓	
Operation of the mechanical shutter (if present)	✓	

8. MILESTONE AIR COMPRESSOR

Maintenance	OK	Date last service
Drain (compressor)		
Replacing air filters (air filter)		
Check sealing connections		

9. PARTS TO BE REPLACED

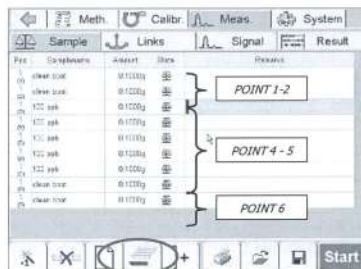
PN	DESCRIPTION	Replaced	Not
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4

เอกสารไม่ควบคุม

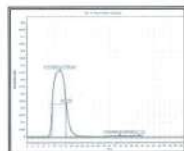
5

เอกสารไม่ควบคุม



Now, it is possible to evaluate:

- Peaks



- The shape of the peak must be regular.
- The distance between Peak Cell 1 and Peak Cell 2 must be between 11 to 15 seconds.

- Results



- The obtained absorbance (height) of the Blank must be < 0.0020.
- The obtained absorbance (height) must be > 0.42 for each 100ppb analysis (0.22 with cuvette installed until December 2005, DMA s/n 05120292.)
- The relative standard deviation (rsd) is < 1.5 %.
- After two blanks (after 10ng measurements), the absorbance is < 0.0020.

- Temperatures & signal profiles

6

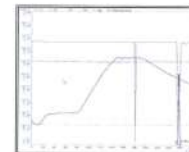
เอกสารไม่ควบคุม

		Not	Replaced
DMA8133	Catalyst tube: 6 months if the unit runs daily, 1 year if the unit is used rarely. In case of analysis of sample with high organic concentration the lifetime of the catalyst can be less than 6 months.		✓
DMA8134	Amalgamator: 6 months if the unit runs daily, 1 year if the unit is used rarely.		✓
DMA8195A	Hg lamp tri-cell (model 2011) (for kit p/n DMA8355): 2 years	-	-
DMA8137	Hg lamp dual-cell: 2 years		✓
70200	Hg trap 1 year		✓
DMA8058/B	Amalgamator coil 1 year or as soon as the heating is not more homogeneous.		✓
DMA8142	Nickel sample boats (set of 40pcs) 2 years if strongly used, replace after 1 year	-	-
DMA8347	Quartz sample boats (set of 10pcs) 4 years		✓
DMA8335	Metal sample boat carrier 2 years		✓
SL0108	PU-tube diam. 6/4 mm for internal O ₂ /air supply 2 years		✓
SO0376D	Heating coil for drying/decomposition 2 years		✓

10. TESTING PROCEDURE

It consists to run some measurements for the evaluation of the analytical performance of the unit, like: absorbance, peaks shape, temperatures, lamp signal and verify the proper working of whole system.

- Run minimum 2 blanks on the same sample boat (quartz if possible) in manner to clean it
- Run blanks until absorbance value (Height) decrease under 0.0020
- Set a fresh and stabilized 100µg/L Hg standard according to the prescriptions reported on the DMA80 User Manual. The quality of the used standard is fundamental for the success of the entire procedure
- Weight approximately 100µg of the fresh 100µg/L - Standard (10ng) and start the analysis as a single measurement mode
- Repeat five times the test
- Run again two blanks measurements



- The Hg lamp signal must be between 3.8 and 4.5V and stable. A few minutes after the start of the analysis the lamp does switch off because of the zero detection but then it instantly returns to the original condition. In case of Tricell configuration two green colour graphics are reported. After the zero shuttering the time necessary to return to full signal is longer on Tricell compare to Ducon lamp.
- During the run the catalyst oven temperature must be stable around to 615°C.
- The drying and ashing furnace must be follow the set temperature method.
- During the run the Amalgamator furnace temperature must be stable at the stand by temperature (170°C). Then at the release step it must raise up to 850/900°C.
- The Cuvette temperature must be stable at approximately 125°C.
- The Hg absorbance peaks must be correctly detected and reported.

11. FINAL REPORT

All screws inserted and tightened	Pass
All tubing sealing connections checked, cleaned or replaced and tightened	Pass
All heating elements are working	Pass
Sensors installed, checked and tightened	Pass
Safety devices (thermo switch) fully checked	Pass
All exhaust and cooling fans are functioning	Pass
Testing procedure successfully passed	Pass
Necessary tools available at customer's site	Pass
Last revision of User Manual available at customer's site	Pass
Advised customer about care and maintenance instructions	Pass

Remarks:

7

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

Working hours of Service Engineer	
-----------------------------------	--

Date	Service Engineer Name	Signature
๑๖/๑๑/๒๕		

Laboratory Manager / Operator acceptance signature:	
---	--

8

เอกสารไม่ควบคุม

DQE Services 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. : SP23-021		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 : Agilent Technologies		
Model : Cary 60		
Serial No. : MY15410009		
ID No. : N/A		
Received Date : 20 May 2023		
Calibration Date : 20 May 2023		
Issue Date : 23 May 2023		
Condition Instrument : Good		
Calibrated by :  (Mr. Tanawut Rittidach) Technical Manager		Approved by :  (Ms. Chonthicha Sangnorn) 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.		


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DQE Services 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. : SP23-021		Page 2 of 5	
Environment Condition : Ambient Temperature 25 ± 5 °C			
Relative humidity 55 ± 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 Starna Scientific Limited			
Spectral Band Width of UUC : 1.5 nm.			
Scan Speed of UUC : 60 nm/min			
Scan Interval of UUC : 0.15 nm.			
Resolution of UUC : Photometric 0.0001 Abs.			
Wavelength 0.1 nm.			

FM-708-02 R01 1/11/2021

เอกสารไม่ควบคุม

DQE Services 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. : SP23-021		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	0.0000	0.0000	0.0028	2.00
	0.5787	0.5742	0.0045	0.0031	2.00
	1.0490	1.0423	0.0067	0.0029	2.00
	2.1900	2.1847	0.0053	0.0075	2.00
440	0.0000	0.0000	0.0000	0.0028	2.00
	0.5607	0.5577	0.0030	0.0034	2.00
	1.0247	1.0234	0.0013	0.0035	2.00
	2.1229	2.1171	0.0058	0.0088	2.00
465	0.0000	0.0000	0.0000	0.0028	2.00
	0.5236	0.5184	0.0052	0.0029	2.00
	0.9634	0.9607	0.0027	0.0029	2.00
	1.9763	1.9715	0.0048	0.0081	2.00
546.1	0.0000	-0.0001	0.0001	0.0028	2.00
	0.5191	0.5159	0.0032	0.0031	2.00
	1.0003	0.9980	0.0023	0.0033	2.00
	1.9987	1.9917	0.0070	0.0087	2.00
590	0.0000	0.0000	0.0000	0.0028	2.00
	0.5523	0.5501	0.0022	0.0030	2.00
	1.0809	1.0808	0.0001	0.0030	2.00
	2.0391	2.0336	0.0055	0.0081	2.00
635	0.0000	0.0000	0.0000	0.0028	2.00
	0.5601	0.5585	0.0016	0.0031	2.00
	1.0512	1.0485	0.0027	0.0030	2.00
	1.9294	1.9317	-0.0023	0.0083	2.00


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DQE Services Co.,Ltd.

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Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



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CALIBRATION 0454

REPORT OF CALIBRATION

Certificate No. : SP23-021

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Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.0000	0.0000	0.0050	2.00
	0.7478	0.7436	0.0042	0.0058	2.00
257	0.0000	0.0000	0.0000	0.0050	2.00
	0.8686	0.8648	0.0038	0.0064	2.00
313	0.0000	0.0000	0.0000	0.0050	2.00
	0.2912	0.2908	0.0004	0.0052	2.00
350	0.0000	0.0000	0.0000	0.0050	2.00
	0.6448	0.6398	0.0050	0.0058	2.00


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CALIBRATION 0454

REPORT OF CALIBRATION

Certificate No. : SP23-021

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Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.72	242.0	-0.28	0.18	2.00
279.45	279.5	-0.05	0.18	2.00
287.81	287.5	0.31	0.18	2.00
334.06	333.5	0.56	0.18	2.00
360.93	360.3	0.63	0.18	2.00
418.59	418.0	0.59	0.18	2.00
445.94	445.3	0.64	0.18	2.00
453.66	453.0	0.66	0.18	2.00
460.02	459.6	0.42	0.18	2.00
536.59	536.4	0.19	0.18	2.00
637.98	638.3	-0.32	0.18	2.00
431.38	431.0	0.38	0.18	2.00
472.50	472.5	0.00	0.18	2.00
513.47	513.5	-0.03	0.18	2.00
528.88	529.0	-0.12	0.18	2.00
573.17	573.0	0.17	0.18	2.00
585.35	585.0	0.35	0.20	2.00
684.40	684.5	-0.10	0.18	2.00
740.72	741.0	-0.28	0.20	2.00
748.55	748.5	0.05	0.18	2.00
807.03	807.0	0.03	0.18	2.00
879.28	879.5	-0.22	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 non TISI accredited

- End of Certificate -


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



ISO 9001:2015
CALIBRATION 0454

CERTIFICATE OF CALIBRATION

Certificate No. : SP23-007

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 : 6 January 2023

Calibration Date : 6 January 2023

Issue Date : 10 January 2023

Condition Instrument : Used

Calibrated by : 
(Mr.Tanawat Ritidach)
Technical Manager

Approved by : 
(Ms. Chonthicha Sangngern)
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



ISO 9001:2015
CALIBRATION 0454

REPORT OF CALIBRATION

Certificate No. : SP23-007

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Environment Condition : Ambient Temperature 25 ± 5 °C

Relative humidity 55 ± 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.

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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	0.575	0.0037	0.0031	2.00
	1.0490	1.044	0.0050	0.0029	2.00
	2.1900	2.181	0.0090	0.0080	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5607	0.558	0.0027	0.0034	2.00
	1.0247	1.021	0.0037	0.0035	2.00
	2.1229	2.115	0.0079	0.0081	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5236	0.520	0.0036	0.0030	2.00
	0.9634	0.961	0.0024	0.0029	2.00
	1.9763	1.968	0.0083	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	1.993	0.0057	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	2.031	0.0081	0.0080	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5601	0.562	-0.0019	0.0032	2.00
	1.0512	1.052	-0.0008	0.0030	2.00
	1.9294	1.923	0.0064	0.0079	2.00

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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	0.743	0.0048	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	0.639	0.0058	0.0055	2.00

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Wavelength Accuracy :

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	417.8	0.68	0.21	2.00
446.70	445.9	0.80	0.18	2.00
453.20	452.5	0.70	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	637.1	0.84	0.18	2.00
440.74	440.0	0.74	0.18	2.00
472.22	471.5	0.72	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	574.0	0.60	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	740.0	0.27	0.20	2.00
748.28	747.5	0.78	0.18	2.00
807.16	806.5	0.66	0.18	2.00
879.70	879.0	0.70	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 non TISI accredited

- End of Certificate -

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FM-708-02 R01 1/11/2021

Agilent CrossLab Start Up Services
Agilent Intuvo 9000 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 checklist will be completed at the end of the service and provided to you as a record of the preventive maintenance activities.

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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, 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-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 <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.
- 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>.

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

Instrument System Site and Location

UAE, Bangkok

List System Component Product Numbers

- 69490A
- 64513A
-
-
-
-
-
-
-
-

List the Serial Numbers of each Component

CN 12100009
 CN 17120171

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 operation of all instrument fans.

Inlet and detector consumable replacement

- ☒ For the inlet installed, perform inlet maintenance using the built-in procedures accessed from Agilent 9000 touch screen display or web interface.
- ☒ Replace column Compression Bolts.
- ☒ Replace the split vent trap for the Split/Spitless Capillary (SSL) or Multi-Mode Inlet (MMI) using the built-in procedure accessed from Agilent 9000 touch screen display or web interface.
- ☒ 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. Use the built-in procedures accessed from Agilent 9000 touch screen display or web interface.
- ☒ Replace the Guard Chip or Jumper Chip for the Split/Spitless Capillary (SSL) or Multi-Mode Inlet (MMI) using the built-in procedure accessed from Agilent 9000 touch screen display or web interface.

Inlet and Detector Tests

- ☒ Zero all pressure sensors.
- ☒ Perform the inlet pressure leak test.
- ☒ Perform the inlet restriction test.
- ☒ Perform the FID jet restriction test if FID installed.
- ☒ Perform the FID leakage test if FID installed.
- ☒ Record if test passed or failed in the results table.

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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ALS Maintenance

- ☐ Check all cabling and configuration settings between GC, tray, and injectors.
- ☐ Vacuum or removed any dust, especially around fans.
- ☐ Check operation of all fans.
- ☐ Check syringe for smooth plunger operation.
- ☐ Check for smooth operation of the needle support rod – clean if necessary
- ☐ Check for correct operation of syringe volume stops

Restore Instrument

- ☒ Restore the normal operating conditions using the Keyboard Local User Interface or Data System.
- ☒ Check and record the post PM detector signal output values. Results should be similar or lower than the detector outputs recorded prior to PM.
- ☒ Perform a chemical checkout. If this is a routine PM, inject the customer's sample using the ALS if applicable. This will act as a final checkout of both the ALS and the GC.

Guidance:

If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

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Intuvo Parts List Table

Note: 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/Model # where used	Quantity Consumed
FID Jet 0.11inch ID	G4591-20320	G3950A	1
Split Vent Trap Filter (2pk)	G5188-6497	G3950A	1
Bus Bolt with Washer	G4581-60260	G3950A	1
Guard Chip for SS inlet	G4587-60565	G3950A	1
Guard Chip for MMI	G4587-60665	G3950A	N/A
Jumper Chip for SS inlet	G4587-60575	G3950A	1
Jumper Chip for MMI	G4587-60675	G3950A	1

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 6006010152 Date service completed 24 Apr 23
Agilent signature SP N. Customer signature _____
Total number of pages in this document _____

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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.

PM Test Results Table

Detector Signal Outputs	Before PM Service	After PM Service
Detector output [D1]	N/A	N/A
Detector output [D2]	N/A	N/A

Tests	Expected Result	Actual Result or N/A
Inlet Leak Test	Pass	Pass
Inlet Restriction Test	Pass	Pass
FID jet restriction test if FID installed	Pass	N/A
FID leakage test if FID installed	Pass	N/A

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Agilent Preventive Maintenance Services

Agilent GCMS
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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เอกสารไม่ควบคุม

Introduction

This checklist covers the following model(s):

Type	Model
SQ	5973 Series MSD
SQ	5975 Series MSD
SQ	5977 Series MSD
TQ	7000 Series MS/MS
TQ	7010 Series MS/MS
QTOF	7200 Series QTOF
QTOF	7250 Series QTOF

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.

Important Customer Web Links

- To access Agilent training and education, visit <https://www.agilent.com/chem/training> 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.

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- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilent/resources>. 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/askquestion>
- 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?** Evaluate Repair Options: [Agilent](#)

Service Engineer's Responsibilities

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

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Additional Instruction Notes

- Preventive maintenance is a factory recommended procedure designed to reduce the likelihood of electromechanical failures. Failure to perform preventive maintenance may reduce the long-term reliability of certain instruments and systems. Two preventative maintenances (PMs) per year are recommended, the Major PM Service will be performed annually with an Interim PM performed 6 months after the Major PM.

Instrument Maintenance

Select the appropriate service to be performed.

- ☐ Interim Preventive Maintenance (when available, is typically 6 months or at the request of the customer)
- ☒ Major Preventive Maintenance (Yearly)
- ☐ Enhanced Preventive Maintenance (when available, is provided "As needed")

System Information

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

Instrument System Name and ID
Instrument System Site and Location

UAE, Bangkok

List System Component Product Numbers	List the Serial Numbers of each Component
1. 67077B	US1715M030
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

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Important notice for customers

The customer should complete the following before the Support Provider arrives on site:

- ☒ Perform an autotune and retain the printed tune report just prior to the start of the PM to verify performance of the equipment.

Note: it is recommended to have the customer run the autotune and tune evaluation prior to the PM and then start the vent cycle so that the instrument will be ready for the service representative.

Definition of the Task/Recommended items within the document

Task		Recommended		
Yes	No	Interim	Major	As Needed
<input checked="" type="checkbox"/>				
	<input checked="" type="checkbox"/>			
		<input checked="" type="checkbox"/>		
			<input checked="" type="checkbox"/>	
				<input checked="" type="checkbox"/>

Yes selected means that the task was done or the part was required.

No selected means that the task was not done or the part was not required.

Interim selected means that this task is recommended to be done at 6-month intervals.

Major selected means that this task is recommended to be done yearly, if the customer would like a service to be done at the 6-month interval then the service could be purchased.

As needed selected means that the task was done or the part was used as needed. For example, there could be two types of filters that could be used and this was the one selected.

Preventive Maintenance Procedures

☐ Service Not Applicable

Interim / Major Preventive Maintenance – GCMS

Yes/No	Interim/Major	Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Perform general inspection of system for cleanliness.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Discuss any problems the customer is having with the instrument.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Review customer maintenance records and exclude maintenance on recently serviced items.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Review the most recent autotune report. This will give a starting point for evaluating spectral peaks, baseline noise, peak shape, mass assignments and resolution.

Interim / Major Preventive Maintenance – System Checks

☐ Service Not Applicable

Yes/No	Interim/Major	Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Verify that calibration peaks were seen prior to starting the PM.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Vent the instrument.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Inspect vacuum hoses, pump, exhaust tubing, and power cords for excessive wear.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Visually inspect calibrant levels: PT, TBA, PF-DID (if appl.), IRM (if appl.). Refill if available.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Look for any obvious external damage or problems.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Clean air intake(s). Cosmetic cover(s) may need to be removed.
<input type="checkbox"/>	<input type="checkbox"/>	Verify system line voltage meets instrument specifications. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	For HydroNet systems, verify customer is running hydrogen. Yes <input type="checkbox"/> No <input type="checkbox"/>

Interim / Major Preventive Maintenance – Wet Mechanical vacuum pumps

☐ Service Not Applicable

Yes/No	Interim/Major	Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wet Mechanical vacuum pumps

Interim / Major Preventive Maintenance – Dry Mechanical vacuum pumps - Diaphragm

☒ Service Not Applicable

Yes/No	Interim/Major	Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Check for evidence of oil leakage. Check pump gasket for leakage.
<input type="checkbox"/>	<input type="checkbox"/>	Drain and replace mechanical pump oil.
<input type="checkbox"/>	<input type="checkbox"/>	Replace Oil Mist Filter if applicable.
<input type="checkbox"/>	<input type="checkbox"/>	Discuss with customer the need for more frequent oil changes if the oil is dirty.
<input type="checkbox"/>	<input type="checkbox"/>	Don't use mist filters with Chemical Ionization.
<input type="checkbox"/>	<input type="checkbox"/>	Perform anti-suckback valve test. Power on until side plate is held closed, power off and check that side plate holds closed. Visually confirm that no oil returns up vacuum hose.

Interim / Major Preventive Maintenance – Dry Mechanical vacuum pumps - Scroll

☒ Service Not Applicable

Yes/No	Interim/Major	Description
<input type="checkbox"/>	<input type="checkbox"/>	Replace the tips seal on the IDP pump.
<input type="checkbox"/>	<input type="checkbox"/>	Check for evidence of poor vacuum – Turbo power demand, poor manifold vacuum, etc.
<input type="checkbox"/>	<input type="checkbox"/>	Replace the Exhaust Filter if required.
<input type="checkbox"/>	<input type="checkbox"/>	Discuss with customer the need for more frequent changes, if needed.
<input type="checkbox"/>	<input type="checkbox"/>	Inform customer that pump gas ballast should be installed all the time.
<input type="checkbox"/>	<input type="checkbox"/>	Perform anti-suckback valve test. Power on until side plate is held closed, power off and check that side plate holds closed.

