

ภาคผนวกที่ 4

เอกสารการสอบเทียบความถูกต้องของเครื่องมือ

**ตารางสรุปรายการเอกสารการสอบเทียบความถูกต้องของเครื่องมือเก็บตัวอย่าง
และเครื่องมือตรวจวิเคราะห์คุณภาพสิ่งแวดล้อม**

รายการตรวจวัด	เครื่องมือเก็บตัวอย่าง	เครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
1. คุณภาพอากาศในบรรยากาศ NO _x / NO ₂	NO/NO _x /NO ₂ Analyzer No. B05, B15, R01	NO/NO _x /NO ₂ Analyzer No. B05, B15, R01
NMHC	Personal Pump SKC No. R12 Rotameter No. L-R02	THC Analyzer
MTBE	Personal Pump SKC No. R19, R35, R42 Rotameter No. L-R02	GC/MS
THC	Personal Pump SKC No. R12 Rotameter No. L-R02	THC Analyzer
1,3-Butadiene	Mass Flow Meter	GC/MS
2. คุณภาพอากาศจากปล่อง 1,3-Butadiene	Personal Pump SKC No. R45	GC/MS
Oxides of Nitrogen	Rotameter No. L-R02 Vacuum Gauge	Spectrophotometer
3. ระดับเสียงในบรรยากาศ L _{eq} 24 hr	Acoustic Calibrator Sound Level Meter ACO-R11, R15, R18, R33, R37, R44	-
4. คุณภาพน้ำ TOC	-	IR
5. ระดับเสียงในสถานประกอบการ L _{eq} 8 hr	Acoustic Calibrator Sound Level Meter ACO-R07, R15, R34, R35, R44, R47	-
6. ระดับเสียงติดตัวบุคคล Noise Dose	Acoustic Calibrator Sound Level Meter NMD-B01, B02, B03, B04, B05, B14 Sound Level Meter NMD-R02, R03, R05, R06, R13, R20, R22, R26, R27, R35	-
7. คุณภาพอากาศในสถานประกอบการ 1,3-Butadiene	Personal Pump SKC No. B48, B50, R24, R36, R38, R39, R40, R42 Rotameter No. L-R02, R04, R06	GC/MS
Methanol	Personal Pump SKC No. B03, B23, R38, R39 Rotameter No. L-R02, R04, R06	GC/FID
MTBE	Personal Pump SKC No. B31, R36, R37 Rotameter No. L-R02, R04, R06	GC/MS
Toluene	Personal Pump SKC No. B52, R39, R42 Rotameter No. L-R02, R04, R06	GC/FID

คุณภาพอากาศในบรรยากาศ



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	06 November 2023	BRAND :	API	MODEL :	200E
NO.	NOX-B05	SERIAL NO.	2284		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 08 August 2023		Serial No.	: 911	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: A00726SV	
Certified Date	: 05 January 2023		Expired Date	: 05 January 2026	
Cylinder Conc.	: 48.8 ppm				
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
% RH	49				
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	0.10	-	0	-
NO Span	400	399.8	-0.050	400.0	1.008
NO _x Span	400	400.2	0.050	400.0	1.011
API Model 200E NO _x Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	505	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.1	mV	-20 - 150		
AZERO	93.9	mV	-20 - 150		
HVPS	670	V	420 - 900 constant		
RCELL TEMP	50.1	°C	50 ± 1		
BOX TEMP	29.2	°C	8 - 48		
PMT TEMP	7.4	°C	7 ± 2		
MOLY TEMP	314.9	°C	315 ± 5		
RCELL PRESS	8.3	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.4	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO _x Span Conc	400	PPB	20 - 20,000		
NO Slope	1.008	-	1.0 ± 0.3		
NO _x Slope	1.011	-	1.0 ± 0.3		
NO Offset	1.5	mV	-20 to +150		
NO _x Offset	0.9	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	06 November 2023	BRAND :	API	MODEL :	200A
NO.	NOX-B15	SERIAL NO.	213		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 08 August 2023		Serial No.	: 911	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: A00726SV	
Certified Date	: 05 January 2023		Expired Date	: 05 January 2026	
Cylinder Conc.	: 48.8 ppm				
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
% RH	49				
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	- 0.10	-	0	-
NO Span	400	399.7	-0.075	400.0	1.006
NO _x Span	400	400.1	0.025	400.0	1.010
API Model 200A NO _x Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	509	cc/min	500 ± 50		
OZONE FLOW	79	cc/min	80 ± 15		
PMT	103.3	mV	-20 - 150		
AZERO	94.2	mV	-20 - 150		
HVPS	674	V	420 - 900 constant		
RCELL TEMP	50.2	°C	50 ± 1		
BOX TEMP	29.1	°C	8 - 48		
PMT TEMP	7.3	°C	7 ± 2		
MOLY TEMP	314.7	°C	315 ± 5		
RCELL PRESS	8.4	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.6	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO _x Span Conc	400	PPB	20 - 20,000		
NO Slope	1.006	-	1.0 ± 0.3		
NO _x Slope	1.010	-	1.0 ± 0.3		
NO Offset	1.2	mV	-20 to +150		
NO _x Offset	0.8	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	06 November 2023	BRAND :	API	MODEL :	200E
NO.	NOX-R01	SERIAL NO.	769		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 08 August 2023		Serial No.	: 911	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: A00726SV	
Certified Date	: 05 January 2023		Expired Date	: 05 January 2026	
Cylinder Conc.	: 48.8 ppm				
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
% RH	49				
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.), PPB			Final Reading (After Adj.), PPB	
Set Point	Expected Concentration	Analyzer Response	% Dif	Analyzer Response	Slope
Zero	0	0.11	-	0	-
NO Span	400	400.1	0.025	400.0	1.010
NO _x Span	400	400.3	0.075	400.0	1.014
API Model 200E NO _x Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	507	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.0	mV	-20 - 150		
AZERO	93.7	mV	-20 - 150		
HVPS	675	V	420 - 900 constant		
RCELL TEMP	50.4	°C	50 ± 1		
BOX TEMP	29.5	°C	8 - 48		
PMT TEMP	7.3	°C	7 ± 2		
MOLY TEMP	315.2	°C	315 ± 5		
RCELL PRESS	8.5	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.7	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO _x Span Conc	400	PPB	20 - 20,000		
NO Slope	1.010	-	1.0 ± 0.3		
NO _x Slope	1.014	-	1.0 ± 0.3		
NO Offset	1.7	mV	-20 to +150		
NO _x Offset	1.0	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		

Calibrated by :

Approved by :