Interim / Major Preventive Maintenance - Cleaning System and Filters

☐ Service Not Applicable

Cleaning System and Filters	
Yes/No Interim/Major	Description
Fans	
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Remove dust from fans and vent covers.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Verify fans are functional and that there is enough space around the instrument for proper cooling.
Source cleaning (all sources except HydroInert)	
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Open analyzer and remove the source.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Disassemble, Clean, Re-assemble source.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Re-install source and close analyzer.
HydroInert Source	
<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Source NOT to be abrasively cleaned. No cleaning required at PM. If a decrease in performance is observed, recommend to the customer that filaments, insulators (repeller and lens stack), extractor lens, and repeller lens may need to be replaced to restore performance. HydroInert source should not be run with helium carrier.
Filters	
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Replace RMSH 2 Helium gas filter - if applicable.
<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Replace RMSN 2 Nitrogen gas filter - if applicable.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Replace RMSHY 2 Hydrogen gas filter - if applicable.
<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	CP17988 - Gas Clean Carrier Gas Kit for 7890 for Nitrogen or Helium; Bracket, Mount, and Filter - if applicable.
<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	CP17974 - Gas Clean Filter Kit GC/MS 1/8"; Mount and Filter - if applicable.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	CP17973 - Gas Clean Filter, Replacement Filter - if applicable.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	5190-90/1 - Methane Gas Filter - if applicable.

System post-check	
Yes/No Interim/Major	Description
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Pump system back down. Wait until system stability has been achieved.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Verify system vacuum reading(s) via the gauge controller.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Leak Check
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Verify system in manual tune
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Compare against previous tune file report(s)
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Change to 1 tune and verify that all temperatures, pressures, and gas flows reach method set points
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Check manually that you have calibration peaks.
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	EI Autotune Performed

Guidance: If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument setup and checkout.

Interim / Major Preventive Maintenance - System Post Check

☐ Service Not Applicable

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 Signature Page and attach Signature Page to Service Order.

Test Results

Test Description	Expected Test Result	Actual Test Result
------------------	----------------------	--------------------

Consumed PM Parts

Common MS Filters and Seals - 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	Interim	Major	As Needed
Helium gas filter - if required	RMSH-2		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Nitrogen gas filter - if required	RMSN-2		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Big Universal Trap, 1/8" fittings, Hydrogen, if required	RMSHY-2		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Gas Clean Carrier Gas Kit for 7890 for Nitrogen or Helium; Bracket, Mount and Filter - if required	CP17988		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Gas Clean Filter Kit GC/MS 1/8 in (complete replacement kit) - if required	CP17974		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Gas Clean GS/MS Filter - if required	CP17973		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Chemical Ionization Gas Purifier (CI systems) - if required	5190-90/1		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Agilent AVF Platinum, 1 quart	5191-5851	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Gas filters need to be changed only if required				

MS Maintenance Supplies for 5973/5975/5977 Series

Part Description	Part Number	Interim	Major	As Needed
Diffusion pump fluid (Diffusion Pump Models)	6040-0809 Qiy 2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
IDP-3 Tip Seal Replacement Kit (IDP-3 Dry Pump Models)	G7077-67018	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
IDP-3 Tip Seal Replacement Kit (no tools - CSD P/N)	5190-9561	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
IDP-3 Tip Seal Replacement Kit (no tools - VPD P/N)	IDP31S	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Filter element for IDP-3	REPLSLRFILTER 2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
DS42 Oil Mist Eliminator 3/4G & 3/8	SR03706556	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Exhaust oil mist trap (thread) Edwards/Pfeiffer	G1099-80039	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Repeller Insulator	G1099-20133		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Lens stack insulator	G3870-20530		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Lens insulator for Extractor (ring insulator)	G3870-20445		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
HydroInert Extractor lens (9mm)	G7078-20909		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
HydroInert Repeller	G7078-20902		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

MS Maintenance Supplies for 7000/7010 Series

Part Description	Part Number	Interim	Major	As Needed
Nitrogen gas filter	RMSN-2		✓	✓
IDP-10 Tip Seal Replacement Kit (IDP-10 Dry Scroll Pump Models)	G7004-67023		✓	✓
IDP-10 Tip Seal Replacement Kit (no tools - VPD P/N)	X3807-67000		✓	✓
Oil Mist Filter RV5	G6600-80043		✓	✓
Filter element for the IDP-10	REFPLSLFILTER 1		✓	✓
Repeller Insulator	G1099-20133			✓
Lens stack insulator	G3870-20530			✓
Lens insulator for Extractor (ring insulator)	G3870-20445			✓
HydroInert Extractor lens (9mm)	G7078-20909			✓
HydroInert Repeller	G7078-20902			✓

MS Maintenance Supplies for 7200/7250 Series

Part Description	Part Number	Interim	Major	As Needed
Nitrogen gas filter - if required	RMSN-2		✓	✓
RIS Probe Maintenance Kit (7200 Series only)	G7004-67023		✓	✓
DS202 Oil Mist Eliminator	X3807-67000		✓	✓
IDP-15 Tip Seal Replacement Kit (IDP-15 Dry Pump Models)	G6600-80043		✓	✓
IDP-15 Tip Seal Replacement Kit (no tools - VPD P/N)	REFPLSLFILTER 1		✓	✓
Filter element, for SH-110/SH-112/IDP-15 exhaust silencer	G1099-20133		✓	✓
DS 3/8 MAG. PLUG AND GASKE T	G3870-20530		✓	✓

MS Maintenance Supplies for JetClean

Part Description	Part Number	Interim	Major	As Needed
Big Universal Trap, 1/8" fittings, Hydrogen, if required	RMSHY-2		✓	✓

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

Common MSD Maintenance Supplies 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	Interim	Major	As Needed
EI High Temperature Filaments	G7005-60061 Qty 2			✓
HES EI Filaments	G7002-60001			✓
LE-EI Filaments	G3850-60021			✓
CI High Temperature Filament - all MSDs	G7005-60072			✓
PFTBA GCMS Tuning Standard calibrant	05971-60571			✓
PFDTD calibrant, 1 mL	8500-8510			✓
PFET, IRM calibrant for GC QTOF 0.5 mL	5190-0531			✓

MSD Maintenance Supplies 5973/5975/5977 Series

Part Description	Part Number	Interim	Major	As Needed
CI Interface tip seal (tip and spring combo)	G1999-60412			✓
CI Interface tip seal (tip only)	G3870-20542			✓
CI Interface tip seal spring (spring only)	G1999-20023			✓
Repeller insulator	G1099-20133 Qty 2			✓
Lens insulator/holder (HES)	G7002-20074			✓
Ring heater/sensor assembly (HES)	G7002-60043			✓
Ceramic insulator for Extractor (HES)	G7002-20064			✓
Transfer Line Tip Cap, Threaded	G3870-20547			✓
Transfer-Line Tip Base, Threaded	G3870-20548			✓
Lens stack insulator	G3870-20530			✓
Lens insulator for Extractor (ring insulator)	G3870-20445			✓
HydroInert Extractor lens (9mm)	G7078-20909			✓
HydroInert Repeller	G7078-20902			✓

MS Maintenance Supplies for 7000/7010 Series

Part Description	Part Number	Interim	Major	As Needed
CI Interface tip seal - 7000	G1999-60412			✓
CI Interface tip seal - 7010	G7002-60412			✓
CI Interface tip seal (tip only)	G3870-20542			✓
CI Interface tip seal spring (spring only)	G1999-20023			✓
Repeller insulator - 7000	G1099-20133 Qty 2			✓
Lens insulator/holder (HES)	G7002-20074			✓
Ring heater/sensor assembly (HES)	G7002-60043			✓
Ceramic insulator for Extractor (HES)	G7002-20064			✓
Transfer-Line Tip Cap, Threaded	G3870-20547			✓
Transfer-Line Tip Base, Threaded	G3870-20548			✓
Lens stack insulator	G3870-20530			✓
Lens insulator for Extractor (ring insulator)	G3870-20445			✓
HydroInert Extractor lens (9mm)	G7078-20909			✓
HydroInert Repeller	G7078-20902			✓

MS Maintenance Supplies for 7200 Series

Part Description	Part Number	Interim	Major	As Needed
Extractor Lens Insulator	G7005-20133			✓
Ion Focus Insulator	G7005-20442			✓
Ring Heater/Sensor Assembly	G7005-60110			✓
RIS Xfer Tip	G7005-20542			✓
RIS Xfer Tip Spring	G7005-20024			✓

MS Maintenance Supplies for 7250 Series

Part Description	Part Number	Interim	Major	As Needed
Lens insulator/holder (HES)	G7002-20074			✓
Ring heater/sensor assembly (HES)	G7002-60043			✓
Ceramic insulator for Extractor (HES)	G7002-20064			✓
Transfer-Line Tip Cap, Threaded	G3870-20547			✓

MS Maintenance Supplies for Intuvo 9000 MS Series

Part Description	Part Number	Interim	Major	As Needed
Swaged MS Tail - Packaged	G4590-60009			✓
Swaged MS Tail (HES) - Packaged	G4590-60109			✓

Common MS Maintenance Supplies

Part Description	Part Number	Interim	Major	As Needed
Abrasive paper, 30 um	5061-5896			✓
Alumina powder	393706201			✓
Cloths, clean (pkg of 15)	05980-60051			✓
Cloths, cleaning (pkg of 300)	9310-4828			✓
Cotton swabs (pkg of 100)	5080-5400			✓
Gloves, clean, large	8650-0030			✓
Gloves, clean, small	8650-0029			✓

Signature Page

Service Engineer Comments (optional)

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

Service Verification

Service Request Number: 6056010152

Date of Service Completion: 24 Apr 2023

Service Engineer Name: S. N.

Customer Name:

Service Engineer Signature:

Total number of pages in this document:

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Agilent CrossLab Start Up Services

Agilent 7697A Headspace Sampler
Preventive Maintenance - Standard

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 7697A Headspace Sampler Preventive Maintenance Checklist - Standard

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.

Agilent 7697A Headspace Sampler Preventive Maintenance Checklist - Standard

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/gen-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? <https://www.agilent.com/go/service>

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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.
- It is important to consult with the customer prior to a PM to determine which parts are installed in the instrument to decide if individual components need to be purchased rather than the 7697A Standard PM Kit. The 7697A Standard PM Kit contents are based off of the contents of the original shipment. Different types of deactivated treatment for the sample probe and sample loop, different sample loop sizes, and transfer line sizes may require for individual parts to be ordered to perform the PM procedure. If different parts are required, reference the Agilent supplies catalog for part numbers.
- Ask the customer to sign the Service Verification section including the customer's and your signature.

Instrument Maintenance

Select the appropriate service to be performed.

- ☐ Interim Preventive Maintenance (when available, is typically 6 months or at the request of the customer)
- ☒ Major Preventive Maintenance (Yearly)
- ☐ Enhanced Preventive Maintenance (when available, is provided "As needed")

System Information

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

Instrument System Name and ID
Instrument System Site and Location

UAE, Bangkok

List System Component Product Numbers	List the Serial Numbers of each Component
1. 64577-19000	CN17110041
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

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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 updates and verify with customers if they would like them installed. Firmware update(s) are strongly recommended.

Preventive Maintenance Procedures

- ☐ Service Not Applicable

Inspect and Clean Sampler

- ☐ Service Not Applicable
- ☒ If a tray is part of the system, remove the tray and pneumatics to allow for access to the oven.
 - ☒ If a tray is part of the system, check that the shutter sensor is not dusty. If it is, use air duster to remove the dust.
 - ☒ Check for any debris in the carousel and clean if necessary.
 - ☒ If a tray is part of the system, reinstall the tray and pneumatics unit.
 - ☒ Remove the front panel of the instrument.
 - ☒ Check the carousel belt for wear. If it is worn, consult with the customer to determine if it should be replaced.
 - ☒ Use a dry, clean cloth to wipe the lifter rod(s) clean. Do not apply any lubricant.
 - ☒ Vacuum the inside of the unit.
 - ☒ Reinstall the front panel of the instrument.
 - ☒ Using the Manual Operations function under the Service Mode Key on the instrument keypad, confirm that the following components work:
 - o Tray Lifter (if applicable)
 - o Sampler Lifter
 - o Carousel Motor
 - o Shutter Motor (if applicable)

Pneumatic Components

- ☐ Service Not Applicable
- ☒ Remove the sample probe.
 - ☒ Remove the sample loop.
 - ☒ Install the new sample loop.
 - ☒ Install the new sample probe.
 - ☒ Remove the fused silica transfer line.
- Special note:** If OQ will be performed after the PM, remove the fused silica transfer line and do not reinstall it until the transfer line measurement is taken for the OR procedure.
- ☒ Reinstall the fused silica transfer line.

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- ☒ Use Service Reminders under the Service Mode Key on the instrument keypad to run the instrument restriction and leak test. Verify that it passes (make a note below the tests results table). If it fails, consult the customer for repair options.

Tray Components

- ☐ **Service Not Applicable.**
- ☒ Check for any debris in the sample trays and clean if necessary.
- ☒ Check that the tray gantry rod is clean. If it is dirty or dusty, wipe it clean with a dry cloth. Do not apply any kind of lubrication.
- ☒ Check that the sensors are not dusty. If they are, use air dusters to remove the dust.
- ☒ Check the tray belts for any wear. If they are worn, consult with the customer to determine if they should be replaced.
- ☒ Verify the three LED's for the tray racks light up when the trays are installed.
- ☒ Run the tray calibration.
- ☒ Reset the counter (pressing the OFF key) of the tray calibration.

Restore Instrument

- ☐ **Service Not Applicable.**
- ☒ Connect the headspace transfer line if it has not been already reconnected.
- ☒ Return instrument to initial condition.
- ☒ Perform system checkout procedure or test.

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.**

7697A Headspace Sampler Test Results

Test Description	Expected Test Result	Actual Test Result
Tray Calibration	Pass	Pass
Leak Test	Pass	Pass
Chemical Checkout Test		

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7697A Headspace Sampler Parts List

Part Description	Part Number	Product or Model# where used	Quantity consumed
7697A Standard PM Kit ¹	G4556-67011	7697A HS Sampler	1
Ferrule Flexi Inert 0.53 mm Col 10/1PK NFS	G3188-27503	7697A HS Sampler AND G3520A module	1 (Optional, not included in PM kit)

¹ Part numbers and descriptions for the kit contents

Part Description	Part Number	Quantity
Sample Probe	G4556-63825	1
Sample Loop (1mL)	G4556-80106	1
Thermal Gap Insulation Foam	G3530-00610	1
7697A Fused Silica and ProSteel Kit	G3903-61001	1
Polyimide, Valcon Ferrule, 5 pack	0100-2595	1
Nut and reducing union for 6 port valve transfer line connection	0100-2594	1
Liner, direct, 2mm ID, deactivated	5181-8818	1

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: 6006010192 Date Service Completed: 24 Apr 2023

Service Engineer Name: Supasak N Customer Name:

Service Engineer Signature: [Signature] Customer Signature:

Total number of pages in this document:

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Certificate of System Qualification

GC-OQ

System ID: UAE.TOX.007_CN11021007
Organization Name: United Analyst and Engineering Consultant Co., Ltd.
Organization Location: 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Date: February 23, 2023 3:19:15 PM
EQP Name: AgilentRecommended
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: ≥ -2.0 and ≤ 0.5

Overall Inlet Pressure Decay Test Status
Pass

Inlet Pressure Accuracy

Name: 7890
Front SSL

Date: February 23, 2023 3:19:15 PM
System ID: UAE.TOX.007_CN11021007

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เอกสารไม่ควบคุม

Setpoint Status: Pass
Setpoint Actual
Inlet Pressure: 25.0 psi 25.0 psi
Accuracy: 0.0 psi
Agilent Recommended: ≤ 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: ≤ 10.0 % setpoint (2.5 mL/min)
Limit is percentage of setpoint or 0.5 mL/minute, 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: ≤ 10.0 % setpoint (3.0 mL/min)
Limit is percentage of setpoint or 0.5 mL/minute, 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: ≤ 10.0 % setpoint (40.0 mL/min)
Limit is percentage of setpoint or 0.5 mL/minute, 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: ≤ 10.0 % setpoint (2.5 mL/min)
Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Overall Detector Flow Accuracy Test Status
Pass

GC Oven Temperature Accuracy

Name: 7890
Setpoint Status: Pass
Zone: Oven
Setpoint/Actual
Temperature: 230.0 230.0 °C
Accuracy: 0.0 °C
Agilent Recommended: ≥ -1.0 % setpoint in K (-5.0 °C)
 ≤ 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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เอกสารไม่ควบคุม

Setpoint Status: Pass
Zone: Oven
Setpoint/Actual
Temperature: 100.0 100.8 °C
Accuracy: 0.8 °C
Agilent Recommended: ≥ -1.0 % setpoint in K (-3.7 °C)
 ≤ 1.0 % setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890
Setpoint Status: Pass
Setpoint/Average
Temperature: 100.0 100.7833 °C
Stability: 0.1 °C
Agilent Recommended: ≤ 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Scouting Run

Tested Combination1 Front SSL / Front UECD
Injection Tower
Name: 7683B
Setpoint Status: Completed
Injection Volume on Column: 1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination1 Front SSL / Front UECD

Date: February 23, 2023 3:19:15 PM
System ID: UAE.TOX.007_CN11021007

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เอกสารไม่ควบคุม

Name: 7890

Setpoint Status: Pass

Base Signal: 212 Hz

ASTM Noise	Drift
Hz	Hz/Hr
1.24	13.32
Agilent Recommended: <= 3.00	Agilent Recommended: <= 15.00

Status: 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: 7890

Setpoint Status: Pass

Signal to Noise: 4533

Agilent Recommended: >= 1500

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Overall Signal to Noise Test Status

Pass

Scouting Run

Tested Combination2 Front SSL / Back FID

Name: 7683B

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: 7890

Setpoint Status: Pass

Base Signal: 12.2 pA

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

Status: Pass

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination2 Front SSL / Back FID

Name: 7683B

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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: 7890

Setpoint Status: Pass

Signal to Noise: 1173500

Agilent Recommended: >= 300000

Overall Signal to Noise Test Status

Pass

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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	G2913A
Serial Number	CN28148436
Firmware Revision	A.11.02
Usage	Sample Injection
Location	Front
Syringe Volume (uL)	10

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Sampler 2

Manufacturer

Agilent Technologies

Type

Tray

Name

7683A

Model Number

G2614A

Serial Number

CN82248787

Firmware Revision

A.02.01

Mainframe 1

Manufacturer

Agilent Technologies

Name

7890

Model Number

G3440A

Serial Number

CN11021007

Firmware Revision

A.01.11

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

7890

Type

UECD

Serial Number

U16886

Adapter

Capillary

Control Type

Electronic Pressure Control (EPC)

Location

Front

Makeup Gas

Nitrogen

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Detector 2

Manufacturer

Agilent Technologies

Name

7890

Type

FID

Adapter

Capillary

Control Type

Electronic Pressure Control (EPC)

Location

Back

Makeup Gas

Nitrogen

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Full Name of Signer:

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Reason for Signature:

Saenguthai Tarak

saenguthai.tarak@non.agilent.com

February 23, 2023

Executed protocol and published this original version of document

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User Name: saenguthai.tarak

Hostname: LAPTOP-CQ3SKOMV

System ID: UAE_TOX_007_CN11021007

Print Date: February 23, 2023 3:19:17 PM

UAE_TOX_007_CN11021007 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 9:16:11 AM	Audit	SessionCreated	Session	None
February 23, 2023 9:18:11 AM	Audit	Data	Session	Transaction Log file is either corrupted or deleted
February 23, 2023 9:18:11 AM	Start	Configuration	Session	None
February 23, 2023 9:18:11 AM	Audit	Entitlement	Licensing	Session identifier generated: 080G-0002-0000-1TMS-HRS G
February 23, 2023 9:18:23 AM	Audit	Entitlement	Licensing	Successfully unlocked session identified by 080G-0002-0000-1TMS-HRS G with unlock code 588V-X85G-00N3-8901-VW 40
February 23, 2023 9:25:58 AM	Audit	EgtLoaded	Session	EOP details for primary technique [Gc] - File path: [ProtocolPacks\Go\Configuration02.51\Gc.02.51.asp], EOP File Name: [Gc.02.51.asp], EOP Name: [AgilentRecommended]Protocol Revision [Gc.02.51]
February 23, 2023 9:26:00 AM	End	Configuration	Session	None
February 23, 2023 9:26:07 AM	Start	Qualification	Session	OQ
February 23, 2023 9:28:07 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No setpoints associated	None

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เอกสารไม่ควบคุม

User Name: saenguthai.sarak
Hostname: LAPTOP-CQ3SKOMV
System ID: UAE_TOX.007_CN11021007
Print Date: February 23, 2023 3:19:17 PM