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Personal Pump Calibration Report												
Calibration Method : Dry Cal Primary Flowmeter						Model : Defender 510-H			S/N : 136164			
Environmental Conditions												
Temperature		25		± 3		°C						
Pressure		1010		± 15		mmbar						
Personal Pump Data												
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3	y	R ²
R01	SKC	224-PCXR4	602467	02/10/2023	1,000	1,500	2,000	1,001	1,499	1,999	1.010x - 22.581	0.999
R02	SKC	224-PCXR4	626450	06/10/2023	1,000	2,000	3,000	996	1,493	1,986	0.992x + 3.742	1.000
R03	SKC	224-PCXR4	691592	06/10/2023	1,000	1,500	2,000	989	1,495	1,994	0.999x - 6.866	1.000
R04	SKC	224-PCXR4	691672	06/10/2023	1,000	1,500	2,000	998	1,491	1,989	0.991x + 5.421	1.000
R05	SKC	224-PCXR4	798470	06/10/2023	1,000	1,500	2,000	999	1,495	1,995	1.005x - 18.995	0.999
R06	SKC	224-PCXR4	798456	02/10/2023	1,000	1,500	2,000	1,000	1,488	1,987	0.986x + 13.398	1.000
R07	SKC	224-PCXR4	798480	02/10/2023	1,000	1,500	2,000	1,000	1,497	1,998	1.009x - 21.689	0.999
R08	SKC	224-PCXR4	883215	05/10/2023	1,000	1,500	2,000	994	1,500	1,990	0.995x + 3.109	1.000
R09	SKC	224-PCXR4	034650	05/10/2023	1,000	1,500	2,000	999	1,497	1,996	1.008x - 21.526	0.999
R10	SKC	224-PCXR4	091765	05/10/2023	1,000	1,500	2,000	996	1,493	1,994	1.000x - 6.596	1.000
R11	SKC	224-PCXR4	091763	04/10/2023	1,000	1,500	2,000	998	1,496	1,983	0.998x - 9.346	0.999
R12	SKC	224-PCXR4	091568	04/10/2023	1,000	1,500	2,000	1,000	1,497	1,999	1.009x - 21.948	0.999
R13	SKC	224-PCXR4	091638	02/10/2023	1,000	1,500	2,000	994	1,495	1,986	0.993x + 2.981	1.000
R14	SKC	224-PCXR4	091764	06/10/2023	1,000	1,500	2,000	998	1,498	2,000	1.012x - 26.788	0.999
R15	SKC	224-PCXR8	529457	06/10/2023	1,000	1,500	2,000	995	1,492	1,987	0.994x + 1.457	1.000
R16	SKC	224-PCXR8	529643	04/10/2023	1,000	1,500	2,000	1,000	1,498	1,997	1.007x - 17.908	0.999
R17	SKC	224-PCXR8	529645	07/10/2023	1,000	1,500	2,000	998	1,496	1,998	1.011x - 25.546	0.999
R18	SKC	224-PCXR8	566756	03/10/2023	1,000	1,500	2,000	994	1,490	1,989	0.995x - 1.759	1.000
R19	SKC	224-PCXR8	566802	02/10/2023	1,000	1,500	2,000	1,000	1,496	1,999	1.010x - 22.864	0.999
R20	SKC	224-PCXR8	529089	06/10/2023	1,000	1,500	2,000	992	1,506	1,996	1.008x - 22.151	0.999
R21	SKC	224-PCXR8	665728	02/10/2023	1,000	1,500	2,000	992	1,486	1,994	1.002x - 11.842	1.000
R22	SKC	224-PCXR8	707444	03/10/2023	1,000	1,500	2,000	1,001	1,500	1,999	1.007x - 18.171	0.999
R23	SKC	224-PCXR8	761067	06/10/2023	1,000	1,500	2,000	1,000	1,488	1,993	0.992x + 5.744	1.000
R24	SKC	224-PCXR8	707893	05/10/2023	1,000	1,500	2,000	994	1,505	1,996	1.005x - 15.010	0.999
R25	SKC	224-PCXR8	761052	06/10/2023	1,000	1,500	2,000	999	1,495	1,989	0.991x + 5.640	1.000
R26	SKC	224-PCXR8	707956	07/10/2023	1,000	1,500	2,000	1,010	1,497	2,002	0.999x - 2.874	0.999
R27	SKC	224-PCXR8	707398	07/10/2023	1,000	1,500	2,000	1,001	1,496	1,997	1.008x - 20.237	0.999
R28	SKC	224-PCXR8	707481	07/10/2023	1,000	1,500	2,000	993	1,506	1,995	1.002x - 10.719	1.000
R29	SKC	224-PCXR8	707402	04/10/2023	1,000	1,500	2,000	995	1,495	1,989	0.995x + 1.091	1.000
R30	SKC	224-PCXR8	093811	04/10/2023	1,000	1,500	2,000	998	1,495	1,992	0.997x - 0.693	1.000
R31	SKC	224-PCXR8	093183	06/10/2023	1,000	1,500	2,000	999	1,502	1,997	0.988x + 9.127	0.999
R32	SKC	224-PCXR8	671950	07/10/2023	1,000	1,500	2,000	998	1,495	1,994	0.998x - 3.451	1.000
R33	SKC	224-PCXR4	626254	07/10/2023	1,000	1,500	2,000	992	1,503	1,995	1.011x - 30.016	0.999
R34	SKC	224-PCXR4	626131	03/10/2023	1,000	1,500	2,000	990	1,499	1,997	1.014x - 32.986	0.999
R35	SKC	224-PCXR8	707460	07/10/2023	1,000	1,500	2,000	990	1,501	1,997	1.005x - 15.898	1.000
R36	SKC	224-PCXR8	707446	05/10/2023	1,000	1,500	2,000	1,000	1,497	1,997	1.002x - 7.547	1.000
R37	SKC	224-PCXR8	707432	02/10/2023	1,000	1,500	2,000	995	1,498	1,995	0.999x - 4.856	1.000
R38	SKC	224-PCXR8	707349	02/10/2023	1,000	1,500	2,000	991	1,496	1,992	1.000x - 7.364	1.000
R39	SKC	224-PCXR8	761095	06/10/2023	1,000	1,500	2,000	995	1,489	1,985	0.990x + 6.253	1.000
Calibrated by :						Approved by :						



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature : 25 \pm 3 $^{\circ}$ C
Pressure : 1010 \pm 15 mmbar

Personal Pump Data

Calibration Data

No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3	y	R ²
R40	SKC	224-PCXR4	612753	07/10/2023	1,000	1,500	2,000	999	1,496	1,996	1.008x - 21.287	0.999
R41	SKC	224-PCXR4	626140	03/10/2023	1,000	1,500	2,000	990	1,499	1,996	1.013x - 31.991	0.999
R42	SKC	224-PCXR4	626463	07/10/2023	1,000	1,500	2,000	998	1,493	1,994	0.998x - 4.088	1.000
R43	SKC	224-PCXR4	626129	07/10/2023	1,000	1,500	2,000	1,001	1,498	1,999	1.010x - 21.673	0.999
R44	SKC	224-PCXR4	602753	07/10/2023	1,000	1,500	2,000	994	1,492	1,990	0.997x - 4.275	1.000
R45	SKC	224-PCXR4	626137	06/10/2023	1,000	1,500	2,000	992	1,487	1,996	1.006x - 16.996	1.000

Calibrated by :

Approved by :



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Rotameter Calibration Report (For Personal Pump Low Flow Adjust)

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Calibration Data

Rotameter Data				Calibration Data							
No.	Brand	Model	Date	Flow Rate (ml/min)						Value From Calibration Curve	
				Flow Rate (Reading)			Actual (Q std.)			y	R ²
				1	2	3	1	2	3		
L-R01	Dwyer	VFA-21	02/10/2023	50	100	200	50.4	98.3	200.4	0.989x + 0.553	1.000
L-R02	Dwyer	VFA-21	06/10/2023	50	100	200	49.3	100.6	199.3	1.002x - 1.123	0.999
L-R03	Dwyer	VFA-21	04/10/2023	50	100	200	50.1	99.3	200.7	1.001x - 0.261	1.000
L-R04	Dwyer	VFA-21	02/10/2023	50	100	200	50.1	100.7	200.6	1.006x - 1.002	0.999
L-R05	Dwyer	VFA-21	03/10/2023	50	100	200	49.8	101.4	200.7	0.995x + 1.282	1.000
L-R06	Dwyer	VFA-21	05/10/2023	50	100	200	50.3	101.1	199.7	1.004x - 0.716	0.999

Calibrated by :

Approved by :



Certificate of Calibration

Certificate Number : SPR23050422-1 Page : 1 of 3

Customer : S.P.S. CONSULTING SERVICE CO., LTD.
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment Name : Mass Flow Meter
Manufacturer : Dwyer
Model : GMF-2101
Serial Number : N/A
ID. Number : MF01/51