UAE_TOX.007_CN11021007 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 9:26:24 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No setpoints associated	Run Count : 1
February 23, 2023 9:26:28 AM	Start	Execution	Inlet Pressure Decay - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: >= 2.0 psi and <= 0.5 psi	None
February 23, 2023 9:26:37 AM	End	Execution	Inlet Pressure Decay - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: >= 2.0 psi and <= 0.5 psi	Run Count : 1
February 23, 2023 9:26:39 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
February 23, 2023 9:26:44 AM	End	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
February 23, 2023 9:26:46 AM	Start	Execution	Detector Flow Accuracy - Front UECD - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
February 23, 2023 9:27:13 AM	Audit	Data	Detector Flow Accuracy - Front UECD - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
February 23, 2023 9:27:19 AM	End	Execution	Detector Flow Accuracy - Front UECD - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
February 23, 2023 9:27:22 AM	Start	Execution	Detector Flow Accuracy - Back FID - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None

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Hostname: LAPTOP-CQ3SKOMV
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Print Date: February 23, 2023 3:19:17 PM

UAE_TOX.007_CN11021007 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 9:27:55 AM	Audit	Data	Detector Flow Accuracy - Back FID - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
February 23, 2023 9:27:57 AM	End	Execution	Detector Flow Accuracy - Back FID - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
February 23, 2023 9:27:59 AM	Start	Execution	Detector Flow Accuracy - Back FID - Type : Outflow - S: 400.0 mL/min - L: <= 10.0% setpoint	None
February 23, 2023 9:28:22 AM	Audit	Data	Detector Flow Accuracy - Back FID - Type : Outflow - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
February 23, 2023 9:28:28 AM	End	Execution	Detector Flow Accuracy - Back FID - Type : Outflow - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
February 23, 2023 9:28:29 AM	Start	Execution	Detector Flow Accuracy - Back FID - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
February 23, 2023 9:28:03 AM	Audit	Data	Detector Flow Accuracy - Back FID - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
February 23, 2023 9:28:06 AM	End	Execution	Detector Flow Accuracy - Back FID - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
February 23, 2023 9:28:08 AM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
February 23, 2023 9:30:02 AM	Audit	Data	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry

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Hostname: LAPTOP-CQ3SKOMV
System ID: UAE_TOX.007_CN11021007
Print Date: February 23, 2023 3:19:17 PM

UAE_TOX.007_CN11021007 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 9:30:04 AM	End	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
February 23, 2023 9:30:06 AM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
February 23, 2023 9:30:40 AM	Audit	Data	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
February 23, 2023 9:30:43 AM	End	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
February 23, 2023 9:30:45 AM	Start	Execution	GC Oven Temperature Stability - 7890 - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
February 23, 2023 9:31:45 AM	Audit	Data	GC Oven Temperature Stability - 7890 - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
February 23, 2023 9:31:48 AM	End	Execution	GC Oven Temperature Stability - 7890 - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
February 23, 2023 9:31:53 AM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front UECD - Part of System Preparation - No limits associated	None
February 23, 2023 2:40:21 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front UECD - Part of System Preparation - No limits associated	None

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User Name: saenguthai.sarak
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Print Date: February 23, 2023 3:19:17 PM

UAE_TOX.007_CN11021007 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 2:40:58 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front UECD - Part of System Preparation - No limits associated	None
February 23, 2023 2:42:19 PM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front UECD - Part of System Preparation - No limits associated	Data files Path : E:\UAE_2023\02\023_ECD_2023-02-23_14-30-45\GC1990_uECD_SCI9.D\ECDA1A.ch
February 23, 2023 2:43:14 PM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front UECD - Part of System Preparation - No limits associated	Run Count : 1
February 23, 2023 2:43:17 PM	Start	Execution	Noise and Drift - Front UECD - Detector UECD - L (Noise): <= 3.00 Hz - L (Drift): <= 15.00 Hz	None
February 23, 2023 2:43:54 PM	Audit	Data	Noise and Drift - Front UECD - Detector UECD - L (Noise): <= 3.00 Hz - L (Drift): <= 15.00 Hz	Data files Path : E:\UAE_2023\02\023_ECD_2023-02-23_14-30-45\GC1990_uECD_SCI9.D\ECDA1A.ch
February 23, 2023 2:44:11 PM	End	Execution	Noise and Drift - Front UECD - Detector UECD - L (Noise): <= 3.00 Hz - L (Drift): <= 15.00 Hz	Run Count : 1
February 23, 2023 2:44:14 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front UECD - GC - L (Peak): <= 3.00% - L (Ret. Time): <= 1.00%	None
February 23, 2023 2:44:45 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front UECD - GC - L (Peak): <= 3.00% - L (Ret. Time): <= 1.00%	None

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User Name: saenguthai.sarak
Hostname: LAPTOP-CQ3SKOMV
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UAE.TOX.007_CN11021007 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 2:46:43 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front UECD - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE 2023\02\2023_ECD - 14-10-45\OQ_GC7890_uEC D_Ph01-020F.D\EC01A.ch
February 23, 2023 2:46:43 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front UECD - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE 2023\02\2023_ECD - 14-10-45\OQ_GC7890_uEC D_Ph01-021F.D\EC01A.ch
February 23, 2023 2:46:43 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front UECD - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE 2023\02\2023_ECD - 14-10-45\OQ_GC7890_uEC D_Ph01-022F.D\EC01A.ch
February 23, 2023 2:46:43 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front UECD - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE 2023\02\2023_ECD - 14-10-45\OQ_GC7890_uEC D_Ph01-023F.D\EC01A.ch
February 23, 2023 2:46:52 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front UECD - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE 2023\02\2023_ECD - 14-10-45\OQ_GC7890_uEC D_Ph01-024F.D\EC01A.ch
February 23, 2023 2:46:52 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front UECD - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE 2023\02\2023_ECD - 14-10-45\OQ_GC7890_uEC D_Ph01-025F.D\EC01A.ch
February 23, 2023 2:47:57 PM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front UECD - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1

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Hostname: LAPTOP-CQ3SKOMV
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UAE.TOX.007_CN11021007 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 2:48:02 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front UECD - Detector UECD - L: >= 1500	None
February 23, 2023 2:48:26 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front UECD - Detector UECD - L: >= 1500	None
February 23, 2023 2:49:10 PM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front UECD - Detector UECD - L: >= 1500	Data files Path : E:\UAE 2023\02\2023_ECD1 A.ch
February 23, 2023 2:51:07 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front UECD - Detector UECD - L: >= 1500	None
February 23, 2023 2:51:24 PM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front UECD - Detector UECD - L: >= 1500	Run Count : 1
February 23, 2023 2:51:33 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Back PID - Part of System Preparation - No limits associated	None
February 23, 2023 2:52:09 PM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Back PID - Part of System Preparation - No limits associated	Data files Path : E:\UAE 2023\FID_SC_01.D\FID02B.ch
February 23, 2023 2:52:37 PM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Back PID - Part of System Preparation - No limits associated	Run Count : 1
February 23, 2023 2:52:44 PM	Start	Execution	Noise and Drift - Back PID - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None

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User Name: saenguthai.sarak
Hostname: LAPTOP-CQ3SKOMV
System ID: UAE.TOX.007_CN11021007
Print Date: February 23, 2023 3:19:17 PM

UAE.TOX.007_CN11021007 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 2:53:23 PM	Start	Execution	Noise and Drift - Back PID - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
February 23, 2023 2:53:53 PM	Audit	Data	Noise and Drift - Back PID - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : E:\UAE 2023\FID_SC_01.D\FID02B.ch
February 23, 2023 2:54:10 PM	End	Execution	Noise and Drift - Back PID - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
February 23, 2023 2:54:13 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Back FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
February 23, 2023 2:57:04 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Back FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
February 23, 2023 2:57:37 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Back FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
February 23, 2023 2:59:21 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE 2023\02\2023-02-22 12-25-09\OQ_GC7890_FID0 _Ph0104.D\FID1B.ch
February 23, 2023 2:59:21 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE 2023\02\2023-02-22 12-25-09\OQ_GC7890_FID0 _Ph0105.D\FID1B.ch

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User Name: saenguthai.sarak
Hostname: LAPTOP-CQ3SKOMV
System ID: UAE.TOX.007_CN11021007
Print Date: February 23, 2023 3:19:17 PM

UAE.TOX.007_CN11021007 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 2:59:22 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE 2023\02\2023-02-22 12-25-09\OQ_GC7890_FID0 _Ph0106.D\FID1B.ch
February 23, 2023 2:59:22 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE 2023\02\2023-02-22 12-25-09\OQ_GC7890_FID0 _Ph0107.D\FID1B.ch
February 23, 2023 2:59:26 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE 2023\02\2023-02-22 12-25-09\OQ_GC7890_FID0 _Ph0108.D\FID1B.ch
February 23, 2023 2:59:26 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE 2023\02\2023-02-22 12-25-09\OQ_GC7890_FID0 _Ph0109.D\FID1B.ch
February 23, 2023 3:00:43 PM	End	Execution	Injection Precision - Injection Tower, Front SSL, Back FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
February 23, 2023 3:00:56 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Back FID - Detector FID - L: >= 300000	None
February 23, 2023 3:02:10 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Back FID - Detector FID - L: >= 300000	None
February 23, 2023 3:02:36 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Back FID - Detector FID - L: >= 300000	None
February 23, 2023 3:03:13 PM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Back FID - Detector FID - L: >= 300000	Data files Path : E:\UAE 2023\FID_SC_01.D\FID1B.ch

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Date: February 23, 2023 3:19:15 PM
System ID: UAE.TOX.007_CN11021007

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User Name: saenguthai.sarak
Hostname: LAPTOP-CQ3SKOMV

System ID: UAE_TOX.007_CN11021007
Print Date: February 23, 2023 3:19:17 PM

UAE_TOX.007_CN11021007 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 3:03:51 PM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Back PID - Detector PID - L >= 300000	Run Count : 1
February 23, 2023 3:04:00 PM	End	Qualification	Session	OQ
February 23, 2023 3:04:00 PM	Start	Reporting	Session	None
February 23, 2023 3:18:15 PM	Audit	Reporting	Session	Report Generated Certificate

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Date: February 23, 2023 3:19:15 PM
System ID: UAE_TOX.007_CN11021007

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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 checklist will be completed at the end of the service and provided to you as a record of the preventive maintenance activities.

Agilent 7890 GC Preventive Maintenance Checklist



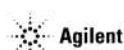
Introduction

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, 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-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 <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.
- 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
 - Installation and First Startup**
https://www.agilent.com/cs/library/usermanuals/Public/7890B_Installation.pdf
 - Operation Manual**
https://www.agilent.com/cs/library/usermanuals/Public/7890B_Operation.pdf
 - Maintaining Your GC**
https://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B_Maintaining%20Guide.pdf



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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 "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. 83440A	CN 11201007	
2. 62917A	CN 82149496	
3. 62614A	CN 82248782	
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

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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 6097489732 Date service completed 22 Feb 2023
 Agilent signature [Signature] Customer signature _____
 Total number of pages in this document 10 pages

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Do not include this section/page in the published, customer-facing PDF version.

This page is only relevant for Agilent source documents for document control purposes and is NOT intended for customer viewing. Refer to the SPIFFM checklist Authoring Guide for more information.

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: D0007063

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.01.09	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: OQ

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

Customer Name/Title: Min Panjawan Viriyothai / Laboratory Manager

EQP Filename: GC 02 51 eqp

EQP Release Date: November 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 EQP 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 fall 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 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 or 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 signoff 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 the 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 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 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-controlled 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.



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/OQ/PD model. 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 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, so 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 recorded in ink with manual calculations. In Agilent CrossLab, this execution process is streamlined and automated by use of Adobe forms and the Agilent Compliance Engine (ACE) delivery tool. It provides reports with no hand-writing 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 procedure.
- 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 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 ACE report.



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Design Qualification (DQ)

DQ for commercial lab instruments is recommended by some, but not all, guidances and procedures. Definitions of DQ found in guidances 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 OQ specifications in this EQP can be used, as appropriate, by the user to prepare URS. The OQ specifications in this EQP 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 GxP 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 OQ 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 EQP 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 (Limit1) and the Agilent Recommended Limit (Limit2) simultaneously.

In the standard EQP documents, Limit 1 and 2 values are the same—effectively de-activating this 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 OQ 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 operational use.

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 RQ 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			
Repair/Replace Strategy	Module	OQ/PV Testing	
Internal pump head parts, active inlet valve (or AIV cartridge), (gaskets) check valves, reference valves, inlet manifold or pump drive, or taking pump head apart to clean (versus repair)	Any pump	Flow Accuracy & Precision	
Pulse damper, pressure transducer	Any pump	Flow Accuracy & Precision	
Multi-channel gradient valve	Desturary	Flow Accuracy & Precision	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 (a regression-testing strategy).

Updated: November 2019

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Overview

Agilent CrossLab qualification services offer flexible choices for the delivery method as described below. The desired service delivery method is chosen according to the laboratory data integrity and general procedural requirements. To ensure complete data traceability, Agilent has devised two delivery methods that access data directly (default methods). An alternative method is also available that accesses data indirectly through a transfer location. If neither of the default methods is chosen, this document captures customer approval of the alternative delivery method.

Available Methods

Method	Definition
Preferred 1	Network-distributed ACE (NDA), where the ACE software is installed on a network node within the laboratory LAN infrastructure. Requires collaboration with the customer to load ACE behind their firewall. Raw data locations are always captured in the equipment qualification report (EQR), which provides end-to-end traceability and a fully characterized data workflow in the delivery.
Preferred 2	Dedicated spinning USB drive, where the ACE software resides on an independent drive that can be driven from the system controller, where the CDS resides. Because the USB spinning drive is connected to the CDS, the validity of this method is equivalent to the preferred 1 method. Raw data is imported directly into ACE by the Data Manager tool, with the data paths always captured in the report, which provides data traceability assurance. This is the most commonly used method.
Alternative	The ACE software is installed on and run from a PC not directly connected to the customer data system (CDS), such as the FSE's laptop. System data files are transferred indirectly from the CDS to the laptop instead of directly like preferred 1 and 2 methods. Requires customer pre-approval to remove later questions on data integrity. NOTE: The FSE's CDS used in this method is qualified for data collection purposes.

EQR Storage

Select the checkbox below to authorize Agilent to store a copy of the Equipment Qualification Reports (EQRs) generated by Agilent Compliance Engine for internal assessments. The intention of the assessment is to evaluate the delivery of the qualification service, with a focus to improve delivery and assess the appropriateness of data integrity measures. The storage is exclusively for the internal assessment by Agilent and will not be shared with other organizations. It is not to be considered a backup for the EQR provided at qualification delivery.

Customer Approval of Alternative Method and EQR Storage

Authorize Agilent to use the alternative method (check for approval):

Authorize Agilent to store EQRs for their internal assessment (check for approval):

Approved by title: *Manoj Nitiguthai / Laboratory Manager*

Comments:

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Introduction

With heightened scrutiny of data integrity, Agilent's ACE (Automated Compliance Engine) software must be able to access instrument-generated raw data files one of two ways: (1) directly, using the connection between network nodes or with the server; (2) indirectly, through temporary storage in a transfer location. (In this document, data integrity refers to the who, what, and where of data used in generating an ACE equipment qualification report, or EQR.)

ACE includes three main service delivery use cases that address data integrity requirements; the rest of this document provides details to determine which one best fits a customer's needs.

Regardless of the delivery method, ACE features and delivery procedures are compatible.

Preferred Method 1: Network-distributed ACE (NDA)

Preferred Method 2: Dedicated spinning USB drive (most commonly used method)

Alternative: Service portable laptop or other PC not directly connected to customer data system (CDS)

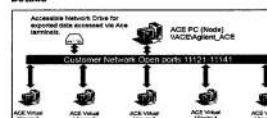
Preferred Method 1: Network-Distributed ACE (NDA)

Overview



ACE software is installed on a network node within the laboratory LAN infrastructure, which requires collaboration with the customer to load ACE behind their firewall. Raw data locations are always captured in the EQR, which provides end-to-end traceability and a fully characterized data workflow in the delivery.

Details



Installing ACE in a separate node (a.k.a. the host PC) on the same network as the system controller offers data traceability that is equivalent to an installation on the system controller itself. The system controller (where the CDS resides) and the ACE host PC are identified and seen by the server and subject to the customer's data access controls and general IT policies. The CDS's audit trail records data movements between nodes or between the client and server, and ACE's data traceability features identify the original data directory and therefore ensures end-to-end data traceability.

The ACE host PC has a separate/partitioned drive for ACE software. During ACE's installation, two services are setup on the operating system (OS): one for security and the other as a watchdog. Because the ACE host PC sits on the network as a shared drive, engineers access ACE through the networked drive: ACE is not installed on ACE Virtual Viewer PCs.

Requirements

Installation

- Install on a host PC with a separate drive (different from that of the OS)
- Attach to a network that clients can access
- 500 GB
- NTFS format
- User has local administration rights

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Operational

- User has an ACE node login with a minimum of power user rights permissions; user also has a personal ACE account and password added through the ACE licensing tool.
- Up to 5 users with 3 open sessions each can access the NDA simultaneously.
- Exception to ports 11121-11141 on ACE node, clients, and switch's/Smart Hubs to be open on the network.

Preferred Method 2: Dedicated Spinning USB Drive

Overview



ACE software resides on an independent drive that can be driven from the system controller, where the CDS resides. Because the drive is connected to the CDS, this method's data integrity is equivalent to preferred 1 method's. Raw data is imported directly into ACE by ACE's Data Manager tool, and data paths are captured in reports to provide data traceability.

Details

A dedicated spinning USB drive can run ACE software without leaving a footprint on the host PC. Therefore, it can be connected directly to the system controller (where the CDS resides) without altering the system's qualification status. For additional protection, the drive can be driven by another host PC on the same network; also, the USB drive can remain on site with the customer for use by the Agilent FSE during service deliveries only.

Alternative Method

The ACE software is installed on and run from a PC not directly connected to the customer data system (CDS), such as the FSE's laptop. System data files are transferred indirectly from the CDS to the laptop instead of directly like preferred 1 and 2 methods.

Requires customer pre-approval to remove later questions on data integrity.

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Standard OQ Test Suite

This document describes the test program for qualifying GC systems, and the following table lists all OQ tests.

Note: Headspace tests apply only if a headspace sampler is an integral part of the system: Injection Carry Over is included in the standard OQ for GCs with headspace configurations but not for liquid sampler configurations (it can be ordered as EXTRA COST TEST). Inlet Pressure Decay is not included for GCs configured with mass spectrometer detectors.

Key:	Fixed setpoints/limits	Variances allowed
Test	Setpoints and Parameters	Limits
System Inspection and Basic Safety and Operation	N/A	Gases, chassis electric grounding, interlocks, hydrogen shutdown, and so on all correct.
GC Oven Temperature Accuracy and Stability (Agilent Intuvo 9000)	Column connector = 230.0°C Oven 1 = 230.0°C Oven 2 = 100.0°C Stability measured at oven 2	Accuracy ≥ -3.8% and ≤ 5.0% of setpoint in K (oven) Accuracy ≥ -1.8% and ≤ 2.0% of setpoint in K (column connector) Stability ≤ 0.5°C
GC Oven Temperature Accuracy and Stability (G1188A and older)	Temperature 1 = 230.0°C Temperature 2 = 100.0°C Stability measured at temperature 2	Accuracy ≥ -1.0% and ≤ 1.5% of setpoint in K Stability ≤ 0.5°C (Agilent) Stability ≤ 1.0°C (Others)
Headspace Leak (7897A only)	N/A	Valve functions properly and HSS is leak tight Valve functions properly
Headspace Vented and Pressurization Valve Integrity (G1188A and older)	N/A	
Headspace Heated Zones Temperature Accuracy	Time: 115.0°C Sample Loop: 110.0°C Syringe Heater: 110.0°C Oven: 100.0°C Agilent: 100.0°C (Applicable zones vary by model: * TurboMatrix 46, TurboMatrix 16, TurboMatrix 110, HS400CL, HS110, HS1100L models only)	Time accuracy ≥ -1.8 and ≤ 5.2% of setpoint (7897A, 7897A w/tray) Time accuracy ≥ -4.3 and ≤ 4.3 % of setpoint (Others) Sample loop accuracy ≥ -4.0°C and ≤ 4.0°C (G1188, G1188A, 7897A, 7897A w/tray) Syringe heater accuracy ≥ -5.0°C and ≤ 5.0°C (Others) Syringe heater accuracy ≥ -5.0°C and ≤ 5.0°C (Others) Oven accuracy ≥ -4.0°C and ≤ 4.0°C (7894, G1268B, G1268B) Oven accuracy ≥ -4.0°C and ≤ 4.0°C (G1188, G1188A) Oven accuracy ≥ -5.0°C and ≤ 5.0°C (PerkinElmer) Oven accuracy ≥ -4.0°C and ≤ 4.0°C (PerkinElmer other models) Oven accuracy ≥ -4.0°C and ≤ 4.0°C (7897A, 7897A w/tray) Oven accuracy ≥ -5.0°C and ≤ 5.0°C (Others) Agilent accuracy ≥ -2.0°C and ≤ 2.0°C (CTC)
Vial Heater Temperature Accuracy	Temperature: 60.0°C	Diff. from setpoint ≥ -2.0°C and ≤ 2.0°C
Inlet Pressure Decay (non-MS) (EPC or manual control only)	Inlet gas flow control	Pressure change / 5 minutes ≥ -2.0 psi and ≤ 0.5 psi
Inlet Pressure Accuracy (EPC or manual control only)	Inlet pressure: 25.0 psi	Accuracy ≤ 1.2 psi
Inlet Flow Stability (EPC control only)	Inlet flow: 4.0 ml/minute	Accuracy ≤ 10.0% Precision ≤ 5.0%

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Test	Setpoints and Parameters	Limits
Detector Flow Accuracy	Flow rate varies by detector type (N/A for TCD)	Accuracy $\pm 10.0\%$ of setpoint (or 0.5 mL/minute, whichever is larger)
Noise and Drift (FID)	Detector signal	Noise ≤ 0.10 pA Drift ≤ 2.50 pA/hour
Noise and Drift (TCD)	Detector signal	Noise ≤ 0.15 DU (He or H ₂ carrier and makeup [or no makeup]) Noise ≤ 0.25 DU (N ₂ carrier and makeup [or no makeup]) Drift ≤ 2.20 DU/hour
Noise and Drift (NPD)	Detector signal (N/A for 5890)	Noise ≤ 0.15 pA Drift ≤ 3.50 pA/hour
Noise and Drift (ECD)	Detector signal (N/A for 5890)	Noise ≤ 0.15 DU Drift ≤ 1.00 DU/hour
Noise and Drift (uECD)	Detector signal	Noise ≤ 3.00 DU Drift ≤ 15.00 DU/hour
Noise and Drift (FPD new style)	Detector signal, sulfur (N/A for 5890)	Noise ≤ 3.00 DU Drift ≤ 5.00 DU/hour
Noise and Drift (FPD+)	Detector signal	Noise ≤ 4.00 DU Drift ≤ 3.00 DU/hour
Noise and Drift (FPD new style)	Detector signal, phosphorous (N/A for 5890)	Noise ≤ 5.00 DU Drift ≤ 5.00 DU/hour
Noise and Drift (FPD+)	Detector signal	Noise ≤ 2.00 DU Drift ≤ 1.50 DU/hour
Noise and Drift (NCD, SCD)	Detector signal	Noise ≤ 5.00 pA Drift ≤ 50.00 pA/hour
Scouting Run	Injection volume on column: varies by configuration	N/A
Signal to Noise (FID/SS/MMH/ALS)	Signal height divided by ASTM baseline noise for known concentration and conditions.	S/N $\geq 300,000$ (N ₂ makeup gas) S/N $\geq 240,000$ (He makeup gas)
Signal to Noise (FID/SS/MMH/HSS)		S/N $\geq 5,000$ (N ₂ makeup gas) S/N $\geq 4,000$ (He makeup gas)
Signal to Noise (FID/VI/HSS)		S/N $\geq 4,000$ (N ₂ makeup gas) S/N $\geq 3,200$ (He makeup gas)
Signal to Noise (FID/non-SS/using 18710-6017)		S/N ≥ 800 (N ₂ makeup gas) S/N ≥ 600 (He makeup gas)
Signal to Noise (FID/non-SS/using 5168-5372)		S/N ≥ 200 (N ₂ makeup gas) S/N ≥ 160 (He makeup gas)
Signal to Noise (NPD)		S/N ≥ 300
Signal to Noise (TCD/SS/MMH)		S/N ≥ 700 (N ₂ makeup gas) S/N $\geq 5,000$ (He or H ₂ makeup gas)
Signal to Noise (TCD/non-SS/MMH)		S/N ≥ 4 (N ₂ makeup gas) S/N ≥ 180 (He or H ₂ makeup gas)
Signal to Noise (uECD)		S/N $\geq 1,500$
Signal to Noise (FPD new style)		S/N ≥ 700 (sulfur) S/N $\geq 1,000$ (phosphorous)
Signal to Noise (FPD+)		S/N $\geq 1,400$ (sulfur) S/N $\geq 2,400$ (phosphorous)
Signal to Noise (NCD)		S/N ≥ 600 (NCD)
Signal to Noise (SCD)		S/N ≥ 550 (SCD) S/N ≥ 95 (SCD on FID base)
Injection Precision (Split/Splitless)	Injection volume on column: 1.0/100/250 μ l (ALS/Agilent HSS/CTC HSS with split/splitless RID) Injection time: 0.2 minutes (pressure-balanced HSS only)	Retention time RSD $\leq 1.00\%$ Area RSD $\leq 3.00\%$ (ALS, Agilent HSS) Area RSD $\leq 4.00\%$ (CTC HSS) Area RSD $\leq 8.00\%$ (NCD, SCD; ALS only)

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Test	Setpoints and Parameters	Limits
Injection Precision (Purged/Packed)	ALS with purged/packed injection port; without HSS	Retention time RSD $\leq 1.00\%$ Area RSD $\leq 3.00\%$ (FID, TCD) Area RSD $\leq 8.00\%$ (other detectors)
Injection Carry Over (HSS only)	Same as Injection Precision	Area carry over $\leq 1.00\%$

Test Design and Rationale

Overview

Many GMP/GLP enforcement agency inspectors now ask firms to provide a risk assessment of their equipment and computer systems plus a science-based rationale for subsequent validation and qualification testing.

GENERAL RISK STATEMENT: Any laboratory chemical system used for raw material testing or final drug product / medical device testing in GMP or used in formal GLP studies will likely fall into a HIGH RISK category. This risk assessment will imply the need for IQ & OQ & on-going qualification. ANY USER SPECIFIC RISK ANALYSIS SUPERCEDES THIS GENERAL RISK STATEMENT.

The test of this section outlines the science-based rationale for each test in the Agilent hardware OQ plus a brief test design and procedure description.

The recommended set of hardware OQ tests described in this EQP derives from Agilent's interpretation of FDA, USP, and GAMP guidelines and other authoritative expert literature.

OQ test design incorporates both modular and holistic testing, which is a proven and regulatory acceptable approach. When applicable, direct metrology is used to test pump flow rates and thermal-controlled column compartments, for example. Holistic chemical testing is used to evaluate critical instrument characteristics.

When applicable, certified reference standards and calibrated equipment are used.

Considering the number of setpoints, parameters, and conditions of each recommended OQ test, the proven concepts of worst case, range, and representative have been applied. If a property or characteristic is known to have its worst performance at one end of a range of use, this is the setpoint that should be tested and other setpoints are not required. If a property or characteristic has no known worst case, testing at the high and low points of the range of use is required. If there are too many possible use cases and conditions to realistically test (and none is a worst case), a representative sample for test is the best approach.

System Inspection and Basic Safety and Operation

Description: System must be in safe and operational condition before starting the OQ tests.

Procedure: The instrument is given a general inspection and its basic safety features are challenged to ensure proper operation.

GC Oven Temperature Accuracy and Stability

Description: Oven temperature accuracy is important for comparability between systems and transferring methods. Oven temperature stability is critical for qualitative and quantitative analysis.

Procedure: At two different temperatures, accuracy is measured using an external calibrated thermometer and expressed as the difference between found and setpoint values. At one of these, a statistically significant number of additional readings are taken during the total duration of the test and stability is expressed as the delta between the highest and lowest temperatures.

Headspace Leak

Description: Proper operation of the valves is critical for repeatable peak areas and carry over.

Procedure: This test verifies that the valves operate properly with no excessive leaks or restricted internal flow paths.

Headspace Vent and Pressurization Valve Integrity

Description: Proper operation of the valves is critical for repeatable peak areas and carry over.

Procedure: This test verifies that the valves operate properly; with no excessive leaks or restricted internal flow paths.

Headspace Heated Zones Temperature Accuracy

Description: Temperature accuracy of the heated zones is important for comparing systems and transferring methods. Oven accuracy is critical to quantitative headspace methods.

Procedure: The temperature is measured using an external calibrated thermometer with appropriate probe design. Accuracy is determined as the difference between found and setpoint values.

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Vial Heater Temperature Accuracy

Description: The 7693A vial heater option can be used during sample preparation. This test verifies that it heats accurately.

Procedure: The heater temperature is measured with an external thermometer and accuracy is calculated as the difference between the measured value and setpoint.

Inlet Pressure Decay

Description: Inlet pressure integrity is critical for repeatable injection and retention times. The pressure decay and pressure accuracy tests combine to demonstrate pressure integrity. **NOTE:** If there is too much air in the system, the MS system's Tune test indicates a leaking detector, so pressure decay is not necessary for MS-only systems.

Procedure: The inlet is capped, a pressure applied, and inlet flow turned off. This pressure decay is recorded over a specified time range.

Inlet Pressure Accuracy

Description: Inlet pressure integrity is critical for repeatable injection and retention times. The pressure decay and pressure accuracy tests combine to demonstrate pressure integrity. This test checks for accurate pressure to the head of the column. Column flow is achieved by maintaining a constant pressure against a known restriction. Because the restriction is a function of the column geometry, measuring pressure in the inlet is the most accurate way to determine flow.

Procedure: The inlet is capped, a pressure is applied, and the inlet pressure is recorded using an external calibrated manometer connected to the inlet.

Inlet Flow Stability

Description: Inlet flow stability is critical for repeatable injection and retention times. Inlet flow accuracy and precision tests combine to demonstrate inlet flow stability.

Procedure: Column flow setpoint is achieved, all detector flows are turned off, and calculations are made: flow accuracy as the absolute % difference of the mean of the ten flow readings and the setpoint; flow precision as the % RSD of ten flow readings.

Detector Flow Accuracy

Description: Detector flow accuracy is critical for a stable detector signal. Incorrect flows may have an impact on detector performance.

Procedure: Flow accuracy is determined by measuring the flows with a calibrated mass flowmeter and then comparing the results to the test setpoints and the values displayed by the GC.

Noise and Drift

Description: This test gives an indication of detector sensitivity and stability.

Procedure: The signal is monitored at specified conditions appropriate to the type of detector over a twenty-minute period. The signal noise is calculated based on ASTM E594-96 as the average peak-to-peak noise in a number of signal segments.

The drift is calculated as the slope of the linear regression for the signal. Detector type and the gases used all contribute to different performance and therefore different limits for each configuration.

Scouting Run

Description: 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 actual qualification runs.

Signal to Noise

Description: Sensitivity of GC detection is a critical performance feature in quantitative and qualitative analysis. A signal-to-noise value of a representative compound at known concentration provides sensitivity statistics.

Procedure: A traceable standard is injected and signal to noise is calculated.

Injection Precision

Description: System precision is critical for quantitative analysis.

Procedure: An initial stabilizing injection is made, followed by six repeat injections of a traceable standard followed by a final blank injection. The % RSD of the six injections is calculated to provide precision statistics. There are separate dedicated instrument parameters and reference standards applicable to each inlet/detector combination. This test is performed with liquid and headspace sampler configurations.

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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 EQR.

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

Selected Signature Options

Status: EQP is not signed

- Reporting variance is allowed in this EQP

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Agilent CrossLab Compliance and its primary components (ACE software tool, procedures, test design, metrology tools, 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 CrossLabs Group R&D VP and Dir. of Technology: Neil Cook, Santa Clara, California USA.
Agilent CrossLabs Group Quality Manager: Julio Hector, Santa Clara, California USA.

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

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Customer Approval

Name: Miss Penjawan Viriyothai
Title: Laboratory Manager
Date: Feb 3, 2021
Signature: 

Name: _____
Title: _____
Date: _____
Signature: _____

Name: _____
Title: _____
Date: _____
Signature: _____

Name: _____
Title: _____
Date: _____
Signature: _____

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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 - EQP Editor 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:	Agilent Recommended
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, Bangkok, Phrakhanong, Bangkok 10260

Date: February 23, 2023 3:23:17 PM
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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); 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 UECD	Pass			
	1	1		
Injection Precision - Injection Tower, Front SSL, Front UECD	Pass			
	1	1		
GC Scouting Run - Injection Tower, Front SSL, Back FID	Pass			
	1	1		
Injection Precision - Injection Tower, Front SSL, Back FID	Pass			
	1	1		
Signal to Noise - Injection Tower, Front SSL, Back FID	Pass			
	1	1		

Overall Qualification Status

Pass

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Service Details

Purpose

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

General Details

Service Order No./Request:	6005768732
EQP Name:	AgilentRecommended
EQP Revision:	GC.02.51
Report Type:	Report

Organization Details

Name:	United Analyst and Engineering Consultant Co., Ltd.
Location:	3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10250

Local Contact Details

Name:	K.Berjawan 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:	C.01.10 Update 03[017]

Customer Data System (CDS):	Gc: OpenLAB CDS
-----------------------------	-----------------

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System ID: UAE.TOX.007_CN11021007

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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	G2913A
Serial Number	CN28149436
Firmware Revision	A.11.02
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

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เอกสารไม่ควบคุม

Sampler 2

Manufacturer	Agilent Technologies
Type	Tray
Name	7683A
Model Number	G2614A
Serial Number	CN82248787
Firmware Revision	A.02.01

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN11021007
Firmware Revision	A.01.11
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	7890
Type	UECD
Serial Number	U16886
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen

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Detector 2

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

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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.

Accuracy = $(X_{me} - X_{set})$ **Absolute Accuracy** = $|(X_{me} - X_{set})|$ **Average** = $\frac{\text{mean value of } n \text{ observations}}{n} = \frac{1}{n} \sum_{i=1}^n X_i$

X_{me} = Mean value
 X_{set} = Setpoint

X_i = Value, i^{th} observation
 n = Total number of observations

% Carry Over = $\frac{X_b}{X_s} \times 100$

X_b = Response of blank injection
 X_s = Response of final standard injection

Correlation (r) = $\frac{1}{\sqrt{\Delta_X \Delta_Y}} \times \left(n \sum_{i=1}^n X_i Y_i - \sum_{i=1}^n X_i \sum_{i=1}^n Y_i \right)$

$\Delta_X = n \sum_{i=1}^n X_i^2 - \left(\sum_{i=1}^n X_i \right)^2$
 $\Delta_Y = n \sum_{i=1}^n Y_i^2 - \left(\sum_{i=1}^n Y_i \right)^2$

n = Number of data points
 X_i = X value of i^{th} point
 Y_i = Y 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

ASTM Noise = $\frac{\sum_{m=1}^n X_{PPM} P_{m0}}{n}$

$X_{PPM} P_{m0}$ = Peak to peak noise in segment m
 n = Number of segments

rms Noise = $\sqrt{\frac{\sum_{i=1}^n (E_i - \bar{E})^2}{(n-1)}}$

E_i = Individual voltage readings
 \bar{E} = Average of n measurements

Six Sigma Noise = $6 \times SD$

Response Factor = $\frac{Y}{X}$

X = Amount
 Y = Response

Parts Per Million (ppm) = $\frac{(M_r - M_t)}{M_t} \times 1,000,000$

M_r = Reported mass
 M_t = Theoretical mass

Stability = $|(Y_{max} - Y_{min})|$

Y_{max} = Maximum value
 Y_{min} = Minimum value

Standard Deviation (SD) = $\sqrt{\frac{1}{(n-1)} \sum_{i=1}^n (X_i - X_{me})^2}$

X_i = Value, i^{th} observation
 X_{me} = Mean value in n observations
 n = Total number of observations

Relative Standard Deviation (% RSD) = $\frac{SD}{X_{me}} \times 100$

SD = Standard deviation
 X_{me} = Mean value of observations

เอกสารไม่ควบคุม

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 intermediated or metadata is displayed, 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, where 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.

เอกสารไม่ควบคุม

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 Scouting Run
GC.02.50	Injection Precision
GC.02.50	Inlet Pressure Accuracy
GC.02.50	Inlet Pressure Decay
GC.02.50	Noise and Drift
GC.02.50	Signal to Noise
GC.02.50	System Inspection and Basic Safety and Operation

เอกสารไม่ควบคุม

System Inspection and Basic Safety and Operation

Purpose

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

Configuration Details

Name: 7890

Setpoint

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 600°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

เอกสารไม่ควบคุม

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 /5 minutes
Agilent Recommended: ≥ -2.0 and ≤ 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: ≤ 1.2

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 (if applicable).

Configuration Details

Name: 7890
Front UECD

Setpoint Flow Type: Makeup 25.0 mL/min

Measurements and Results

Time Flow
10:02 24.9 mL/min
Accuracy: 0.1 mL/min
Agilent Recommended: ≤ 10.0 % 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: 7890
Back FID

Setpoint Flow Type: Fuel 30.0 mL/min

Measurements and Results

Time Flow
10:05 30.2 mL/min
Accuracy: 0.2 mL/min
Agilent Recommended: ≤ 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 Flow
10:08 389.6 mL/min
Accuracy: 10.4 mL/min
Agilent Recommended: ≤ 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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Setpoint	Flow Type:	Makeup	25.0	mL/min
----------	------------	--------	------	--------

Measurements and Results

Time	Flow			
10:13	24.9	mL/min		

Accuracy: 0.1 mL/min

Agilent Recommended: <= 10.0 % 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

GC Oven Temperature Accuracy

Purpose

This test uses a calibrated digital thermometer 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	Temperature	
10:20	230.0	°C

Accuracy: 0.0 °C

Agilent Recommended: >= -1.0 % setpoint in K (-5.0 °C)
<= 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	Temperature	
10:25	100.8	°C

Accuracy: 0.8 °C

Agilent Recommended: >= -1.0 % setpoint in K (-3.7 °C)
<= 1.0 % setpoint in K (3.7 °C)

Setpoint Status: Pass **Runs:** 1

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Purpose

This test uses a calibrated digital thermometer 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	
1. 10:25	100.8	°C
2. 10:27	100.8	
3. 10:29	100.8	
4. 10:31	100.7	
5. 10:33	100.8	
6. 10:35	100.8	

Average: 100.7833 °C

High: 100.8 °C

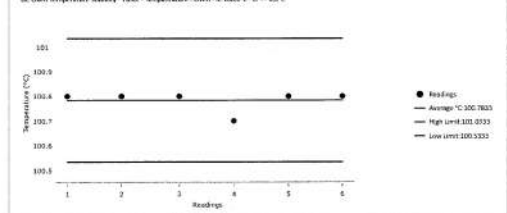
Low: 100.7 °C

Stability: 0.1 °C

Agilent Recommended: <= 0.5 °C

Setpoint Status: Pass **Runs:** 1

GC Oven Temperature Stability: 2800 - Temperature - Oven - 3.100/0.1 - L = 0.5°C



Overall GC Oven Temperature Stability Test Status

Pass

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 Combination1 Front SSL / Front UECD
Injection Tower
Name: 7683B

Setpoint Injection Volume on Column: 1.0 uL

Conditions

Y-Axis Unit: Hz

Configuration

Sample: ECD Std Kit, 18713-60040
Evaluated Compound: Lindane
Evaluation Standard Concentration: 0.033 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): 13
Run time for Signal to Noise (minutes): 14.5
Run time for tests not requiring extra noise interval (minutes): 1

Setpoint Status: Completed Runs: 1

Data Audit Log

Host name: LAPTOP-CQ3SKOMV
Original Data Path: E:\UAE 2023\IQ2023_ECD 2023-02-22 14-10-45
Analyzed Data Path: SDS://SessionData/IQ/Tests/GcScout_0_0/GcScout_0_0_1/PreviousRun/Run1

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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	Time
Integration	Off	0
Integration	On	7
Integration	Off	9

Acquisition operator: Saenguthai tarak

Acquisition method: OQ2023_uECD_SC.M

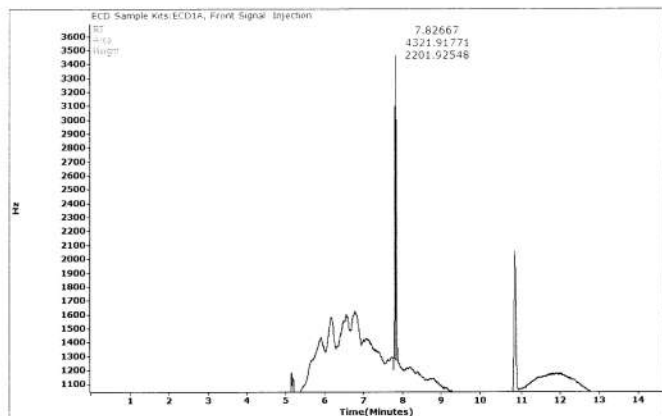
Data file analyzed for this test: OQ_GC7890_uECD_SC10.D