Environmental Conditions
Ambient Temperature : 23 °C ± 2 °C Received Date : 26 May 2023
Relative Humidity : 50 % ± 15 % Calibration Date : 29 May 2023
Location of Calibration : In-Lab Recommend Due Date : 29 May 2024
Calibration Procedure : SP-CPM-04-13 Date of Issue : 30 May 2023

Method of Calibration

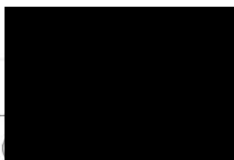
This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by :



Approved by :



Authorized Signatory



Calibration Report

Certificate Number : SPR23050422-1

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Mass Flow Calibrator	AFC-COMplete-10	12532	AD2207-177-0001	17 Jul 2023
Standard Flow Meter	520-H	200353	MW-0071-22	25 Aug 2023

Traceability

This certification is traceable to the International System of Unit maintained at :
MIT - Miracle International Technology Co.,Ltd.
MesaLabs - Mesa Laboratories, Inc.NVLEP Lab Code 200661-0 (ISO17025)



Result of Calibration

Certificate No. : SPR23050422-1

Page : 3 of 3

Function : Air Flow Measurement

Unit : mL/min

Calibration Point	UUC Reading	Standard Reading	UUC Error	K Factor Value	Uncertainty (±)
0.0	0.00	0.00	0.00	1.00000	0.12
3.3	3.42	3.59	-0.17	1.04971	0.26
7.3	7.52	7.78	-0.26	1.03457	0.26
13.5	13.83	14.34	-0.51	1.03688	0.26
17.0	17.12	17.65	-0.53	1.03096	0.26

Note:

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2$, providing a level of confidence approximately 95 %

- End of Certificate -



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chulachin, Bangkok 10900
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Calibration Report Total Hydrocarbon Analyzer			
Date : 02 November 2023	Brand : HORIBA	Model : APHA-360CE	
No. 801			Serial No. 4211954001
Calibrator (Dilution System)			
Brand : API			Model : 700
Last Cal. Date : 08 August 2023			Serial No. : 911
Reference Standard Gas			
Standard Gas : Methane (CH ₄)			Cylinder No. : D612165
Certified Date : 25 February 2023	Expired Date : 25 February 2031	Cylinder Conc. : 453 ppm	
Calibrating Condition			
Pressure : 1011 mmbar	Temp. : 24.6 °C	% RH : 49	
			Start Time : 2:00 PM
Pre-Calibration Checks			
Change Particulate Filter : Yes	Station Temp : 25.0 °C		
Leak Test : Yes			
Calibration Setting			
Span Set Point	Initial Reading (Before Adj)		Final Reading (After Adj)
	Expected Concentration (PPM)	Analyzer Response (PPM)	Analyzer Response (PPM)
	Zero : 0	0.10	0
Span : 10	10.03	10	
Calibration Setting (Final)			
Span Instrument Gain : 0.997			Finish Time : 3:00 PM
APHA-360 Total Hydrocarbon Analyzer			
Test Values	Observed Value	Units	Nominal Range
Signal (CH ₄)	911.8	mV	800-1,350
Signal (THC)	917.1	mV	800-1,350
Detector	77.8	kPa	((Pressure Air/1013)x100)-20 ± 4 kPa
Purifier	19.0	kPa	8 - 25
NMC	259.2	°C	260 ± 10
Bypass	0.9	L / min	0.9 ± 0.3
Over Flow	0.8	L / Min	0.8

Calibrated by :

Approved by :

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: CN10630014
Organization Name: S.P.S.Consulting Service Co.,Ltd.
Organization Location: 7 Soi Paholyothin 24 Bangkok 10900

Date: September 1, 2023 2:41:39 PM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.50, GCMS.02.50
Overall Qualification Status: Pass

System Inspection and Basic Safety and Operation

Name: 6890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Decay

Name: 6890

Front SSL

Setpoint Status: Pass

Pressure: 25.0 psi

Pressure Change: -0.2 psi /5 minutes

Agilent Recommended: ≥ -2.0 and ≤ 0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 6890

Front SSL

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Setpoint Status: Pass

Setpoint Actual
Inlet Pressure: 25.0 psi 24.8 psi
Accuracy: 0.2 psi
Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Inlet Pressure Accuracy

Name: 6890

Back SSL

Setpoint Status: Pass

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

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 6890

Front FID

Setpoint Status: Pass

Flow Type: Fuel
Setpoint: 30.0 mL/min Measured Flow: 30.8 mL/min
Accuracy: 0.8 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: September 1, 2023 2:41:39 PM
System ID: CN10630014

Setpoint Status: Pass

Flow Type: Oxidizer

Setpoint: 400.0 mL/min Measured Flow: 395.3 mL/min

Accuracy: 4.7 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: 24.7 mL/min

Accuracy: 0.3 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: 6890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 229.5 °C

Accuracy: -0.5 °C

Agilent Recommended: ≥ -1.0 % setpoint in K (-5.0 °C)
≤ 1.0 % setpoint in K (5.0 °C)

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 100.0 99.8 °C

Accuracy: -0.2 °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: 6890

Setpoint Status: Pass

Setpoint/Average

Temperature: 100.0 99.83333 °C

Stability: 0.1 °C

Agilent Recommended: ≤ 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Scouting Run

Tested Combination1 Front SSL / Front FID

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 FID

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Name: 6890

Setpoint Status: Pass

Base Signal: 15.8 pA

ASTM Noise

counts

443.17

<= 768.00

Drift

counts/Hr

18437.04

<= 19200.00

Agilent Recommended:

Status:

Pass

Pass

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1 Front SSL / Front FID

Name: 7683B

Setpoint Status: Pass

Injection Volume on Column: 1.0 uL

Area RSD: 0.67 % Retention Time RSD: 0.02 %

Agilent Recommended: <= 3.00 <= 1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination1 Front SSL / Front FID

Name: 6890

Injection Tower

Setpoint Status: Pass

Signal to Noise: 671482

Agilent Recommended: >= 300000

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Overall Signal to Noise Test Status

Pass

Log Amp

Tested Combination2 Back SSL / External SQ

Name: 5975A

Setpoint Status: Pass

Overall Log Amp Test Status

Pass

RFPA

Tested Combination2 Back SSL / External SQ

Name: 5975A

Setpoint Status: Pass

Amu: 1050 m/z Drift After Five Minutes: 12 mV RFPA Voltage: 466 mV

Agilent Recommended: >= -100 and <= 100 <= 1100

Overall RFPA Test Status

Pass

Tune EI

Tested Combination2 Back SSL / External SQ

Name: 5975A

Setpoint Status: Pass

Filament: 1

Setpoint Status: Pass

Filament: 2

Overall Tune EI Test Status

Pass

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Signal to Noise EI

Tested Combination2 Back SSL / External SQ
Name: 5975A

Source: EI - Inert Filament: 1

Setpoint Status: Pass

Signal to Noise: 113

Agilent Recommended: >= 80

Source: EI - Inert Filament: 2

Setpoint Status: Pass

Signal to Noise: 183

Agilent Recommended: >= 80

Overall Signal to Noise EI Test Status

Pass

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID CN10630014
Manufacturer Agilent Technologies
Name 6690

Tested Combination1

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

Tested Combination2

Injection Technique Manual Injection
Inlet Back
Detector External
LTM Included? No

Sampler 1

Manufacturer Agilent Technologies
Type Injection Tower
Name 7683B
Model Number G2913A
Serial Number CN64136101
Firmware Revision A.11.02
Usage Sample Injection
Location Front
Syringe Volume (µL) 10

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Sampler 2

Manufacturer	Agilent Technologies
Type	Manual Injection
Usage	Sample Injection
Syringe Volume (µL)	10