Acquisition Date: 22-Feb-23, 16:47:49

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Overall Scouting Run Status

Completed

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

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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 Combination1 Front SSL / Front UECD
Name: 7890

Setpoint Base Signal: 212 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
<= 3.00	<= 15.00
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

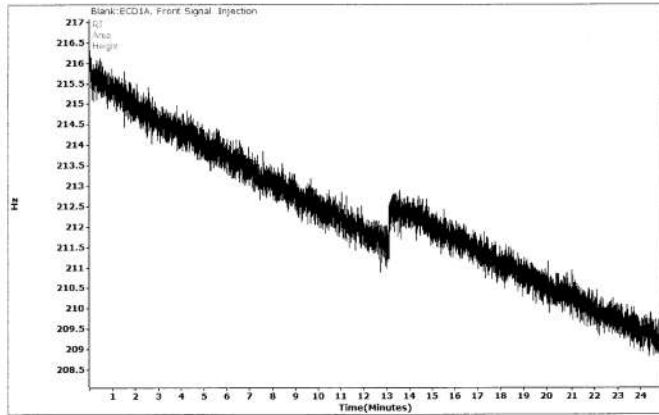
Host name: LAPTOP-CQ3SKOMV
Original Data Path: E:\UAE 2023
Analyzed Data Path: SDS://SessionData/IQ/Tests/GcNd_0_0/GcNd_0_0_1/PreviousRun/Run1

Date: February 23, 2023 3:23:17 PM
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Acquisition operator: Saenguthai tarak
Acquisition method: OQ2023_ND.M
Data file analyzed for this test: ECD_ND_03.D
Acquisition Date: 23-Feb-23, 14:12:21
Noise Type: ASTM
Noise Value: 1.23596
Noise start time: 3.0
Noise duration: 20.0
Drift Value: 13.31948



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 Combination 1 Front SSL / Front UECD

Injection Tower

Name: 7683B

Setpoint Injection Volume on Co-furn: 1.0 µL

Conditions

Y-Axis Unit:

Hz

Configuration

Sample:

ECD Std Kit, 18713-60040

Evaluated Compound:

Lindane

Evaluation Standard Concentration:

0.033 mg/L

(from Certificate of Analysis)

Measurements

Area	Retention Time
4410.319	7.82182 minutes
4540.771	7.82054
4686.163	7.81954
4537.986	7.81910
4671.157	7.81729
4669.186	7.81661

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System ID: UAE_TOX_007_CNI1021007

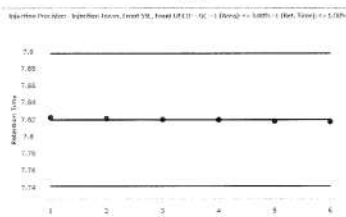
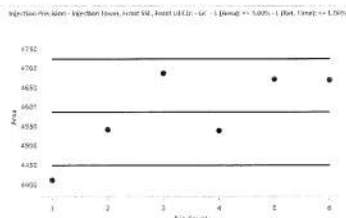
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Results	Area	Hz*s	Retention Time	minutes
Average:	4585.930	Hz*s	7.81915	minutes
STD Deviation:	109.0127	Hz*s	0.00196	minutes
RSD:	2.38	%	0.03	%
Agilent Recommended:	<= 3.00		<= 1.00	
Status:	Pass		Pass	

Setpoint Status: Pass

Runs: 1



Data Audit Log

Host name: LAPTOP-CQ3SKOMV
Original Data Path: E:\UAE 2023\OQ2023_ECD 2023-02-22 14-10-45
Analyzed Data Path: SDS:\SessionData\OQ\Tests\Gclp_0_0\Gclp_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 : 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 :

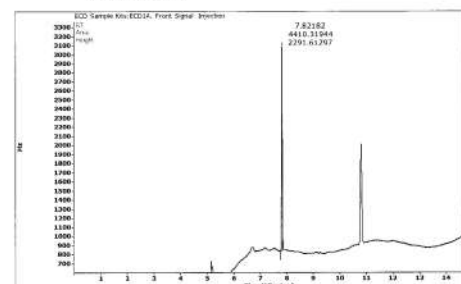
Integration Type	Value	Time
Integration	Off	0
Integration	On	7
Integration	Off	9

Acquisition operator: Saenguthai tarak

Acquisition method: OQ2023_uECD_SC.M

Data file analyzed for this test: OQ_GC7890_uECD_Pre01-020F.D

Acquisition Date: 22-Feb-23, 20:38:47

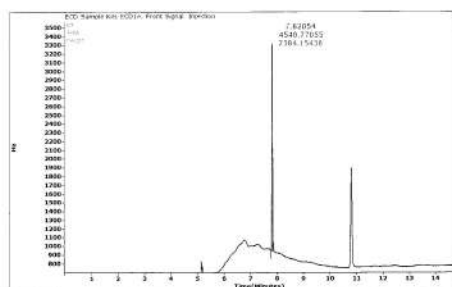


Date: February 23, 2023 3:23:17 PM
System ID: UAE_TOX_007_CNI1021007

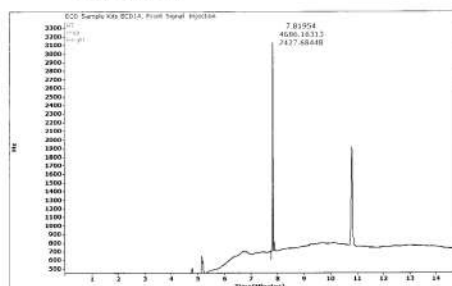
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เอกสารไม่ควบคุม

Acquisition operator: Saenguthai tarak
Acquisition method: OQ2023_uECD_SC.M
Data file analyzed for this test: OQ_GC7890_uECD_Pre01-021F.D
Acquisition Date: 22-Feb-23, 20:56:02



Acquisition operator: Saenguthai tarak
Acquisition method: OQ2023_uECD_SC.M
Data file analyzed for this test: OQ_GC7890_uECD_Pre01-022F.D
Acquisition Date: 22-Feb-23, 21:13:24

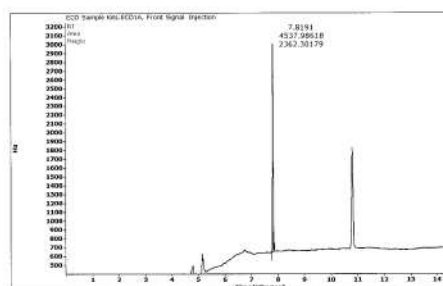


Date: February 23, 2023 3:23:17 PM
System ID: UAE.TOX.007_CN11021007

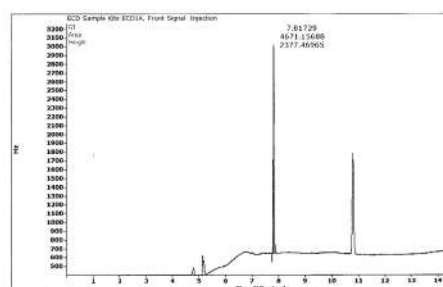
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เอกสารไม่ควบคุม

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_Pre01-024F.D
Acquisition Date: 22-Feb-23, 21:47:54

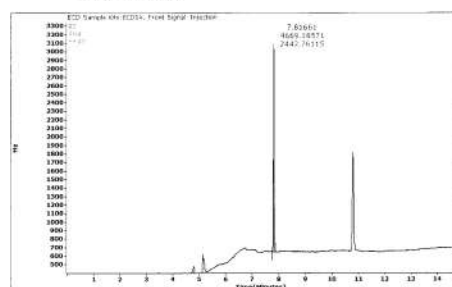


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Acquisition operator: Saenguthai tarak
Acquisition method: OQ2023_uECD_SC.M
Data file analyzed for this test: OQ_GC7890_uECD_Pre01-025F.D
Acquisition Date: 22-Feb-23, 22:05:09



Overall Injection Precision Test Status

Pass

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 Combination1 Front SSL / Front UECD

Injection Tower

Name: 7890

Setpoint

Conditions

Injection Volume on Column: 1.0 μ L
Noise Evaluation Start Time/Duration: 13 min. / 1.0 min.

Configuration

Y-Axis Unit: Hz
Sample: ECD Std KR, 18713-60040
Evaluated Compound: Lindane
Evaluation Standard Concentration: 0.033 mg/L (Certificate of Analysis)

Measurements

Noise (Type/Value): ASTM / 2.97346 Hz
Retention Time of Evaluated Peak: 7.80950 minutes
Peak Height (Uncorrected/Corrected): 13479.23 Hz / 13479.23 Hz

(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: 4533
Agilent Recommended: >= 1500

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: E:\UAE 2023
Analyzed Data Path: SDS://SessionData/OQ/Tests/GcSn_0_0/GcSn_0_0_1/PreviousRun/Run1

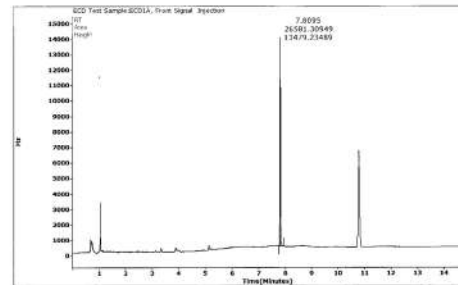
Integration Parameters :

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

Timed Event Table :

Integration Type	Value	Time
Integration	OFF	0
Integration	ON	6.5
Integration	OFF	9

Acquisition operator: Saenguthai tarak
Acquisition method: OQ2023_uECD_SC.M
Data file analyzed for this test: uECD_SN_01.D
Acquisition Date: 23-Feb-23, 12:36:40



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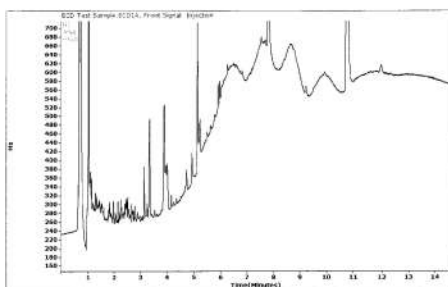
เอกสารไม่ควบคุม

Date: February 23, 2023 3:23:17 PM
System ID: UAE_TOX.007_CN11021007

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เอกสารไม่ควบคุม

Acquisition operator: Saenguthai tarak
Acquisition method: OQ2023_uECD_SC.M
Data file analyzed for this test: uECD_SN_01.D
Acquisition Date: 23-Feb-23, 12:36:40



Overall Signal to Noise Test Status

Pass

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 FID
Injection Tower
Name: 7885B
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

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

Noise start time for Signal to Noise (minutes):

Run time for Signal to Noise (minutes):

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

Yes
4
5.5
1

Setpoint Status: Completed

Runs: 1

Data Audit Log

Host name: LAPTOP-CQ3SKOMV
Original Data Path: E:\UAE 2023
Analyzed Data Path: SDS://SessionData/OQ/Tests/GcScout_1_0/GcScout_1_0_1/PreviousRun/Run1

Date: February 23, 2023 3:23:17 PM
System ID: UAE_TOX.007_CN11021007

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เอกสารไม่ควบคุม

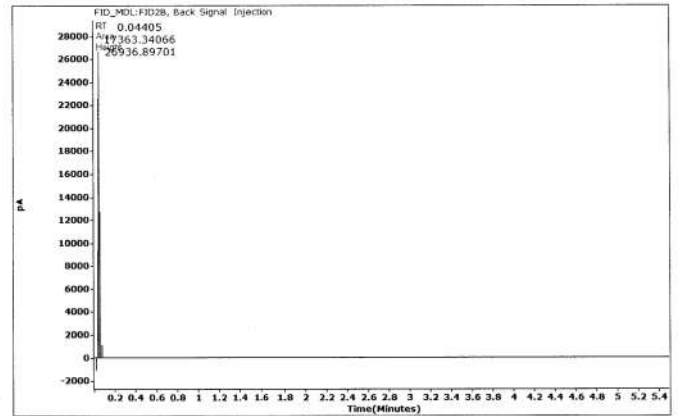
Date: February 23, 2023 3:23:17 PM
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เอกสารไม่ควบคุม

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
Integration	Off
Acquisition operator:	Saenguthai tarak
Acquisition method:	OQ2023_SC.M
Data file analyzed for this test:	FID_SC_01.D
Acquisition Date:	22-Feb-23, 11:51:54



Overall Scouting Run Status

Completed

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

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เอกสารไม่ควบคุม

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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

	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

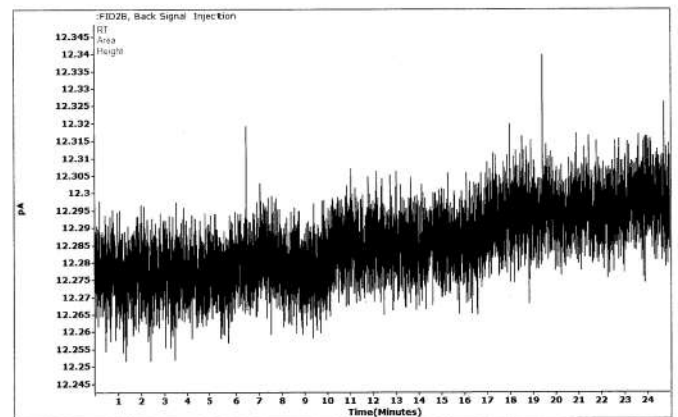
Host name:	LAPTOP-CQ3SKOMV
Original Data Path:	E:\UAE 2023
Analyzed Data Path:	SDS:\SessionData\OQ\Tests\GcNd_1_0\GcNd_1_0_1\PreviousRun\Run1

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

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เอกสารไม่ควบคุม

Acquisition operator:	Saenguthai tarak
Acquisition method:	OQ2023_uECD_ND.M
Data file analyzed for this test:	OQ_GC7890_FID_ND-1.D
Acquisition Date:	23-Feb-23, 10:34:49
Noise Type:	ASTM
Noise Value:	0.043B7
Noise start time:	3.0
Noise duration:	20.0
Drift Value:	0.06816



Overall Noise and Drift Test Status

Pass

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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, 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 µL

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 pA*s	0.04601 minutes
	15996.00	0.04578
	16219.94	0.04568
	16051.64	0.04562
	16123.53	0.04577
	16058.47	0.04654

Date: February 23, 2023 3:23:17 PM
System ID: UAE_TOX.007_CN11021007

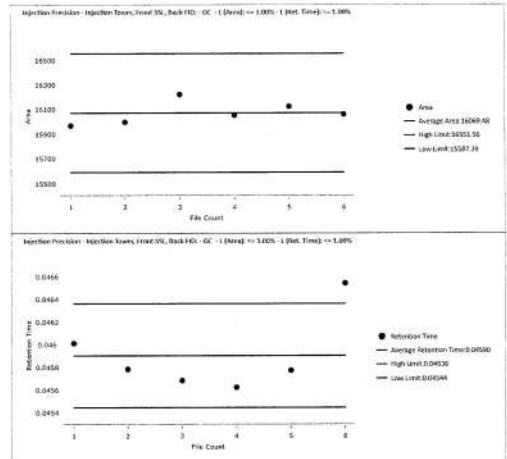
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เอกสารไม่ควบคุม

Results

Area	Retention Time
Average: 16069.48 pA*s	0.04590 minutes
STD Deviation: 91.48010 pA*s	0.00034 minutes
RSD: 0.57 %	0.74 %
Agilent Recommended: <= 3.00	<= 1.00
Status: Pass	Pass

Setpoint Status: Pass Runs: 1



Data Audit Log

Host name: LAPTOP-CQ3SKOMV
Original Data Path: E:\UAE 2023\OQ2023-02-22 12-25-05
Analyzed Data Path: SDS\SessionData\OQ\Tests\Gdip_1_0\Gdip_1_0_1\PreviousRun\Run1

Date: February 23, 2023 3:23:17 PM
System ID: UAE_TOX.007_CN11021007

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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:

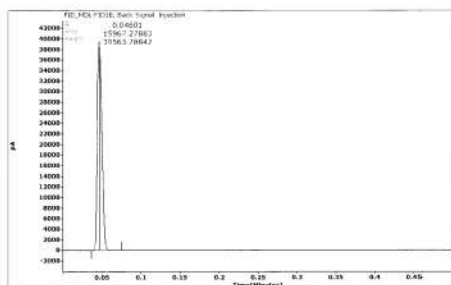
Integration Type	Value	Time
Integration	Off	0
Integration	On	0.015
Integration	Off	0.2

Acquisition operator: Saenguthai tarak

Acquisition method: OQ2023_InjPre.M

Data file analyzed for this test: OQ_GC7890_FIDD_Pre0104.D

Acquisition Date: 22-Feb-23, 12:29:41

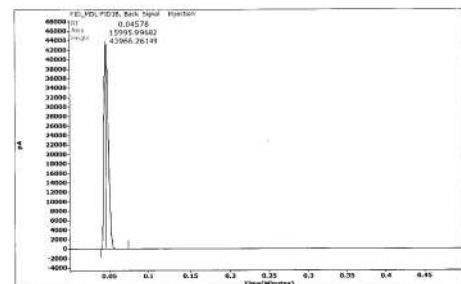


Date: February 23, 2023 3:23:17 PM
System ID: UAE_TOX.007_CN11021007

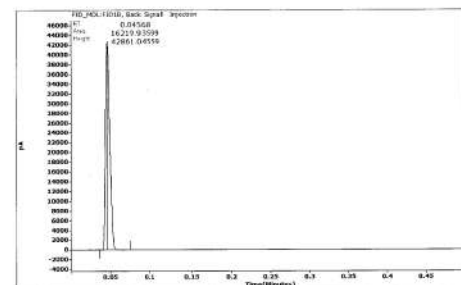
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เอกสารไม่ควบคุม

Acquisition operator: Saenguthai tarak
Acquisition method: OQ2023_InjPre.M
Data file analyzed for this test: OQ_GC7890_FIDD_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_FIDD_Pre0106.D
Acquisition Date: 22-Feb-23, 12:32:14

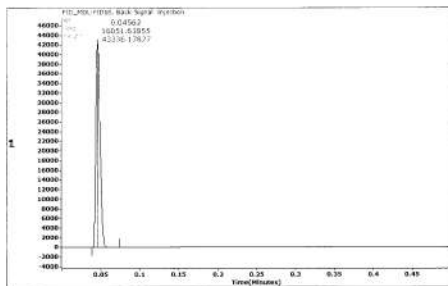


Date: February 23, 2023 3:23:17 PM
System ID: UAE_TOX.007_CN11021007

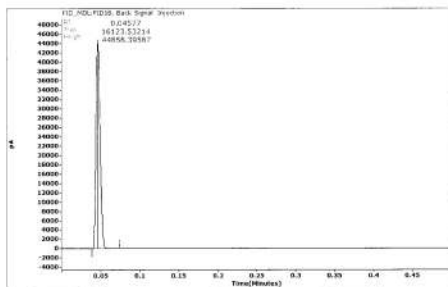
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เอกสารไม่ควบคุม

Acquisition operator: Saenguthai tarak
Acquisition method: OQ2023_InjPre.M
Data file analyzed for this test: OQ_GC7890_FIDD_Pre0107.D
Acquisition Date: 22-Feb-23, 12:33:30



Acquisition operator: Saenguthai tarak
Acquisition method: OQ2023_InjPre.M
Data file analyzed for this test: OQ_GC7890_FIDD_Pre0108.D
Acquisition Date: 22-Feb-23, 12:34:45

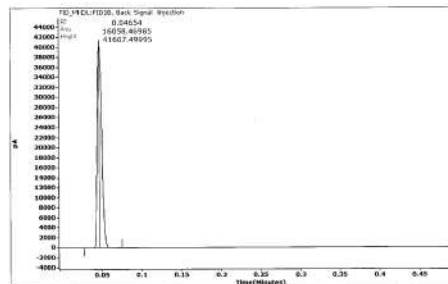


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System ID: UAE.TOX.007_CN11021007

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เอกสารไม่ควบคุม

Acquisition operator: Saenguthai tarak
Acquisition method: OQ2023_InjPre.M
Data file analyzed for this test: OQ_GC7890_FIDD_Pre0109.D
Acquisition Date: 22-Feb-23, 12:36:01



Overall Injection Precision Test Status

Pass

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

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

Host name: LAPTOP-CQ3SKOMV
Original Data Path: E:\UAE 2023
Analyzed Data Path: SDS://SessionData/OQ/Tests/GcSn_1_0/GcSn_1_0_1/PreviousRun/Run1

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

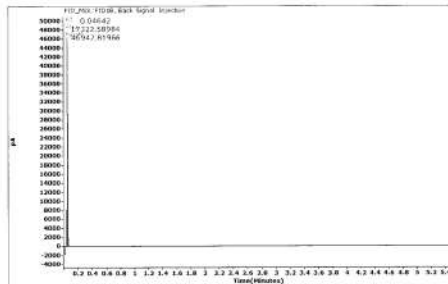
Integration Type	Value	Time
Integration	Off	0
Integration	On	0.015
Integration	Off	0.5

Acquisition operator: Saenguthai tarak

Acquisition method: OQ2023_SC.M

Data file analyzed for this test: FID_SN_01.D

Acquisition Date: 22-Feb-23, 12:48:33



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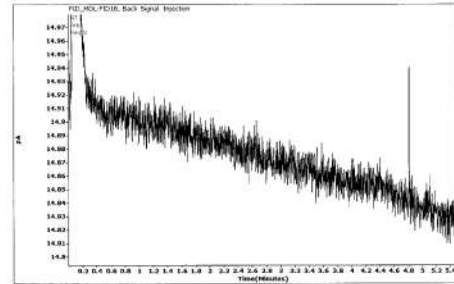
เอกสารไม่ควบคุม

Acquisition operator: Saenguthai tarak

Acquisition method: OQ2023_SC.M

Data file analyzed for this test: FID_SN_01.D

Acquisition Date: 22-Feb-23, 12:48:33



Overall Signal to Noise Test Status

Pass

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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 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 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, 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, 18713-60040	84
EQR	Material	Certificate of Analysis FID MDL std kit, 5188-5372	85
EQR	General	CDS Logon	86
EQR	General	Certificate of System Qualification	87
EQR	General	Certificate of System Qualification	88
EQR	General	Certificate of System Qualification	89

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เอกสารไม่ควบคุม

General

Document Name: ACE Self Qualification Certificate



Agilent Compliance Engine Self Qualification

Date: January 25, 2023 6:59:10 AM

Drive Serial #: 5FC8004E

Platform Revision:

ACE 3.12.56

Individual self-qualification reports for each specific technique installed are also available upon request. They provide additional details on the general report from the concise summary and are structured by the actual algorithms challenged during the process. There is not a one-to-one relationship between algorithms and IQ program tests because some algorithms are used by several tests and across multiple similar hardware components of the qualified systems.

Technique Type	Tests Completed	Result
Gel Permeation Chromatography	9	Conforms
Capillary Electrophoresis	10	Conforms
Gas Chromatography - GCMS	17	Conforms
Emission Spectroscopy	3	Conforms
Dissolution	6	Conforms
Atomic Absorption	7	Conforms
ICP-MS	8	Conforms
Gas Chromatography	29	Conforms
Infrared Spectroscopy	7	Conforms
Liquid Chromatography	17	Conforms
Liquid Chromatography - LCMS	8	Conforms
Microfluidics	18	Conforms
Sample Preparation - Gas Chromatography	9	Conforms
Sample Preparation - Liquid Chromatography	8	Conforms
Supercritical Fluid Chromatography	15	Conforms
Software	6	Conforms
UV-Vis Spectrophotometer	13	Conforms

Overall Qualification Status

Conforms

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เอกสารไม่ควบคุม

General

Document Name: Operator's training certificate and qualifications



Certificate of Completion

Learner Name: Saenguthai Saeng Tarak

Title Of Course: AN-CE-GC-2-026-C: ACE GC Specific Training

Completion Date: November 22, 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 while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

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เอกสารไม่ควบคุม

General

Document Name: Operator's training certificate and qualifications



Certificate of Completion

Learner Name: Saenguthai Saeng Tarak

Title Of Course: AN-CE-SS-B-030-A: ACE 3.X User Update Training

Completion Date: July 9, 2020

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 while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

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เอกสารไม่ควบคุม

General

Document Name: Operator's training certificate and qualifications



Certificate of Completion

Learner Name: Saenguthai Tarak

Title Of Course: AN-ASP/CEKSE-GC-1-001-M: 7890/7820 GC and OL OC Standalone Chemstation 16F/ Service

Completion Date: November 23, 2014

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 while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Gas Flowmeter

TERMS AND CONDITIONS

This certificate is issued by TRESICAL (MALAYSIA) SDN BHD, hereafter referred to as TRESICAL, subject to the following terms and conditions:

1. METHOD OF CALIBRATION

The equipment received for calibration/ testing shall be calibrated/ tested according to the international Standards, other Published Standards or approved in-house Methods, as discussed and agreed upon by the customer and TRESICAL. In the absence of any written instructions to the contrary, the customer is deemed to have agreed and accepted the method(s) used by TRESICAL for the calibration/ testing of their (the customer's) equipment. TRESICAL shall state in the certificate, the calibration/ testing procedure used for calibration/ testing.

2. WARRANTIES

In carrying out the calibration or testing, TRESICAL guarantees that it has exercised reasonable care and diligence, but no warranties implied or otherwise, are given with respect to TRESICAL's calibration/ testing results, services or facilities.

If any customer is not satisfied with the calibration/ testing results, they shall contact TRESICAL within one week (seven calendar days), after which no claims will be entertained.

In providing this certificate, TRESICAL does not in any way imply the suitability of the equipment for the customer's intended use. TRESICAL shall not, under any circumstances, be liable for any direct or indirect special or consequential damage.

3. USE OF RESULTS AND REPORTS

The result reported for the calibration/ testing performed by TRESICAL apply only to the particular equipment at the time of calibration/ testing. These results do not indicate or imply that they are applicable to other, similar, items.

Unless otherwise expressed in writing, this report does not indicate or imply that TRESICAL approves, recommends or endorses any manufacturer, supplier or user of any equipment, or that TRESICAL is liable, towards the equipment's performance after calibration.

This report shall not be used for advertising purposes without the prior written consent of TRESICAL.

4. LOSS AND DAMAGE

TRESICAL shall not be held responsible/ liable for claims by any person/ organization, loss or damage to any person or property directly, indirectly or allegedly caused by the equipment.

TRESICAL, its collection centers and collection agents shall not, under any circumstances, be responsible for any loss or damage to the equipment during transit to and from TRESICAL, and within TRESICAL premises. The customer shall solely bear the risk of loss or damage to the equipment. Insurance coverage of the equipment shall be responsibility of the customer.

TRESICAL shall not, under any circumstances, be liable for defects in failure of loss of any equipment or for the consequences arising from any such defect/ failure/ losses.

5. LITIGATION

In addition to any right of lien to which TRESICAL may be entitled to by law, TRESICAL shall be entitled to a general lien on all equipment, of the customer, in their possession, for the price of any goods or services sold or rendered to the customer that payment has not been received for, or for any other payment due to TRESICAL.

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

Document Name: Certificate of Calibration Gas Flowmeter

TERMS AND CONDITIONS

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2. WARRANTIES

In carrying out the calibration or testing, TRESICAL guarantees that it has exercised reasonable care and diligence, but no warranties implied or otherwise, are given with respect to TRESICAL's calibration/ testing results, services or facilities.

If any customer is not satisfied with the calibration/ testing results, they shall contact TRESICAL within one week (seven calendar days), after which no claims will be entertained.

In providing this certificate, TRESICAL does not in any way imply the suitability of the equipment for the customer's intended use. TRESICAL shall not, under any circumstances, be liable for any direct or indirect special or consequential damage.

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Unless otherwise expressed in writing, this report does not indicate or imply that TRESICAL approves, recommends or endorses any manufacturer, supplier or user of any equipment, or that TRESICAL is liable, towards the equipment's performance after calibration.

This report shall not be used for advertising purposes without the prior written consent of TRESICAL.

4. LOSS AND DAMAGE

TRESICAL shall not be held responsible/ liable for claims by any person/ organization, loss or damage to any person or property directly, indirectly or allegedly caused by the equipment.

TRESICAL, its collection centers and collection agents shall not, under any circumstances, be responsible for any loss or damage to the equipment during transit to and from TRESICAL, and within TRESICAL premises. The customer shall solely bear the risk of loss or damage to the equipment. Insurance coverage of the equipment shall be responsibility of the customer.

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5. LITIGATION

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Gas Flowmeter

Trescal
(CALIBRATION SOLUTIONS TO IMPROVE YOUR PERFORMANCE.)

Certificate of Calibration

Control No. CA46939C

Cert. No. PSYP-22058826

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Instrument Calibrated

Resolution	0.1	SCCM
Readability	0.1	
Calibration Gas	Air	

Standard Temperature	25 °C
Standard Pressure	14.696 psi abs
Specification	
	± 0.0 % of reading (0 sccm to 5 sccm)
	± 2.0 % of reading (5 sccm to 500 sccm)
	or 0.2 sccm (whichever greater)

REFERENCE READ	UNIT READ	CORRECTION		SPECIFICATION UNCERTAINTY	
		AS LEFT	AS FOUND	±	±
0.00	0.0	0.0	0.0	0.2	-
2.00	2.2	-0.2	-0.2	0.2	0.1
50.0	49.7	0.3	0.3	1.0	0.4
100.0	99.7	0.3	0.3	2.0	0.7
500	500.8	-0.8	-0.8	10.0	4.0
k = 2					

Remark : (*) mean Out of Specification

Info 1: True Read = Unit Read + Correction

Info 2: Unit = Unit Read - True

Info 3: Uncertainty: Measurement, associated with the result of measurement, is the dispersion of the value that reasonably can be attributed to the measurand.

This report reported measurement uncertainty is based on the current measurement uncertainty, multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95%.

This certificate is based in accordance with the conditions of accreditation generated by the Labor which has extended the competence and capability of the laboratory and its responsibility to international standards and to the units of measurement within the corresponding national standards laboratory. Copyright of this certificate is owned by the issuing laboratory and may not be reproduced without the prior written approval of the issuing laboratory.

TRESICAL (MALAYSIA) SDN BHD
Lot 16A, 16B, 16C, Jalan U1/19, Kawasan Komersial Industri Park, 46050 Seri Alam, Selangor Darul Ehsan, Malaysia. Tel: +603-2558 5500 Fax: +603-2558 5506
www.tresical.com

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

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เอกสารไม่ควบคุม

Tools

Document Name: Certificate of Calibration Manometer

CERTIFICATE OF CALIBRATION

No: CS224280

Date of Issue: 29th August 2022

Issue By: ISOLAB (SINGAPORE) PTE LTD

Requested by : Agilent Technologies (Thailand) Ltd
U Chu Liang Building, 22/F Unit A,D
968 Rama IV Road, Silom, Bangkok,
Bangkok 10500 Thailand.

Job Order No : 221831
Ambient Temperature : (20 ± 2) °C
Relative Humidity : (55 ± 10) % relative humidity
Page : 1 of 2

Descriptions : Digital Manometer
Instrument : Digitron
Model : 2023P
Serial No : 590281297
Calibration Range : (0 to 100) psi
Medium Used : Air
Calibration Start Date : 29th August 2022
Calibration End Date : 29th August 2022
Next Due Date : 29th August 2023

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

Method of Calibration
The Digital Manometer has been calibrated at ISOLAB's laboratory under the ambient conditions stated above according to in-house calibration procedure SP/CP-002-RT. The Digital Manometer was calibrated by comparison with reference standard. The reference standard used is traceable to national measurement standards maintained at National Metrology Centre (NMC-Singapore).

The following reference standard was used during the calibration:

S/N	Reference Instruments / Equipment	Serial Number	CAL Reference	Next Calibration Due Date
1.	Reference Pressure Indicator	1618000203 & 1623000113	PL005389	20 th January 2023

Calibrated By

Approved By

Leem Lee
Calibration Officer

Simone Montano Jr.
Approved Signatory

* "The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council".

This certificate may not be reproduced other than in full except with prior written approval of ISOLAB.

ISOLAB (Singapore) Pte Ltd
2, Joo Koon Circle Singapore 629031 Tel: (65) 6266 6155 Fax: (65) 6266 0824
Website : www.isolab.com.sg Email : service@isolab.com.sg

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เอกสารไม่ควบคุม

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

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Manometer

Notes:

- This calibration test certificate is prepared 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 of similar or equivalent services on similar or equivalent items and does not constitute endorsement by ISOLAB (S) PTE LTD of the item or that ISOLAB (S) PTE LTD in any way does not "guarantee" the true performance of the item. The user should determine the suitability of these instruments and equipment for their intended purpose of use and application in terms of calibration data, correction, accuracy and uncertainties as well. ISOLAB (S) PTE LTD does not guarantee any extrapolation of calibration data beyond and outside the calibrated test point ranges.
- 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 required 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.
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- Additional copies of this calibration and test certificates are available to the clients and customers at an additional, minimal 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 subcontractors can obtain a copy of this certificate from ISOLAB, unless and otherwise it is an authority 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.
- ISOLAB (S) PTE LTD, shall not be responsible for any loss or damage to the clients or its agents or representatives, in contract, including negligence or breach of statutory duties or otherwise for any direct or indirect loss or damage suffered by the client, its agents or representatives howsoever arising or whether connected with services provided by ISOLAB (S) PTE LTD.
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- ISOLAB (S) PTE LTD, values and honours the inter-laboratory comparison data(s) with same artifact (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 artifact is not falls under the responsibilities of ISOLAB. The same conditions are applicable for customers calibration instruments and equipment's as well.
- ISOLAB (S) PTE LTD, does not guarantee the integrity of calibration data, if the instruments and equipment's have malfunctioned, repaired, altered, modified and removed 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.
- 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 constitutes any responsibilities for old, used, drifted, damaged, under performance of instruments and equipment's with respect to manufacturers or OEM specifications. If the instruments and equipment's were within the adjustment capabilities and available options for adjustments, also with customer 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.
- 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 corrections and errors indicated in the calibration and test certificate(s). These conditions shall follow the guidelines and requirements stated in ILAC-18 Guidelines.

Date: February 23, 2023 3:23:17 PM
System ID: UAE.TOX.007_CNI1021007

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Manometer

CERTIFICATE OF CALIBRATION

No: CS224280

Date of Issue: 29th August 2022

Digital Manometer

Serial No: 590281297

Page: 2 of 2
Calibration Start Date: 29th August 2022
Calibration End Date: 29th August 2022

Results of Calibration

The results of the calibration are shown in the below table. The expanded uncertainties of the measurement are at a level of confidence at approximately 95% with a coverage factor "k" as mentioned below.

Calibration Results (As Found)

Applied Pressure (psi)	UUT Indicated Values (psi)	Corrections (psi)	Uncertainty (psi)	k-Factor
0.0	0.0	0.0	NA	NA
25.0	25.0	0.0	0.1	2.00
100.0	100.2	-0.2	0.1	2.00
25.0	25.0	0.0	0.1	2.00
0.0	0.0	0.0	NA	NA

Calibration Results (As Left)

Applied Pressure (psi)	UUT Indicated Values (psi)	Corrections (psi)	Uncertainty (psi)	k-Factor
0.0	0.0	0.0	NA	NA
25.0	25.0	0.0	0.1	2.00
100.0	100.2	-0.2	0.1	2.00
25.0	25.0	0.0	0.1	2.00
0.0	0.0	0.0	NA	NA

* Customer's specification tolerance: $\pm 0.2\%$ of full scale* The accuracy of the instrument was found to be within $\pm 0.2\%$ of maximum scale value

* The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council.

Remarks:

- No Adjustment/Offset were made during calibration.
- Although there was no adjustment was made to the UUT, customer instructed to reflect "As Found" and "As Left" results on calibration certificate.

Leon Lee
Calibration OfficerDate: February 23, 2023 3:23:17 PM
System ID: UAE.TOX.007_CNI1021007

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Manometer

Tools

Document Name: Certificate of Calibration Thermometer Probe

CERTIFICATE OF CALIBRATION

No: CS224293

Date of Issue: 06th September 2022

Issue By: ISOLAB (SINGAPORE) PTE LTD

Requested by: Agilent Technologies (Thailand) Ltd
U Chu Liang Building, 22/F Urair A.D
968 Rama IV Road, Siam, Bangkok,
Bangkok 10500 Thailand.Job Order No: 221834
Ambient Temperature: (22 \pm 2) °C
Relative Humidity: (55 \pm 10) % relative humidity
Page: 1 of 2

Descriptions:
Instrument: Type K Thermocouple Wire Sensor
Brand: N/A
Model: 80PK Probe
Serial No: 14670616/80PK-P3
Immersion: Approximately 250 mm
Calibration Range: (0 to 230) °C
Calibration Start Date: 27th August 2022
Calibration End Date: 01st September 2022
Next Due Date: 01st September 2023

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

Method of Calibration

The Type K Thermocouple Wire Sensor has been calibrated at ISOLAB's laboratory under the ambient conditions stated above according to in-house calibration procedure STCP-004-R6. The Type K Thermocouple Wire Sensor was calibrated by comparison with a Reference Sensor in constant temperature bath. The Reference Sensor and Reference Indicator are traceable to national measurement standards maintained at National Metrology Centre (NMC-Singapore), Northern Temperature Primary Laboratory (NTP, 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 Instruments / Equipment	Serial Number	CAI Reference	Next Calibration Due Date
i.	Reference Sensor	36981/2	CE2113-S	13 th August 2023
ii.	Reference Sensor	19107/3	CE1073-S	04 th September 2022
iii.	Reference Sensor	2382/1	CE1083-S	24 th September 2022
iv.	Reference Indicator	08-P123 29109/2/1	21-41-65	18 th November 2022
v.	Reference Indicator	13-P466 JTL33 K3972	22-66-113	13 th May 2023
vi.	Reference Thermocouple Type K Cold Junction Sensor	23212022/1	CE2020-S	24 th February 2023

Calibrated By:

Gerald Ooi
Calibration Officer

Approved By:

Tharish Nigayyan
Approved Signatory

* The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council.

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ISOLAB (Singapore) Pte Ltd
2, Joo Koon Circle Singapore 629031 Tel: (65) 6266 6155 Fax: (65) 6266 6824
Website: www.isolab.com.sg Email: service@isolab.com.sg

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

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

Document Name: Certificate of Calibration Thermometer Probe

Notes:

- This calibration test certificate is prepared based upon the same 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 or equivalent services on similar or equivalent items and does not constitute endorsement by ISOLAB (S) PTE LTD of the item or the 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 range(s).
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- ISOLAB (S) PTE LTD, doesn't guarantee the integrity of calibration data, if the instruments and equipment's are 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.
- ISOLAB (S) PTE LTD and their performance of the calibration of customer's artifact's in instruments and equipment's with "as and where condition" and does not constitute any responsibilities for old, used, drifted, damaged, under performance of instruments and equipment's with respect to manufacturers or OEM spec fluctuations. If the instruments and equipment's is/are within the adjustment capabilities and available options for adjustments, also with customer 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.
- 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 (CML) assigned by SAC-SINGLAS at the time of calibration. Expanded uncertainties reported in calibration certificates shall be separately added or subtracted with corrections and errors individual in the calibration and test certificate(s). These conditions shall follow the guidelines and requirements stated in ILAC-G8 Guidelines.

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

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Thermometer Probe

CERTIFICATE OF CALIBRATION

No : CS224293
Date of Issue: 06th September 2022

Type K Thermocouple Wire Sensor
Serial No: 14670616/80PK-P3

Page: 2 of 2
Calibration Start Date: 27th August 2022
Calibration End Date: 01st September 2022

Results of Calibration

The results of the calibration are shown in the below table. The expanded uncertainties of the measurement are at a level of confidence at approximately 95% with a coverage factor "k" as mentioned below.

Actual Temperature (°C)	UUT Average Value (°C)	Correction (°C)	Uncertainty (°C)	k-Factor
0.0	-0.3	0.3	0.3	2.00
100.1	100.9	-0.8	0.3	2.00
229.9	230.0	-0.1	0.3	2.00

Actual Temperature (°C)	UUT Average Value (°C)	Correction (°C)	Uncertainty (°C)	k-Factor
0.0	-0.3	0.3	0.3	2.00
100.1	100.9	-0.8	0.3	2.00
229.9	230.0	-0.1	0.3	2.00

* Manufacturer's Tolerance: (0 to 230) °C ± 2 °C

* The user should determine the suitability of this instrument for its intended use.