Mainframe 1

Manufacturer	Agilent Technologies
Name	6890
Model Number	G1530N
Serial Number	CN630014
Firmware Revision	N.06.07
Oven Type	Standard

Inlet 1

Manufacturer	Agilent Technologies
Name	6890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Inlet 2

Manufacturer	Agilent Technologies
Name	6890
Type	SSL
Location	Back
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Detector 1

Manufacturer	Agilent Technologies
Name	6890
Type	FID
Adapter	Packed
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen

Detector 2

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5975A
Serial Number	US61633454
Firmware Revision	5.02.09
High Vacuum System	Turbo Pump
Scouting Run Standard	OFN Std

MS EI Source 1

Manufacturer	Agilent Technologies
Source Type	EI - Inert
Number of filaments	2

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Electronic Signature

Purpose

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

Details

Full Name of Signer: Adirek Rattanawijit
Logged On User Name: adirek.rattanawijit@non.agilent.com
Signature Creation Date: September 1, 2023
Reason for Signature: Executed protocol and published this original version of document

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Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

User Name: adirek.rattanawijit
Hostname: C014-QA

System ID: CN10630014
Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:29:16 PM	Audit	SessionCreated	Session	None
September 1, 2023 1:29:16 PM	Start	Configuration	Session	None
September 1, 2023 1:29:16 PM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
September 1, 2023 1:32:47 PM	Audit	EqpLoaded	Session	EQP details for primary technique [Go] - File path: [ProtocolPacks/Go/Configurations/02.50/GoMs.02.50.eqp], EQP File Name: [GoMs.02.50.eqp], EQP Name: [AgilentRecommended] EQP details for hyphenated technique [GoMs] - File path: [ProtocolPacks/GoMs/Configurations/02.50/GoMs.02.50.eqp], EQP File Name: [GoMs.02.50.eqp], EQP Name: [AgilentRecommended]
September 1, 2023 1:32:50 PM	End	Configuration	Session	None
September 1, 2023 1:32:54 PM	Start	Qualification	Session	OQ
September 1, 2023 1:32:54 PM	Execution	System Inspection and Basic Safety and Operation - 6890 - Qualitative Test - No setpoints associated	None	
September 1, 2023 1:33:23 PM	End	Execution	System Inspection and Basic Safety and Operation - 6890 - Qualitative Test - No setpoints associated	Run Count: 1

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:33:26 PM	Start	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
September 1, 2023 1:33:34 PM	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
September 1, 2023 1:33:37 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
September 1, 2023 1:33:41 PM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
September 1, 2023 1:33:43 PM	Start	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
September 1, 2023 1:33:50 PM	End	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
September 1, 2023 1:33:53 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None
September 1, 2023 1:34:00 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
September 1, 2023 1:34:02 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
September 1, 2023 1:34:12 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
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SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:34:14 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
September 1, 2023 1:34:21 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
September 1, 2023 1:34:23 PM	Start	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
September 1, 2023 1:34:50 PM	Audit	Data	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
September 1, 2023 1:34:52 PM	End	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
September 1, 2023 1:34:55 PM	Start	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
September 1, 2023 1:35:33 PM	Audit	Data	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
September 1, 2023 1:35:35 PM	End	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
September 1, 2023 1:35:37 PM	Start	Execution	GC Oven Temperature Stability - 6890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:36:42 PM	Audit	Data	GC Oven Temperature Stability - 6890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
September 1, 2023 1:36:44 PM	End	Execution	GC Oven Temperature Stability - 6890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
September 1, 2023 1:36:47 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
September 1, 2023 1:37:18 PM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\OQPV2023\IS COUT_001.D\FID1A.CH
September 1, 2023 1:37:41 PM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Run Count : 1
September 1, 2023 1:37:44 PM	Start	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
September 1, 2023 1:38:02 PM	Audit	Data	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\OQPV2023\IN D_001.D\FID1A.CH
September 1, 2023 1:38:08 PM	End	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:38:23 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 80	None
September 1, 2023 1:38:23 PM	Start	Execution	Tune EI - 5975A SQ: - Source: - None EI - Inert Filament 2 (Qualitative - No setpoints associated)	
September 1, 2023 1:38:56 PM	End	Execution	Tune EI - 5975A SQ: - Source: - Run Count : 1 EI - Inert Filament 2 (Qualitative - No setpoints associated)	
September 1, 2023 1:39:01 PM	Start	Execution	Tune EI - 5975A SQ: - Source: - None EI - Inert Filament 1 (Qualitative - No setpoints associated)	
September 1, 2023 1:39:16 PM	End	Execution	Tune EI - 5975A SQ: - Source: - Run Count : 1 EI - Inert Filament 1 (Qualitative - No setpoints associated)	
September 1, 2023 1:39:18 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 80	None
September 1, 2023 1:39:27 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 80	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\OQPV2023\IS N_F1_001.D\data.ms
September 1, 2023 1:40:37 PM	End	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 80	Run Count : 1
September 1, 2023 1:40:41 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	None

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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User Name: adirek.rattanawijit
Hostname: C614-QA

System Id: CN10630014
Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:41:07 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	Data files Path : C:\Users\Win 10 Home\Desktop\IQPV_GCIS PS\IQPV2023\IQPV2023\IS N_F2_001.D\data.ms
September 1, 2023 1:43:19 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	None
September 1, 2023 1:43:24 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	None
September 1, 2023 1:43:36 PM	End	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	Run Count : 1
September 1, 2023 1:43:41 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
September 1, 2023 1:57:52 PM	Audit	AccRestarted	Session	None
September 1, 2023 2:01:02 PM	Audit	SessionReloaded	Session	None
September 1, 2023 2:01:05 PM	Start	Qualification	Session	OQ
September 1, 2023 2:01:05 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None

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Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

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User Name: adirek.rattanawijit
Hostname: C614-QA

System Id: CN10630014
Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\IQPV_GCIS PS\IQPV2023\IP_002.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\IQPV_GCIS PS\IQPV2023\IP_003.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\IQPV_GCIS PS\IQPV2023\IP_004.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\IQPV_GCIS PS\IQPV2023\IP_005.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\IQPV_GCIS PS\IQPV2023\IP_006.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\IQPV_GCIS PS\IQPV2023\IP_007.D\FID 1A.CH
September 1, 2023 2:01:51 PM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1

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Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

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User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 2:01:54 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	None
September 1, 2023 2:02:04 PM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GC\SPS\OQPV2023\SN_001.D\FID1A.CH
September 1, 2023 2:02:16 PM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Run Count : 1
September 1, 2023 2:03:19 PM	Start	Execution	Log Amp - 5975A SQ: - Source: EI - Inert	None
September 1, 2023 2:06:05 PM	End	Execution	Log Amp - 5975A SQ: - Source: EI - Inert	Run Count : 1
September 1, 2023 2:06:07 PM	Start	Execution	RFPA - 5975A SQ: - Source: EI - Inert	None
September 1, 2023 2:17:21 PM	End	Qualification	Session	OQ
September 1, 2023 2:17:21 PM	Start	Reporting	Session	None
September 1, 2023 2:24:55 PM	End	Reporting	Session	None
September 1, 2023 2:24:55 PM	Start	Qualification	Session	OQ
September 1, 2023 2:25:10 PM	Start	Execution	RFPA - 5975A SQ: - Source: EI - Inert	None
September 1, 2023 2:34:26 PM	End	Execution	RFPA - 5975A SQ: - Source: EI - Inert	Run Count : 1
September 1, 2023 2:38:18 PM	End	Qualification	Session	OQ

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 2:36:18 PM	Start	Reporting	Session	None
September 1, 2023 2:40:24 PM	Audit	Reporting	Session	Report Generated : Certificate

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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คุณภาพอากาศจากปล่องระบาย



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature : 25 \pm 3 $^{\circ}$ C
Pressure : 1010 \pm 15 mmbar

Personal Pump Data

Calibration Data

No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3	y	R ²
R40	SKC	224-PCXR4	612753	07/10/2023	1,000	1,500	2,000	999	1,496	1,996	1.008x - 21.287	0.999
R41	SKC	224-PCXR4	626140	03/10/2023	1,000	1,500	2,000	990	1,499	1,996	1.013x - 31.991	0.999
R42	SKC	224-PCXR4	626463	07/10/2023	1,000	1,500	2,000	998	1,493	1,994	0.998x - 4.088	1.000
R43	SKC	224-PCXR4	626129	07/10/2023	1,000	1,500	2,000	1,001	1,498	1,999	1.010x - 21.673	0.999
R44	SKC	224-PCXR4	602753	07/10/2023	1,000	1,500	2,000	994	1,492	1,990	0.997x - 4.275	1.000
R45	SKC	224-PCXR4	626137	06/10/2023	1,000	1,500	2,000	992	1,487	1,996	1.006x - 16.996	1.000

Calibrated by :

Approved by :



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Rotameter Calibration Report (For Personal Pump Low Flow Adjust)

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Calibration Data

Rotameter Data				Calibration Data							
No.	Brand	Model	Date	Flow Rate (ml/min)						Value From Calibration Curve	
				Flow Rate (Reading)			Actual (Q std.)			y	R ²
				1	2	3	1	2	3		
L-R01	Dwyer	VFA-21	02/10/2023	50	100	200	50.4	98.3	200.4	0.989x + 0.553	1.000
L-R02	Dwyer	VFA-21	06/10/2023	50	100	200	49.3	100.6	199.3	1.002x - 1.123	0.999
L-R03	Dwyer	VFA-21	04/10/2023	50	100	200	50.1	99.3	200.7	1.001x - 0.261	1.000
L-R04	Dwyer	VFA-21	02/10/2023	50	100	200	50.1	100.7	200.6	1.006x - 1.002	0.999
L-R05	Dwyer	VFA-21	03/10/2023	50	100	200	49.8	101.4	200.7	0.995x + 1.282	1.000
L-R06	Dwyer	VFA-21	05/10/2023	50	100	200	50.3	101.1	199.7	1.004x - 0.716	0.999

Calibrated by :

Approved by :



CALIBRATION LABORATORY Co.,LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : VACUUM GAUGE
MANUFACTURER : HI-LIGHT
MODEL / TYPE : N/A
SERIAL NO. : N/A[64-220088-1]
CLID. NO. : 212301419
JOB CONTROL NO. : 230725081570

CUSTOMER : S.P.S. CONSULTING SERVICE CO.,LTD.
7 SOI PHAHOLYOTHIN 24 ROAD., JOMPOL,
CHATUCHAK, BANGKOK 10900

DATE OF RECEIVED : 25 July 2023

DATE OF ISSUED : 31 July 2023

Report of calibration screening must not be taken in part. Except complete. Without the approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Sittipong Pimdee
Calibration Engineer



Approved By :
Authorized Signatory
31 July 2023



This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q23081570

F3-011-04/01-12

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@clccalibration



CALIBRATION LABORATORY Co.,LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : VACUUM GAUGE
MANUFACTURER : HI-LIGHT
MODEL / TYPE : N/A
SERIAL NO. : N/A[64-220088-1]
DATE OF CALIBRATION : 26 July 2023
DUE DATE OF CALIBRATION : 26 July 2024

ENVIRONMENT CONDITIONS :

Temperature : (23 ± 2) °C

Relative Humidity : (55 ± 10) %RH

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPPP-05 according to DKD-R 6-1 as calibration guidelines.

The calibration was performed by direct measurement with Document Process Calibrator and Pressure Module which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Document Process Calibrator, Fluke Model 741B S/N. 8295020 with Pressure Module Model 700PD5 S/N. 89404505.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).
Certificate No. MP-0035-23, Due Date 02 February 2024.

UNCERTAINTY :

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of $k = 2$. It has been evaluated according to the "Calibration of Pressure Gauges (DKD-R 6-1)" which provides a level of confidence approximately 95%.

Certificate No. Q23081570

F3-011-04/01-12

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@clccalibration



CALIBRATION LABORATORY Co.,LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The DUC was exercised by applying a known pressure from its zero to full scale 1 times. Then 2 series of known gauge pressure were applied. The STD reading were recorded and the means value were reported in the table below.

CALIBRATION DATA

CORRECTION OF PRESSURE

DUC Test point (inHg)	STD Reading (kPa)		Conversion to inHg		Correction (inHg)	
	Up	Down	Up	Down	Up	Down
0	0.00	0.00	0.0	0.0	0.0	0.0
-5	-15.07	-15.10	-4.5	-4.5	+0.5	+0.5
-10	-32.10	-32.13	-9.5	-9.5	+0.5	+0.5
-15	-49.20	-49.23	-14.5	-14.5	+0.5	+0.5
-20	-66.26	-66.26	-19.6	-19.6	+0.4	+0.4
-25	-83.30	-83.33	-24.6	-24.6	+0.4	+0.4
-30	-100.39	-100.39	-29.6	-29.6	+0.4	+0.4

Uncertainty of measurement ± 0.2 inHg

Transmitting fluid : Air.

Technical Note. Conversion factor 1 kPa ; 0.2953003 inHg

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 008 Page 36 of 54

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q23081570

F3-011-04/01-12

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@clccalibration

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Agilent CrossLab Compliance Services

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: CN10630014
Organization Name: S.P.S.Consulting Service Co.,Ltd.
Organization Location: 7 Soi Paholyothin 24 Bangok 10900

Date: September 1, 2023 2:41:39 PM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.50, GCMS.02.50
Overall Qualification Status: Pass

System Inspection and Basic Safety and Operation

Name: 6890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Decay

Name: 6890

Front SSL

Setpoint Status: Pass

Pressure: 25.0 psi

Pressure Change: -0.2 psi /5 minutes

Agilent Recommended: ≥ -2.0 and ≤ 0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 6890

Front SSL

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

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Setpoint Status: Pass

Setpoint Actual
Inlet Pressure: 25.0 psi 24.8 psi
Accuracy: 0.2 psi
Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Inlet Pressure Accuracy

Name: 6890
Back SSL

Setpoint Status: Pass

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

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 6890
Front FID

Setpoint Status: Pass

Flow Type: Fuel
Setpoint: 30.0 mL/min Measured Flow: 30.8 mL/min
Accuracy: 0.8 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

Flow Type: Oxidizer
Setpoint: 400.0 mL/min Measured Flow: 395.3 mL/min
Accuracy: 4.7 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: 24.7 mL/min
Accuracy: 0.3 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: 6890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 229.5 °C

Accuracy: -0.5 °C

Agilent Recommended: ≥ -1.0 % setpoint in K (-5.0 °C)

≤ 1.0 % setpoint in K (5.0 °C)

Setpoint Status: **Pass**

Zone: **Oven**

Setpoint/Actual

Temperature: **100.0** **99.8** °C

Accuracy: **-0.2** °C

Agilent Recommended: **>= -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: **6890**

Setpoint Status: **Pass**

Setpoint/Average

Temperature: **100.0** **99.83333** °C

Stability: **0.1** °C

Agilent Recommended: **<= 0.5**

Overall GC Oven Temperature Stability Test Status

Pass

Scouting Run

Tested Combination1 Front SSL / Front FID

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 FID

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Name: **6890**

Setpoint Status: **Pass**

Base Signal: **15.8** pA

ASTM Noise counts **443.17**

Drift counts/Hr **18437.04**

Agilent Recommended: **<= 768.00**

Status: **Pass**

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1 Front SSL / Front FID

Name: **7683B**

Setpoint Status: **Pass**

Injection Volume on Column: **1.0** uL

Area RSD: **0.67** %

Retention Time RSD: **0.02** %

Agilent Recommended: **<= 3.00**

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination1 Front SSL / Front FID