* The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council.

Remarks:

- No Adjustment/Offset were made during calibration.
- Although there was no adjustment was made to the UUT, customer instructed to reflect "As Found" and "As Left" results on calibration certificate.

Gerald Guek
Calibrated Officer

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

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Thermometer Probe

Tools

Document Name: Certificate of Calibration Thermometer

CERTIFICATE OF CALIBRATION

No : CS224282
Date of Issue: 31st August 2022

Issue By: ISOLAB (SINGAPORE) PTE LTD

Requested by: Agilent Technologies (Thailand) Ltd
U On Linc Building, 23rd Unit A/D
968 Rama IV Road, Siam, Bangkok,
Bangkok 10500 Thailand.

Job Order No: 221832
Ambient Temperature: (22 ± 2) °C
Relative Humidity: (55 ± 10) % relative humidity
Page: 1 of 2

Descriptions:
Instrument: Digital Thermometer
Brand: Fluke
Model: 51 II
Serial No: 14670616
Calibration Range: (0 to 350) °C @ Type K Simulation for Channel 1
Calibration Start Date: 27th August 2022
Calibration End Date: 27th August 2022
Next Due Date: 27th August 2023
Isolab (S) Pte Ltd and its practices are in compliance with ISO/IEC 17025:2017. The Quality System practice is in accordance with the Quality Standard ISO 9001.

Method of Calibration
The Digital Thermometer has been calibrated at ISOLAB's laboratory with respect to above ambient conditions also in accordance to the calibration procedure STCP-002-R5. 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 of 1990 (ITS-90).

The following reference standards were used during the calibration:

S/N	Reference Instruments / Equipment	Serial Number	CAL. Expiry Date	Next Calibration Due Date
1.	Reference Calibrator	8139002	EL099659	06 th January 2023
2.	Reference Thermocouple Type K Cold Junction Sensor	2362202371	CS20209-5	24 th February 2023

Calibrated By:

Gerald Guek
Calibrated Officer

Approved By:

Thamiah Nagesan
Approved Signature

* The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council.
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ISOLAB (Singapore) Pte Ltd
2, Joo Koon Circle Singapore 629031 Tel: (65) 6266 6155 Fax: (65) 6266 6824
Website: www.isolab.com.sg Email: service@isolab.com.sg



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เอกสารไม่ควบคุม

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

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Thermometer

Notes:

1. This calibration test certificate is prepared 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 of similar or equivalent services on similar or equivalent items and does not constitute endorsement by ISOLAB (S) PTE LTD of the item or that ISOLAB (S) PTE LTD in anyway does not "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 extrapolations of calibration data beyond and outside the calibrated test point ranges.
2. Unless and 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 required 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 used or by any other means of soft copies are totally 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 certificate are available to the clients and customers at an additional, minimal 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 sub-contractors 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 submitted 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 statutory duties or otherwise for any direct or indirect loss or damage suffered by the client, its agents or representatives however arising in whether 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 measurements 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-accessories in the event of calibration.
7. ISOLAB (S) PTE LTD, values and honors the inter-laboratory comparison data(s) with same artifacts (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 artifact is not falls under the responsibilities 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 artifact's (instruments and equipment's) with "as and where condition" and does not constitute any responsibility 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 were 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 certificate shall be separately added or subtracted with corrections and errors indicated in the calibration and test certificate(s). These conditions shall follow the guidelines and requirements stated in IAC-GR Guidelines.

Date: February 23, 2023 3:23:17 PM
System ID: UAE.TOX.007_CNI1021007

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Thermometer

CERTIFICATE OF CALIBRATION

No : CS224282

Date of Issue: 31st August 2022Digital Thermometer
Serial No: 14678616

Page : 2 of 2
Calibration Start Date : 27th August 2022
Calibration End Date : 27th August 2022

Results of Calibration

The results of the calibration are shown in the below table. The expanded uncertainties of the measurement are at a level of confidence at approximately 95% with a coverage factor "k" as mentioned below.

Channel 1 Measurement (As Found)

Applied Voltage (mV)	Equivalent Temperature (°C)	Average UUT Indicated Values (°C)	Corrections (°C)	Uncertainty (°C)	k-Factor
0.0000	0.0	0.5	-0.5	0.4	2.00
4.0960	100.0	100.5	-0.5	0.4	2.00
9.3430	230.0	230.5	-0.5	0.4	2.00
14.2930	350.0	350.5	-0.5	0.4	2.00

Channel 1 Measurement (As Left)

Applied Voltage (mV)	Equivalent Temperature (°C)	Average UUT Indicated Values (°C)	Corrections (°C)	Uncertainty (°C)	k-Factor
0.0000	0.0	0.5	-0.5	0.4	2.00
4.0960	100.0	100.5	-0.5	0.4	2.00
9.3430	230.0	230.5	-0.5	0.4	2.00
14.2930	350.0	350.5	-0.5	0.4	2.00

* The user should determine the suitability of this instrument for its intended use.

* The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council.

Remarks:

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

[Signature]
Calibration Officer

Date: February 23, 2023 3:23:17 PM
System ID: UAE.TOX.007_CNI1021007

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Thermometer

Tools

Document Name: Certificate of Calibration Thermometer Probe

CERTIFICATE OF CALIBRATION

No : CS224302

Date of Issue: 06th September 2022

Issue By ISOLAB (SINGAPORE) PTE LTD

Requested by : Agilent Technologies (Thailand) Ltd
U Chu Liang Building, 22/F Unit A/D
968 Rama IVth Road, Silom, Bangkok,
Bangkok 10500 Thailand.

Job Order No : 221836
Ambient Temperature : (22 ± 2) °C
Relative Humidity : (55 ± 10) % relative humidity
Page : 1 of 2

Descriptions

Instrument : Type K Needle Probe
Brand : Omega
Model : TSC3-CAS5-0200 PROBE
Serial No : 14670616/212N-P1
Immersion : Approximately 140 mm
Calibration Range : (0 to 350) °C
Calibration Start Date : 07th September 2022
Calibration End Date : 06th September 2022
Next Due Date : 06th September 2023
Isolab (S) Pte Ltd and its practices are in compliance with ISO/IEC 17025:2017. The Quality System practice is in accordance with the Quality Standard (ISO 9001).

Method of Calibration

The Type K Needle Probe has been calibrated at ISOLAB's laboratory under the ambient conditions stated above according to in-house calibration procedure STCP-004-R4. The Type K Needle Probe was calibrated by comparison with a Reference Sensor in constant temperature bath. The Reference Sensor and Reference Indicator are traceable to national measurement standards maintained at National Metrology Centre (NMC-Singapore), Northern Temperature Primary Laboratory (NPL, 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 Instruments / Equipment	Serial Number	CAL Reference	Next Calibration Due Date
i.	Reference Sensor	34981/2	C22117-S	13 th August 2023
ii.	Reference Sensor	31137/3	C22088-S	05 th July 2023
iii.	Reference Sensor	23821/1	C21085-S	24 th September 2022
iv.	Reference Indicator	06-P123 24/08/2021	21-11-85	18 th November 2022
v.	Reference Indicator	13-P496 ITL31387/2	22-05-113	13 th May 2023
vi.	Reference Indicator	39308/2	EL009663	16 th January 2023
vii.	Reference Thermocouple Type K Cold Junction Sensor	2102022/1	C22029-S	24 th February 2023

[Signature]
Calibration Officer

[Signature]
Tharish Nigappan
Approved Signatory

*The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council.

This certificate may not be reproduced other than in full except with prior written approval of ISOLAB.

ISOLAB (Singapore) Pte Ltd *[www.isolab.com.sg]*
2, Ann Koon Circle Singapore 620911 Tel: (65) 6256 4515 Fax: (65) 6256 6824
Website: www.isolab.com.sg Email: service@isolab.com.sg



Date: February 23, 2023 3:23:17 PM
System ID: UAE.TOX.007_CNI1021007

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เอกสารไม่ควบคุม

Date: February 23, 2023 3:23:17 PM
System ID: UAE.TOX.007_CNI1021007

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Thermometer Probe

Notes:

- This calibration certificate is prepared based upon the item specified 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 of similar or equivalent services on similar or equivalent items and does not constitute an endorsement by ISOLAB (S) PTE LTD of the item or the 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.
- 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 required 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.
- Reproduction and transmission of calibration and test certificates by email, fax and or by any other means of soft copies are totally permitted 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 written approval by ISOLAB (S) PTE LTD. The full reproduction under "special discountage" is only done by ISOLAB (S) PTE LTD in the form of black and white "Certified True Copy(s)" with an attention by ISOLAB's quality management or respective approval signatures.
- Additional copies of this calibration and test certificates are available to the clients and customers at an additional, minimal 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 subcontractors can obtain a copy of this certificate from ISOLAB, unless 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.
- 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 statutory duties or otherwise for any direct or indirect loss or damage suffered by the client, its agents or representatives however arising or whether connected with services provided by ISOLAB (S) PTE LTD.
- 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-accessories in the event of calibration.
- ISOLAB (S) PTE LTD, values and honors the inter-laboratory comparison data(s) with same artifact (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 artifact is / are not falls under the responsibilities of ISOLAB. The same conditions are applicable for customers calibration instruments and equipment's as well.
- 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.
- ISOLAB (S) PTE LTD and their performance of the calibration of customer's clients' instruments and equipment's with "as and where condition" and does not constitute any responsibilities for old, used, defunct, damaged, under performance of instruments and equipment's with respect to manufacturers or OEM specifications. If the instruments and equipment's is / are within the adjustment capabilities and available options for adjustments, also with customer clear written agreement to make such adjustments, were made, however no guarantee for the inherent drift and uncertainty of the instruments and equipment's will be warranted.
- 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 corrections and errors indicated in the calibration and test certificate(s). These conditions shall follow the guidelines and requirements stated in ILAC-QH Guidelines.

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

Document Name: Certificate of Calibration Thermometer Probe

CERTIFICATE OF CALIBRATION

No : CS224302
Date of Issue: 06th September 2022Type K Needle Probe
Serial No: 146706161ZLN-P1Page : 2 of 2
Calibration Start Date : 01st September 2022
Calibration End Date : 06th September 2022**Results of Calibration**
The results of the calibration are shown in the below table. The expanded uncertainties of the measurement are at a level of confidence at approximately 95% with a coverage factor "k" as mentioned below.

Calibration Results (As Found)

Actual Temperature (°C)	UUT Average Values (°C)	Corrections (°C)	Uncertainty (°C)	k-Factor
0.0	0.5	-0.5	0.3	2.00
100.1	99.8	0.3	0.3	2.00
230.0	230.8	-0.8	0.3	2.00
350.0	350.4	-0.4	0.5	2.00

Calibration Results (As Left)

Actual Temperature (°C)	UUT Average Values (°C)	Corrections (°C)	Uncertainty (°C)	k-Factor
0.0	0.5	-0.5	0.3	2.00
100.1	99.8	0.3	0.3	2.00
230.0	230.8	-0.8	0.3	2.00
350.0	350.4	-0.4	0.5	2.00

* Manufacturer's Tolerance: (0 to 250) °C = ± 2 °C, (350) °C = ± 3 °C
* The user should determine the suitability of this instrument for its intended use.
* The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council.

Remarks:

- No Adjustment/Offset were made during calibration.
- Although there was no adjustment was made to the UUT, customer instructed to reflect "As Found" and "As Left" results on calibration certificate.

Gerald Chua
Calibration OfficerDate: February 23, 2023 3:23:17 PM
System ID: UAE.TOX.007_CN11021007

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Thermometer Probe

CERTIFICATE OF CALIBRATION

No : CS224299
Date of Issue: 06th September 2022

Issue By ISOLAB (SINGAPORE) PTE LTD

Requested by : Agilent Technologies (Thailand) Ltd
11 Chu Long Building, 22nd Floor A/D
968 Rama IV Road, Silom, Bangkok,
Bangkok 10500 Thailand.Job Order No : 221835
Ambient Temperature : (22 ± 2) °C
Relative Humidity : (55 ± 10) % relative humidity
Page : 1 of 2

Description:

Instruments : Type K Needle Probe
Brand : Omega
Model : TXC36-CASS-020G PROBE
Serial No : 146706161ZLN-P3
Immersion : Approximately 159 mm
Calibration Range : (0 to 350) °C
Calibration Start Date : 29th August 2022
Calibration End Date : 07th September 2022
Next Due Date : 07th September 2023

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

Method of Calibration

The Type K Needle Probe has been calibrated at ISOLAB's laboratory under the ambient conditions stated above according to in-house calibration procedure STCP-004-R6. The Type K Needle Probe was calibrated by comparison with a Reference Sensor in constant temperature bath. The Reference Sensor and Reference Indicator are traceable to national measurement standards maintained at National Metrology Centre (NMC-Singapore), Northern Temperature Primary Laboratory (NTP, 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 Instruments / Equipment	Serial Number	CAL Reference	Next Calibration Due Date
i.	Reference Sensor	36981/2	C022113-S	13 th August 2023
ii.	Reference Sensor	33157/2	C022066-S	05 th July 2023
iii.	Reference Sensor	23821/1	C021084-S	24 th September 2022
iv.	Reference Indicator	09-P123 29109/1	21-1-403	18 th November 2022
v.	Reference Indicator	13-M496 1TL33118/2	22-05-113	13 th May 2023
vi.	Reference Indicator	39398/3	01-000903	10 th January 2023
vii.	Reference Thermocouple Type K Cold Junction Sensor	21022022/1	C022029-S	24 th February 2023

Calibrated By

Gerald Chua
Calibration Officer

Approved By

Therish Nagappa
Approved Signatory

* The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council.
This certificate may not be reproduced other than in full except with prior written approval of ISOLAB.

ISOLAB (Singapore) Pte Ltd
2, Joo Koon Circle Singapore 629931 Tel: (65) 6266 6155 Fax: (65) 6256 6824
Website: www.isolab.com.sg Email: service@isolab.com.sg

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

Document Name: Certificate of Calibration Thermometer Probe

Notes:

- This calibration and certificate is prepared 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 and endorsement by ISOLAB (S) PTE LTD of the item or that ISOLAB (S) PTE LTD in any way does not "guarantee" the long 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 does not guarantee any extrapolation of calibration data beyond and outside the calibration (test) ranges.
- 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 required 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.
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- Additional copies of this calibration and test certificate 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 subcontractors can obtain a copy of this certificate from ISOLAB unless and otherwise it is a necessary 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.
- 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 statutory duties or otherwise for any direct or indirect loss or damage suffered by the client, its agents or representatives however or arising or whether connected with services provided by ISOLAB (S) PTE LTD.
- ISOLAB (S) PTE LTD does not 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 are responsible for non-working of power adapters, battery packs or sub-components in the event of calibration.
- ISOLAB (S) PTE LTD values and honours the inter-laboratory comparisons data(s) with same artifact (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 issued in the same artifact "as and where condition" under the responsibility of ISOLAB. The same conditions are applicable for customers calibration instruments and equipment's as well.
- ISOLAB (S) PTE LTD does not 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.
- ISOLAB (S) PTE LTD and their performance of the calibration of customer's client's instruments and equipment's with "as and where condition" and does not constitute any responsibilities for old, used, defunct, damaged, under performance of instruments and equipment's with respect to manufacturers or OEM specifications. If the instruments and equipment's are 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.
- The combined 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 corrections and errors indicated in the calibration and test certificate(s). These conditions shall follow the guidelines and requirements stated in ILAC-G8 Guidelines.

Date: February 23, 2023 3:23:17 PM
System ID: UAE_TOX_007_CN11021007

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Document Name: Certificate of Calibration Thermometer Probe

CERTIFICATE OF CALIBRATION

No : CS224299

Date of Issue: 06th September 2022Type K Needle Probe
Serial No: 14670616/HZ6IN-P3Page: 2 of 2
Calibration Start Date: 29th August 2022
Calibration End Date: 05th September 2022

Results of Calibration

The results of the calibration are shown in the below table. The expanded uncertainty of the measurement are at a level of confidence at approximately 95% with a coverage factor "k" as mentioned below.

Calibration Results (As Found)				
Actual Temperature (°C)	UUT Average Values (°C)	Corrections (°C)	Uncertainty (°C)	k-Factor
0.0	0.3	-0.3	0.4	2.00
100.0	99.8	0.2	0.4	2.00
230.0	230.3	-0.3	0.4	2.00
350.0	349.8	0.2	0.8	2.00

Calibration Results (As Left)				
Actual Temperature (°C)	UUT Average Values (°C)	Corrections (°C)	Uncertainty (°C)	k-Factor
0.0	0.3	-0.3	0.4	2.00
100.0	99.8	0.2	0.4	2.00
230.0	230.3	-0.3	0.4	2.00
350.0	349.8	0.2	0.8	2.00

* Manufacturer's Tolerance: (0 to 230 °C) ± 0.1 °C, (230 to 350 °C) ± 0.2 °C

* The user should determine the suitability of this instrument for its intended use.

* The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council.

Remarks:

- No Adjustment/Offset were made during calibration.
- Although there was no adjustment was made to the UUT, customer instructed to reflect "As Found" and "As Left" results on calibration certificate.

Gerald Chan
Calibration OfficerDate: February 23, 2023 3:23:17 PM
System ID: UAE_TOX_007_CN11021007

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Thermometer Probe

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

Materials

Document Name: Certificate of Analysis ECD std kit, 18713-60040



Certificate of Analysis

Electron Capture Detector Test Sample

Agilent Part Number: 18713-60040 Sample Lot Number: 0006700236

This analytical reference material was manufactured and verified in accordance with an ISO 9001 registered quality system, and the analysis concentrations were verified by an ISO 17025 accredited laboratory. The certified values for each analyte are shown in the table below.

Concentrations:	
gamma-BHC (linoleic)	0.033 mg/L (± 0.5%)
albin	0.033 mg/L (± 0.5%)

Solvent: Isooctane

* Albin and Isooctane are not included in the manufacture of this standard. Balance control in the manufacture of this standard are calibrated with weights traceable to NIST in compliance with ANSI/NISO Z-39.1 and ISO 9001.

Purities:	
gamma-BHC (linoleic)	99.9%
albin	99.9%
Isooctane	99.9%

Typical Analytical Spectrum or Chromatography
GC Chromatography - gamma-BHC (linoleic) and albin in isooctaneDate of release: 26 August 2022
Date of expiration: 30 September 2024Agilent Technologies
Materials Reference
ISO 9001 AccreditedDate: February 23, 2023 3:23:17 PM
System ID: UAE_TOX_007_CN11021007

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เอกสารไม่ควบคุม

Materials

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



Certificate of Analysis

FID MDL Sample

Agilent Part Number: 8908-5372 Sample Lot Number: 890666164

This analysis is a reference material not manufactured and certified to meet the requirements of any ISO 9001 registered quality system, and the goal is to demonstrate your method by using ISO 17025 accredited laboratory. The certified value for each analyte was determined previously.

Concentrations:

n-tetradecane	2.37 mg/L (± 0.2%)
n-tridecane	2.36 mg/L (± 0.2%)
n-pentadecane	23.6 mg/L (± 0.2%)
n-hexadecane	23.6 mg/L (± 0.2%)

Substrate: Inertcoated

Certified by: Agilent and client before use used in the manufacture of this standard. Release used in the manufacture of this standard are addressed with weight measure in ISO 17025 compliance with ISO 9001:2015 and ISO 19000.