Injection Tower

Name: **6890**

Setpoint Status: **Pass**

Signal to Noise: **671482**

Agilent Recommended: **>= 300000**

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Overall Signal to Noise Test Status

Pass

Log Amp

Tested Combination2 Back SSL / External SQ

Name: 5975A

Setpoint Status: Pass

Overall Log Amp Test Status

Pass

RFPA

Tested Combination2 Back SSL / External SQ

Name: 5975A

Setpoint Status: Pass

Amu: 1050 m/z

Drift After Five Minutes:

12 mV

RFPA Voltage:

466 mV

Agilent Recommended:

>= -100 and <= 100

<= 1100

Overall RFPA Test Status

Pass

Tune EI

Tested Combination2 Back SSL / External SQ

Name: 5975A

Setpoint Status: Pass

Filament: 1

Setpoint Status: Pass

Filament: 2

Overall Tune EI Test Status

Pass

Signal to Noise EI

Tested Combination2 Back SSL / External SQ

Name: 5975A

Source: EI - Inert

Filament:

1

Setpoint Status: Pass

Signal to Noise: 113

Agilent Recommended: >= 80

Source: EI - Inert

Filament:

2

Setpoint Status: Pass

Signal to Noise: 183

Agilent Recommended: >= 80

Overall Signal to Noise EI Test Status

Pass

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	CN10630014
Manufacturer	Agilent Technologies
Name	6890

Tested Combination1

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

Tested Combination2

Injection Technique	Manual Injection
Inlet	Back
Detector	External
LTM Included?	No

Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7683B
Model Number	G2913A
Serial Number	CN64136101
Firmware Revision	A.11.02
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

Sampler 2

Manufacturer	Agilent Technologies
Type	Manual Injection
Usage	Sample Injection
Syringe Volume (µL)	10

Mainframe 1

Manufacturer	Agilent Technologies
Name	6890
Model Number	G1530N
Serial Number	CN630014
Firmware Revision	N.06.07
Oven Type	Standard

Inlet 1

Manufacturer	Agilent Technologies
Name	6890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Inlet 2

Manufacturer	Agilent Technologies
Name	6890
Type	SSL
Location	Back
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1

Manufacturer	Agilent Technologies
Name	6890
Type	FID
Adapter	Packed
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen

Detector 2

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5975A
Serial Number	US61633454
Firmware Revision	5.02.09
High Vacuum System	Turbo Pump
Scouting Run Standard	OFN Std

MS EI Source 1

Manufacturer	Agilent Technologies
Source Type	EI - Inert
Number of filaments	2

Electronic Signature

Purpose

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

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Full Name of Signer:	Adirek Rattanawijit
Logged On User Name:	adirek.rattanawijit@non.agilent.com
Signature Creation Date:	September 1, 2023
Reason for Signature:	Executed protocol and published this original version of document

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User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:29:16 PM	Audit	SessionCreated	Session	None
September 1, 2023 1:29:16 PM	Start	Configuration	Session	None
September 1, 2023 1:29:16 PM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
September 1, 2023 1:32:47 PM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.50/Gc.02.50.eqp], EQP File Name: [Gc.02.50.eqp], EQP Name: [AgilentRecommended] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.50/GcMs.02.50.eqp], EQP File Name: [GcMs.02.50.eqp], EQP Name: [AgilentRecommended]
September 1, 2023 1:32:50 PM	Configuration	Session	Session	None
September 1, 2023 1:32:54 PM	Start	Qualification	Session	OQ
September 1, 2023 1:32:54 PM	Execution	System Inspection and Basic Safety and Operation - 6890 - Qualitative Test - No setpoints associated	System Inspection and Basic Safety and Operation - 6890 - Qualitative Test - No setpoints associated	None
September 1, 2023 1:33:23 PM	End	Execution	System Inspection and Basic Safety and Operation - 6890 - Qualitative Test - No setpoints associated	Run Count : 1

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:33:26 PM	Start	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
September 1, 2023 1:33:34 PM	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
September 1, 2023 1:33:37 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
September 1, 2023 1:33:41 PM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
September 1, 2023 1:33:43 PM	Start	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
September 1, 2023 1:33:50 PM	End	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
September 1, 2023 1:33:53 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None
September 1, 2023 1:34:00 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
September 1, 2023 1:34:02 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
September 1, 2023 1:34:12 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

User Name: adirek.rattanawijit
 Hostname: C814-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:34:14 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
September 1, 2023 1:34:21 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
September 1, 2023 1:34:23 PM	Start	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
September 1, 2023 1:34:50 PM	Audit	Data	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
September 1, 2023 1:34:52 PM	End	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
September 1, 2023 1:34:55 PM	Start	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
September 1, 2023 1:35:33 PM	Audit	Data	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
September 1, 2023 1:35:35 PM	End	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
September 1, 2023 1:35:37 PM	Start	Execution	GC Oven Temperature Stability - 6890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None

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User Name: adirek.rattanawijit
 Hostname: C814-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:36:42 PM	Audit	Data	GC Oven Temperature Stability - 6890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
September 1, 2023 1:36:44 PM	End	Execution	GC Oven Temperature Stability - 6890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
September 1, 2023 1:36:47 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
September 1, 2023 1:37:18 PM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Data files Path : C:\Users\Win 10 Home\Desktop\IQPV_GC\IS PS\IQPV2023\IQPV2023\IS COUT_001.D\FID1A.CH
September 1, 2023 1:37:41 PM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Run Count : 1
September 1, 2023 1:37:44 PM	Start	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
September 1, 2023 1:38:02 PM	Audit	Data	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : C:\Users\Win 10 Home\Desktop\IQPV_GC\IS PS\IQPV2023\IQPV2023\IN D_001.D\FID1A.CH
September 1, 2023 1:38:08 PM	End	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1

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User Name: adirek.rattanawijit System Id: CN10630014
 Hostname: C614-QA Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:38:23 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 80	None
September 1, 2023 1:38:23 PM	Start	Execution	Tune EI - 5975A SQ: - Source: - None EI - Inert Filament 2 (Qualitative - No setpoints associated)	
September 1, 2023 1:38:58 PM	End	Execution	Tune EI - 5975A SQ: - Source: - Run Count : 1 EI - Inert Filament 2 (Qualitative - No setpoints associated)	
September 1, 2023 1:39:01 PM	Start	Execution	Tune EI - 5975A SQ: - Source: - None EI - Inert Filament 1 (Qualitative - No setpoints associated)	
September 1, 2023 1:39:16 PM	End	Execution	Tune EI - 5975A SQ: - Source: - Run Count : 1 EI - Inert Filament 1 (Qualitative - No setpoints associated)	
September 1, 2023 1:39:18 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 80	None
September 1, 2023 1:39:27 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 80	Data files Path : C:\Users\Win10 Home\Desktop\OQPV_GCIS PSIOQPV2023\OQPV2023\IS N_F1_001.D\data.ms
September 1, 2023 1:40:37 PM	End	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 80	Run Count : 1
September 1, 2023 1:40:41 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	None