Purities:

n-tetradecane	99.9%
n-tridecane	99.9%
n-pentadecane	99.9%
n-hexadecane	99.9%
Inertcoated	99.9%

Typical Analytical Spectrum or Chromatography

FID Chromatography - n-tetradecane, n-tridecane, n-pentadecane and n-hexadecane in Inertcoated

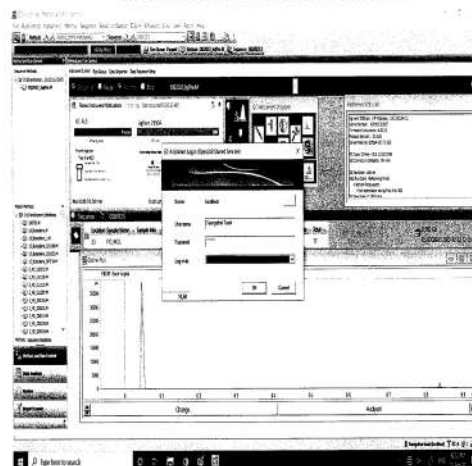
Date of release: 08 March 2022
Date of expiration: 31 March 2025Marius Bouffard
SAS RepresentativeDate: February 23, 2023 3:23:17 PM
System ID: UAE_TOX_007_CN11021007

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เอกสารไม่ควบคุม

General

Document Name: CDS Logon

Date: February 23, 2023 3:23:17 PM
System ID: UAE_TOX_007_CN11021007

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เอกสารไม่ควบคุม

General

Document Name: Certificate of System Qualification

Software Verification Report					
Date:	Wednesday, 22 February, 2023	Time:	13:13:43 PM [UTC +07:00]	Host Name:	QC04-A
Windows User Name:	GC-04	Base Revision Number:	C 01.18 Update 03 (017)	Product Name:	Agilent OpenLab
Install Type:	Workstation CoreStation Edition	Additional Package:	Default		

Base Reference File Name: AgilentOpenLabCDS.exe

Summary:

Overall Evaluation of Installation Check: PASS

File Report Summary:

No missing files or invalid files found
No system file difference found

GAC File Report Summary:

No missing or invalid GAC files found

Files Registration Report Summary:

Not registered files: NONE

No missing registered files found

Registry Report Summary:

No invalid registry entries found

Details

ID	Description
04	Agilent OpenLab CDS ChemStation (64-bit) Drivers 1.8 [70]
05	Agilent OpenLab Data Provider for ChemStation A.1.0140 [0]
06	Agilent OpenLab CDS ChemStation Micro GC Drivers 2.1.1.0 [0]
07	Agilent OpenLab ControlPanel ChemStation Plugins A.01.10 [017]
08	Agilent OpenLab CDS ChemStation GC Drivers 3.2 [15]
09	Agilent OpenLab CDS ChemStation LC and CE Drivers 3.2.23 [0]
10	Agilent OpenLab CDS ChemStation Edition C 01.10 [28 7]

Date: February 23, 2023 3:23:17 PM
System ID: UAE_TOX_007_CN11021007

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เอกสารไม่ควบคุม

General

Document Name: Certificate of System Qualification

Software Verification Report					
Date:	Wednesday, 22 February, 2023	Time:	13:13:43 PM [UTC +07:00]	Host Name:	GC04-A
Windows User Name:	GC-04	Base Revision Number:	2.5	Product Name:	Agilent OpenLAB CDS ChemStation 3900 A/D Drivers
Install Type:	N/A	Additional Package:	N/A		

Base Reference File Name: 35000E_Ruffile.exe

Summary:

Overall Evaluation of Installation Check: PASS

File Report Summary:

No missing files or invalid files found
No system file difference found

Files Registration Report Summary:

Files Registration check not required for this product

Registry Report Summary:

Registry entries check not required for this product

Date: February 23, 2023 3:23:17 PM
System ID: UAE_TOX_007_CN11021007

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เอกสารไม่ควบคุม

User Name: saenguthai.tarak
Hostname: LAPTOP-CQ3SKOMV

System Id: UAE.TOX.007_CN11021007
Print Date: February 23, 2023 3:23:23 PM

UAE.TOX.007_CN11021007 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 9:26:24 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No limits associated	Run Count : 1
February 23, 2023 9:26:26 AM	Start	Execution	Inlet Pressure Decay - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
February 23, 2023 9:26:37 AM	End	Execution	Inlet Pressure Decay - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	Run Count : 1
February 23, 2023 9:26:39 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
February 23, 2023 9:26:44 AM	End	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
February 23, 2023 9:26:46 AM	Start	Execution	Detector Flow Accuracy - Front UECD - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
February 23, 2023 9:27:13 AM	Audit	Data	Detector Flow Accuracy - Front UECD - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
February 23, 2023 9:27:19 AM	End	Execution	Detector Flow Accuracy - Front UECD - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
February 23, 2023 9:27:22 AM	Start	Execution	Detector Flow Accuracy - Back FID - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None

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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: saenguthai.tarak
Hostname: LAPTOP-CQ3SKOMV

System Id: UAE.TOX.007_CN11021007
Print Date: February 23, 2023 3:23:23 PM

UAE.TOX.007_CN11021007 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 9:27:55 AM	Audit	Data	Detector Flow Accuracy - Back FID - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
February 23, 2023 9:27:57 AM	End	Execution	Detector Flow Accuracy - Back FID - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
February 23, 2023 9:27:59 AM	Start	Execution	Detector Flow Accuracy - Back FID - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
February 23, 2023 9:28:22 AM	Audit	Data	Detector Flow Accuracy - Back FID - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
February 23, 2023 9:28:26 AM	End	Execution	Detector Flow Accuracy - Back FID - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
February 23, 2023 9:28:29 AM	Start	Execution	Detector Flow Accuracy - Back FID - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
February 23, 2023 9:29:03 AM	Audit	Data	Detector Flow Accuracy - Back FID - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
February 23, 2023 9:29:06 AM	End	Execution	Detector Flow Accuracy - Back FID - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
February 23, 2023 9:29:08 AM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
February 23, 2023 9:30:02 AM	Audit	Data	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry

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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: saenguthai.tarak
Hostname: LAPTOP-CQ3SKOMV

System Id: UAE.TOX.007_CN11021007
Print Date: February 23, 2023 3:23:23 PM

UAE.TOX.007_CN11021007 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 9:30:04 AM	End	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
February 23, 2023 9:30:06 AM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
February 23, 2023 9:30:40 AM	Audit	Data	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
February 23, 2023 9:30:43 AM	End	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
February 23, 2023 9:30:45 AM	Start	Execution	GC Oven Temperature Stability - 7890 - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
February 23, 2023 9:31:45 AM	Audit	Data	GC Oven Temperature Stability - 7890 - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
February 23, 2023 9:31:48 AM	End	Execution	GC Oven Temperature Stability - 7890 - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
February 23, 2023 9:31:53 AM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front UECD - Part of System Preparation - No limits associated	None
February 23, 2023 2:40:21 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front UECD - Part of System Preparation - No limits associated	None

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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: saenguthai.tarak
Hostname: LAPTOP-CQ3SKOMV

System Id: UAE.TOX.007_CN11021007
Print Date: February 23, 2023 3:23:23 PM

UAE.TOX.007_CN11021007 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 2:40:56 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front UECD - Part of System Preparation - No limits associated	None
February 23, 2023 2:42:19 PM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front UECD - Part of System Preparation - No limits associated	Data file Path : E:\UAE\2023020223_EC0\14-10-4500_GC7890_uECD_SC10.D\EC01A.ch
February 23, 2023 2:43:14 PM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front UECD - Part of System Preparation - No limits associated	Run Count : 1
February 23, 2023 2:43:17 PM	Start	Execution	Noise and Drift - Front UECD - Detector UECD - L (Noise) : <= 3.00 Hz - L (Drift) : <= 15.00 Hz	None
February 23, 2023 2:43:54 PM	Audit	Data	Noise and Drift - Front UECD - Detector UECD - L (Noise) : <= 3.00 Hz - L (Drift) : <= 15.00 Hz	Data file Path : E:\UAE\2023020223_EC0\14-10-4500_GC7890_uECD_SC10.D\EC01A.ch
February 23, 2023 2:44:11 PM	End	Execution	Noise and Drift - Front UECD - Detector UECD - L (Noise) : <= 3.00 Hz - L (Drift) : <= 15.00 Hz	Run Count : 1
February 23, 2023 2:44:14 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front UECD - GC - L (Area) : <= 3.00% - L (Ret. Time) : <= 1.00%	None
February 23, 2023 2:44:45 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front UECD - GC - L (Area) : <= 3.00% - L (Ret. Time) : <= 1.00%	None

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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: saenguthai.tarak
Hostname: LAPTOP-CQ3SKOMV
System ID: UAE.TOX.007_CN11021007
Print Date: February 23, 2023 3:23:33 PM

UAE.TOX.007_CN11021007 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 2:46:43 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front UECD: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE\2023020203_ECD 14-10-45\OQ_GC7890_uEC D_Pne01-020F.D\ECD1A.ch
February 23, 2023 2:46:43 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front UECD: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE\2023020203_ECD 14-10-45\OQ_GC7890_uEC D_Pne01-021F.D\ECD1A.ch
February 23, 2023 2:46:43 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front UECD: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE\2023020203_ECD 14-10-45\OQ_GC7890_uEC D_Pne01-022F.D\ECD1A.ch
February 23, 2023 2:46:43 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front UECD: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE\2023020203_ECD 14-10-45\OQ_GC7890_uEC D_Pne01-023F.D\ECD1A.ch
February 23, 2023 2:46:52 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front UECD: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE\2023020203_ECD 14-10-45\OQ_GC7890_uEC D_Pne01-024F.D\ECD1A.ch
February 23, 2023 2:46:52 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front UECD: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE\2023020203_ECD 14-10-45\OQ_GC7890_uEC D_Pne01-025F.D\ECD1A.ch
February 23, 2023 2:47:57 PM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front UECD: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1

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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: saenguthai.tarak
Hostname: LAPTOP-CQ3SKOMV
System ID: UAE.TOX.007_CN11021007
Print Date: February 23, 2023 3:23:33 PM

UAE.TOX.007_CN11021007 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 2:48:02 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front UECD: - Detector UECD - L: >= 1500	None
February 23, 2023 2:48:26 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front UECD: - Detector UECD - L: >= 1500	None
February 23, 2023 2:49:10 PM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front UECD: - Detector UECD - L: >= 1500	Data files Path : E:\UAE\2023uECD_SN_01.D\ECD1A.ch
February 23, 2023 2:51:07 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front UECD: - Detector UECD - L: >= 1500	None
February 23, 2023 2:51:24 PM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front UECD: - Detector UECD - L: >= 1500	Run Count : 1
February 23, 2023 2:51:33 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Back FID: - Part of System Preparation - No limits associated	None
February 23, 2023 2:52:00 PM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Back FID: - Part of System Preparation - No limits associated	Data files Path : E:\UAE\2023FID_SC_01.D\FID28.ch
February 23, 2023 2:52:37 PM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Back FID: - Part of System Preparation - No limits associated	Run Count : 1
February 23, 2023 2:52:44 PM	Start	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/ hour	None

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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: saenguthai.tarak
Hostname: LAPTOP-CQ3SKOMV
System ID: UAE.TOX.007_CN11021007
Print Date: February 23, 2023 3:23:33 PM

UAE.TOX.007_CN11021007 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 2:53:23 PM	Start	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/ hour	None
February 23, 2023 2:53:53 PM	Audit	Data	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/ hour	Data files Path : E:\UAE\2023OQ_GC7890_FID_IND-1.D\FID28.ch
February 23, 2023 2:54:10 PM	End	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/ hour	Run Count : 1
February 23, 2023 2:54:13 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
February 23, 2023 2:57:04 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
February 23, 2023 2:57:37 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
February 23, 2023 2:59:21 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE\2023OQ2023 2023-02-22 12-25-05\OQ_GC7890_FID01_Pne0104.D\FID18.ch
February 23, 2023 2:59:21 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE\2023OQ2023 2023-02-22 12-25-05\OQ_GC7890_FID01_Pne0105.D\FID18.ch

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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: saenguthai.tarak
Hostname: LAPTOP-CQ3SKOMV
System ID: UAE.TOX.007_CN11021007
Print Date: February 23, 2023 3:23:33 PM

UAE.TOX.007_CN11021007 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 2:58:22 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE\2023OQ2023 2023-02-22 12-25-05\OQ_GC7890_FID01_Pne0106.D\FID18.ch
February 23, 2023 2:59:22 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE\2023OQ2023 2023-02-22 12-25-05\OQ_GC7890_FID01_Pne0107.D\FID18.ch
February 23, 2023 2:59:26 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE\2023OQ2023 2023-02-22 12-25-05\OQ_GC7890_FID01_Pne0108.D\FID18.ch
February 23, 2023 2:59:26 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\UAE\2023OQ2023 2023-02-22 12-25-05\OQ_GC7890_FID01_Pne0109.D\FID18.ch
February 23, 2023 3:00:43 PM	End	Execution	Injection Precision - Injection Tower, Front SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
February 23, 2023 3:00:56 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Back FID: - Detector FID - L: >= 300000	None
February 23, 2023 3:02:10 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Back FID: - Detector FID - L: >= 300000	None
February 23, 2023 3:02:36 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Back FID: - Detector FID - L: >= 300000	None
February 23, 2023 3:03:13 PM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Back FID: - Detector FID - L: >= 300000	Data files Path : E:\UAE\2023FID_SN_01.D\FID18.ch

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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: saenguthai.tarak
 Hostname: LAPTOP-GQ9SK08V
 System ID: UAE_TOX.007_CN11021007
 Print Date: February 23, 2023 3:23:23 PM

UAE_TOX.007_CN11021007 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 3:03:51 PM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Back FID - Detector FID - L: >= 300000	Run Count : 1
February 23, 2023 3:04:00 PM	End	Qualification	Session	OQ
February 23, 2023 3:04:00 PM	Start	Reporting	Session	None
February 23, 2023 3:18:15 PM	Audit	Reporting	Session	Report Generated : Certificate
February 23, 2023 3:19:57 PM	Audit	Reporting	Session	Report Signed : Certificate PDF Name: UAE_TOX.007_CN11021007_20230223_Certificate_1.pdf User Name: saenguthai.tarak@non.agilent.com Full Name of Signer: Saenguthai Tarak Reason for signature: Executed protocol and published this original version of document
February 23, 2023 3:22:42 PM	Audit	Reporting	Session	Report Generated : Report

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Date: February 23, 2023 3:23:17 PM
 System ID: UAE_TOX.007_CN11021007

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เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
 CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
 53/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
 TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert. No.: 23TM193
 Page : 1 of 3

Certificate of Calibration

Equipment : Water Bath
 Manufacturer : Memmert
 Model : WNE 14
 Serial No. : L416.0606
 ID No. : UAE.MIC.002/2560
 Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangchak, Phrakhanong,
 Bangkok 10260
 Location : Microbiology Laboratory
 Received Order : 15 February 2023
 Calibration Date : 15 February 2023
 Ambient Temperature : (26 ± 10) °C
 Relative Humidity : (50 ± 30) %
 Calibrated by : Suwit Imjai
 Approved by :
 () Pornthippa Tameyakul
 (/) Malee Bulkruea

Issue Date : 24 February 2023

The Uncertainties are for a confidence probability of approximately 95%.

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

เอกสารไม่ควบคุม



Equipment : Water Bath
 Condition As-Received : Used Item
 Reference : 2302-0295OC-2
 Procedure Used :-

Cert. No.: 23TM193
 Page : 2 of 3

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY59003411	22LM165	26 Nov 2023

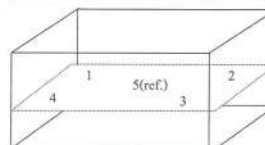
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	22	65	231
Finished of Calibration	23	61	231



Front

Position :	Ref. Std. ID No.:
1	4804539-001
2	4804539-002
3	4804539-003
4	4804539-004
5(ref.)	4804539-005

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2302-0295OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 23TM193
Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)				
			Position				
			1	2	3	4	5 (ref.)
44.5	44.5	44.5	44.453	44.437	44.428	44.477	44.459

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor k
44.5	0.079	0.038	0.15	2

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

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

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

UUC* : Unit Under Calibration

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

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

-o0o-

เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534-4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL: 0-2717-3006-29 FAX: 0-2719-9484



Cert. No.: 23TM194
Page : 1 of 3

Certificate of Calibration

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 14
Serial No. : L416.0612
ID No. : UAE.MIC.003/2560
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 15 February 2023
Calibration Date : 15 February 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Suwit Imjai

Approved by : 
Approved Signatory

(/) Pornthippa Tameyakul
(/) Malee Butkruea

Issue Date : 24 February 2023

The Uncertainties are for a confidence probability of approximately 95%.

This certificate may not be reproduced other than in full, except with the prior written

Approval of the head of Corporate Services 3: Equipment Calibration and Testing Services

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2302-0295OC-3
Procedure Used :-

Cert. No.: 23TM194
Page : 2 of 3

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY59003411	22LM165	26 Nov 2023

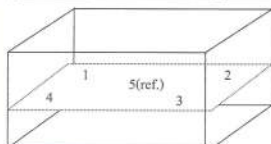
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	22	65	231
Finished of Calibration	22	63	230



Front

Position :	Ref. Std. ID No.:
1	4804539-001
2	4804539-002
3	4804539-003
4	4804539-004
5(ref.)	4804539-005

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2302-0295OC-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 23TM194
Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)				
			Position				
			1	2	3	4	5 (ref.)
44.5	44.5	44.6	44.520	44.509	44.498	44.552	44.530

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor k
44.5	0.077	0.037	0.15	2

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

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

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

UUC* : Unit Under Calibration

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

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

-o0o-

เอกสารไม่ควบคุม



Cert. No.: 23TM726
Page : 1 of 3

Certificate of Calibration

Equipment : Cooled Incubator
Manufacturer : Binder
Model : KB 400 E6
Serial No. : 2020000015535
ID No. : UAE.MIC.018/2564
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udonsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory (302)
Received Order : 27 April 2023
Calibration Date : 27 April 2023
Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$

Calibrated by : Tawatchai Pama

Approved by :
Approved Signatory

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

Issue Date : 12 May 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

เอกสารไม่ควบคุม



Equipment : Cooled Incubator
Condition As-Received : Used Item
Reference : 2304-0461OC-1

Cert. No.: 23TM726
Page : 2 of 3

Procedure Used :-

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY57013711	22LM93	02 Jul 2023

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

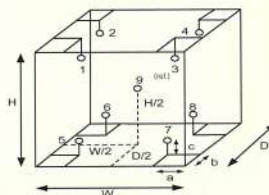
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	20	19
REL.Humid. (%)	72	82
AC Supply (Volt)	230	231



Probe Installation Details :

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

Dimension of Chamber :

D = 0.48 m
W = 0.65 m
H = 1.2 m
Capacity = 0.37 m³

Position :	Ref. Std. ID No.:
1	22-18RTD-2/1
2	18RTD-2/2
3	18RTD-2/3
4	18RTD-2/4
5	18RTD-2/5
6	18RTD-2/6
7	18RTD-2/7
8	18RTD-2/8
9 (ref.)	18RTD-2/9

เอกสารไม่ควบคุม



Equipment : Cooled Incubator
Condition As-Received : Used Item
Reference : 2304-0461OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 23TM726
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
35.0	35.0	35.0	0.0090	0.16	0.21	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
35.0	34.913	34.997	34.834	34.893	35.034	35.027	35.025	35.035	34.980	0.30

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

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

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

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

UUC* : Unit Under Calibration

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

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

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Cert. No.: 23TM728
Page : 1 of 3

Certificate of Calibration

Equipment : Incubator
Manufacturer : Memmert
Model : IPP 260
Serial No. : V616.0066
ID No. : UAE.MIC.032/2559
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udonsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory (302)

Received Order : 27 April 2023
Calibration Date : 27 - 28 April 2023
Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$

Calibrated by : Tawatchai Pama

Approved by :
Approved Signatory

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

Issue Date : 11 May 2023

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2304-0461OC-6
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 23TM728
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
25.0	25.0	25.0	0.020	0.81	1.2	2
36.0	36.0	36.0	0.15	1.1	1.6	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
25.0	25.541	25.354	25.388	25.278	24.341	24.349	24.379	24.455	24.747	0.30
36.0	35.275	35.351	35.768	35.941	36.543	36.590	36.653	36.728	36.232	0.39

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

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

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

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

UUC* : Unit Under Calibration

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

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

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Equipment : Incubator
Condition As-Received : Used Item
Reference : 2304-0461OC-6

Cert. No.: 23TM728
Page : 2 of 3

Procedure Used :-

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY57013711	22LM93	02 Jul 2023

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

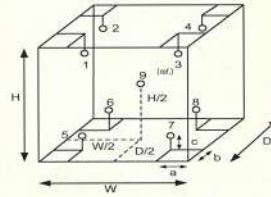
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	25	22
REL.Humid. (%)	76	83
AC Supply (Volt)	231	231



Position :	Ref. Std. ID No.:
1	22-18RTD-2/1
2	18RTD-2/2
3	18RTD-2/3
4	18RTD-2/4
5	18RTD-2/5
6	18RTD-2/6
7	18RTD-2/7
8	18RTD-2/8
9 (ref.)	18RTD-2/9

Probe Installation Details :

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

Dimension of Chamber :

D = 0.50 m
W = 0.64 m
H = 0.80 m
Capacity = 0.26 m³

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