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:41:07 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	Data files Path : C:\Users\Win10 Home\Desktop\OQPV_GCIS PSIOQPV2023\OQPV2023\IS N_F2_001.D\data.ms
September 1, 2023 1:43:13 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	None
September 1, 2023 1:43:24 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	None
September 1, 2023 1:43:36 PM	End	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	Run Count : 1
September 1, 2023 1:43:41 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
September 1, 2023 1:57:52 PM	Audit	AccRestarted	Session	None
September 1, 2023 2:01:02 PM	Audit	SessionReloaded	Session	None
September 1, 2023 2:01:05 PM	Start	Qualification	Session	OQ
September 1, 2023 2:01:06 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\IP_002.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\IP_003.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\IP_004.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\IP_005.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\IP_006.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\IP_007.D\FID 1A.CH
September 1, 2023 2:01:51 PM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 2:01:54 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	None
September 1, 2023 2:02:04 PM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\SN_001.D\FID 1A.CH
September 1, 2023 2:02:16 PM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Run Count : 1
September 1, 2023 2:03:19 PM	Start	Execution	Log Amp - 5975A SQ: - Source: EI - Inert	None
September 1, 2023 2:06:05 PM	End	Execution	Log Amp - 5975A SQ: - Source: EI - Inert	Run Count : 1
September 1, 2023 2:06:07 PM	Start	Execution	RFPA - 5975A SQ: - Source: EI - Inert	None
September 1, 2023 2:17:21 PM	End	Qualification	Session	OQ
September 1, 2023 2:17:21 PM	Start	Reporting	Session	None
September 1, 2023 2:24:55 PM	End	Reporting	Session	None
September 1, 2023 2:24:55 PM	Start	Qualification	Session	OQ
September 1, 2023 2:25:10 PM	Start	Execution	RFPA - 5975A SQ: - Source: EI - Inert	None
September 1, 2023 2:34:26 PM	End	Execution	RFPA - 5975A SQ: - Source: EI - Inert	Run Count : 1
September 1, 2023 2:39:18 PM	End	Qualification	Session	OQ

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 2:36:18 PM	Start	Reporting	Session	None
September 1, 2023 2:40:24 PM	Audit	Reporting	Session	Report Generated : Certificate

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sirinthorn Rd.,Bangbumru, Bangplud Bangkok 10700 THAILAND.
 Tel.0-2435-8800 Fax.0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



NSC-TISI-TIS 17025
 CALIBRATION 0394

Cert. No. : SP23016
 Pages 1 of 3

Calibration Certificate

Equipment : UV-VIS SPECTROPHOTOMETER
Manufacturer : PERKINELMER
Model : LAMBDA 25
Serial No.: 501S14123010
ID No.: SP03/58
Calibration Mode : WAVELENGTH ACCURACY
 PHOTOMETRIC ACCURACY

Condition As Found : GOOD

Customer : S.P.S. CONSULTING SERVICE CO., LTD.
 7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN ROAD,
 CHOMPHON, CHATUCHAK,
 BANGKOK 10900, THAILAND.

Location : ORGANIC LABORATORY IV

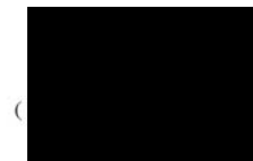
Ambient Temperature : (25.0 ± 5) °C
Relative Humidity : (48.4 ± 25) %

Received Date : 30 AUGUST 2023
Calibration Date : 30 AUGUST 2023
Date of Issue : 31 AUGUST 2023

Calibrated by :

Nathakorn Pisutpaisan

Approved by :



This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : SP23016
Job No. : VC66SP0014
Pages : 2 of 3

Calibration Method :

This instrument was calibrated by using on-site calibration procedure In-house method : CP-SP-01
The calibration procedure to direct measurement wavelength accuracy by using wavelength standard solution, Photometric accuracy by using absorbance standard filter and absorbance standard solution
The calibration procedure used was based on ASTM E275-01, ASTM E925-02

Condition of this result of calibration :

1. Certified reference materials

Material	Ref. type	Cell serial No.	Cert. No.	Due Date
Holmium liquid	RM-HL	29706	106864	01/11/2024
Didymium liquid	RM-DL	28912	106905	02/11/2024
Neutral density filter	RM-1N2N3N	13877	106918	03/11/2024
Potassium dichromate solutions	RM-0204060810	14204	106902	02/11/2024
Potassium Iodide solution	-	KI-0701-001	CI-0090-22	08/04/2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 The UK National Physical Laboratory (NPL)

3.2 The National Institute of Standards and Technology, NIST.

Result of calibration : Wavelength Accuracy

(Without adjustment)

Material	Certified Values of Reference Material (nm)	UUC* Reading (nm)	Error (nm)	Uncertainty ± (nm)	k Factor
RM-HL	278.13	278.3	0.17	0.16	2.00
	361.25	361.3	0.05	0.16	2.00
	467.82	468.0	0.18	0.16	2.00
	536.56	536.6	0.04	0.16	2.00
	640.50	640.4	-0.10	0.16	2.00
RM-DL	740.09	740.0	-0.09	0.16	2.00
	864.94	865.0	0.06	0.16	2.00

UUC* = Unit Under Calibration

Continuation of Calibration Certificate

Cert. No. : SP23016
Job No. : VC66SP0014
Pages : 3 of 3

Result of calibration : Photometric Accuracy

(Without adjustment)

Material	Wavelength (nm)	Filter S/N	Nominal Absorbance (A)	Certified Absorbance (A)	UUC* Reading Absorbance (A)	Error (A)	Uncertainty ± (A)	k Factor
Neutral Density glass filter	440.0	29360	1.0	1.0517	1.0564	0.0047	0.0031	2.00
		29914	0.7	0.7445	0.7460	0.0015	0.0032	2.00
		29381	0.5	0.5416	0.5429	0.0013	0.0032	2.00
	546.1	29360	1.0	0.9821	0.9849	0.0028	0.0030	2.00
		29914	0.7	0.6961	0.6961	0.0000	0.0030	2.00
		29381	0.5	0.5073	0.5073	0.0000	0.0030	2.00
	590.0	29360	1.0	1.0222	1.0244	0.0022	0.0030	2.00
		29914	0.7	0.7237	0.7234	-0.0003	0.0030	2.00
		29381	0.5	0.5361	0.5360	-0.0001	0.0031	2.00
	635.0	29360	1.0	0.9753	0.9775	0.0022	0.0030	2.00
		29914	0.7	0.6910	0.6910	0.0000	0.0030	2.00
		29381	0.5	0.5211	0.5210	-0.0001	0.0032	2.00
RM-0204060810	235.0	20		0.2422	0.2462	0.0040	0.0101	2.00
		40		0.4866	0.4900	0.0034	0.0115	2.00
		60		0.7414	0.7390	-0.0024	0.0068	2.00
		80		0.9858	0.9871	0.0013	0.0093	2.00
		100		1.2442	1.2480	0.0038	0.0087	2.00

UUC* = Unit Under Calibration

Condition of this result of calibration : Spectrophotometer PERKINELMER Model Lambda 25 S/N 501S141230

Resolution of Wavelength Mode 0.1 nm

Resolution of Photometric Mode 0.0001 A

Parameter Setting

Measurement Mode Wavelength, Absorbance

Wavelength Scan 1100 nm-190 nm

Scanning Speed 7.5 nm/min

Data Pitch 0.1 nm

Band width(Wavelength) 1.0 nm

Band width(Vis) 1.0 nm

Band width(Uv) 1.0 nm

Stray Light** UUC* Reading at 220 nm	
Transmission T(%)	Absorbance(A)
0.0111	3.9564

**Specific Acceptance :

Transmission ≤ 1.0 T(%), Absorbance ≥ 2.0 A

**Stray light not TISI Accredited

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

End of Calibration Certificate

ระดับเสียงในบรรยากาศ



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0413

MTC No. EEL. BP. 109/0366

CALIBRATION CERTIFICATE

Submitted by : S.P.S. Consulting Service Co.,Ltd.

Address : 7 Soi Phaholyothin 24, Phaholyothin Road, Jompol, Chatuchak, Bangkok 10900.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.

: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Calibrator

Manufacturer : ACO

Model : 2127

Serial No. : 130006

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.

2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.

3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.

4. Digital Multimeter Agilent 34401A S/N MY44005560.

5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.

6. Audio Analyzer Keithley 2015-P S/N 4106495.

7. Condenser Microphone Bruel&Kjaer 4180 S/N 2889871.

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 15) \%$

Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Calibration Procedure: CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 27 Mar. 2023

Date of Calibration : 29 Mar. 2023

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BLMTC.002 Rev.4

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0413

MTC No. EEL. BP. 109/0366

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 94 dB re 20 μPa at 1000 Hz

Acoustic Output in dB re 20 μPa , Corrected to Reference Conditions : 101.325 kPa, 23.0 $^\circ\text{C}$ and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	93.94	-0.06	± 0.10	$\pm 0.40 \text{ dB}$

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	999.9	-0.1	± 1.5	$\pm 1.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1.80	± 0.50	$\pm 3.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

Approved by :



Director
Electrical and Electronic Standards Laboratory

Date of Calibration : 29 Mar. 2023

Industrial Metrology and Testing Service Centre

Date of Issue : 30 Mar. 2023

Ref : 2011266032701228001

End of Certificate

2 / 2

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BLMTC.002 Rev.4

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E-mail : sumalee@tistr.or.th



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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Tel : (062) 939-4370-72, Fax : (062) 513-4221, E-mail : sales@spscon.com, www.spscon.com

Noise R_569/23

Sound Level Meter Calibration Report

Acoustic Calibrator Data

Brand	ACO	Number	AC 03/56
Model	2127	Serial No.	130006
Calibration Range	94 dB, 1000 Hz	Last Calibration	29 March 2023
		Due Date	29 March 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-R06	ACO	6236	00152005	19 October 2023	94.1	94.0
ACO-R11	ACO	6236	00172038	19 October 2023	94.0	94.0
ACO-R15	ACO	6236	00172062	19 October 2023	94.0	94.0
ACO-R18	ACO	6236	00172065	19 October 2023	94.1	94.0
ACO-R33	ACO	6236	00192045	19 October 2023	94.0	94.0
ACO-R37	ACO	6236	00192049	19 October 2023	94.0	94.0
ACO-R44	ACO	6236	00192056	19 October 2023	94.1	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.94 ± 0.10 dB	

Calibrated by :



Approved by :



คุณภาพน้ำ

Spectrum BX Preventive Maintenance (PM)			
Company Name:	S.P.S. Consulting Service Co.,Ltd.		
Address:	7 Soi Phaholyothin 24 ,Phaholyothin Rd.,Jompol, Chatuchak,Bangkok 10900		
User Name:	K.Waraphon Phoowat	WO Number :	WO-02463710
Telephone No.:	083-033-6758	Certificate Number:	IR1107-2023
Customer Support Engineer:	Tanongsak	PM Number :	1 of 1
Date PM Performed: (DD-MMM-YYYY)	30-Aug-2023	Next PM Due Date: (DD-MMM-YYYY)	30-Aug-2024

Scope

The purpose of this PM is to ensure the continued functionality of the Spectrum FTIR Spectrophotometer by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer.

The document can be used for spectrum One, Spectrum One, NTS, Spectrum 100, Spectrum 100N, Spectrum Optica, Spectrum 4000F and the Frontier Series of FTIR Spectrophotometers.

The customer should save their method before the PM begins.

General Instructions:

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM. Always check with the customer before making any changes that may affect the customer's analysis should be signed by an authorized PerkinElmer and customer representative and left with the customer. Update the PM sticker and instrument logbook as required.

General Instructions:

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM. Always check with the customer before making any changes that may affect the customer's analysis or calibration, including a current back-up of system software and/or data files. The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer.

Update the PM sticker and instrument logbook as required.

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Component List

Component / Specific Model	Serial #	Software Version		Configuration Notes
Spectrum BX	70366	5.3.1	Std	KBr B/S

Parts Lists

Parts Included with the PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot/SN #	Expiration Date (MM/YY)
N0171159	Desiccant	2	NA	NA

Procedure Checklist

Use (X) to check off those steps in the checklist that have been completed.

1. General:

- ☒ Source and Source Mirror
- ☒ Beam splitter
- ☒ Optical Unit Windows
- ☒ Mirror

2. Mechanical:

- ☒ Motors including Electronics unit fan
- ☒ Purge seals
- ☒ Change Desiccant

3. Electronics Check:

- ☒ Laser Output

1000, Paragon, RX or BX Laser Output	Specification	Value	Laser Gain
	16 +/- 1	15.88	3.53

- ☒ EndStop

End Stop	Specification	Value
	+/- 50	3.00

- ☒ Zero Path

Zero Path	Specification	Value
	+/- 20	3.00

- ☒ Energy

Energy	Specification	Value
	NA	14962.00

- ☒ Gain

Gain	Specification	Value
	Less than +/- 9.5	7.10 / -8.56

- ☒ Match

Match	Specification	Value
	NA	3.38

3. Performance Test:

- ☒ Signal to Noise Ratio (SNR) – (Record typical SNR Value).

	Detector Type	Typical SNR
Signal to Noise Ratio	DTGS (MIR)	3282.99

4. Wavenumber Calibrate:

- ☒ Wavenumber Calibrate

Certified Value (cm-1)	Value	Specification	Difference (cm-1)
3082.22	3082.08	+/- 0.5	0.14
3060.14	3060.02	+/- 0.5	0.12
1601.38	1601.41	+/- 0.5	-0.03
1583.04	1583.30	+/- 0.5	-0.26
1028.42	1028.52	+/- 0.5	-0.10




6. Review:

- ☒ Review with the customer PM work performed.
- ☒ Reset desiccant and service intervals on maintenance dialog.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer-supplied materials to have on hand
- ☒ Attach PM sticker.
- ☐ Update Logbook.

Additional Comments

Additional Comments Regarding the PM

Review

<i>The preventive maintenance checks and if applicable performance tests for FTIR have been completed.</i>	
<i>Passes</i> <input checked="" type="checkbox"/> <i>Fails</i> <input type="checkbox"/> <i>the preventive maintenance.</i>	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative: 	Date: 30-Aug-2023 (DD-MMM-YYYY)
Authorized Customer Representative:	Date: 30-Aug-2023 (DD-MMM-YYYY)

ระดับเสียงในสถานประกอบการ



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0413

MTC No. EEL. BP. 109/0366

CALIBRATION CERTIFICATE

Submitted by : S.P.S. Consulting Service Co.,Ltd.

Address : 7 Soi Phaholyothin 24, Phaholyothin Road, Jompol, Chatuchak, Bangkok 10900.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.

: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Calibrator

Manufacturer : ACO

Model : 2127

Serial No. : 130006

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.

2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.

3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.

4. Digital Multimeter Agilent 34401A S/N MY44005560.

5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.

6. Audio Analyzer Keithley 2015-P S/N 4106495.

7. Condenser Microphone Bruel&Kjaer 4180 S/N 2889871.

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 15) \%$

Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Calibration Procedure: CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 27 Mar. 2023

Date of Calibration : 29 Mar. 2023

The results relate only to the items tested/calibrated or value assigned.

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0413

MTC No. EEL. BP. 109/0366

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 94 dB re 20 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ Pa, Corrected to Reference Conditions : 101.325 kPa, 23.0 $^\circ\text{C}$ and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	93.94	-0.06	± 0.10	$\pm 0.40 \text{ dB}$

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	999.9	-0.1	± 1.5	$\pm 1.0\%$

3. Total distortion

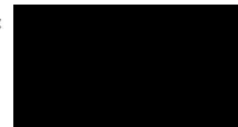
Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1.80	± 0.50	$\pm 3.0\%$

Note : 1. No adjustment.

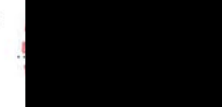
2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :



Approved by :



Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 29 Mar. 2023

Date of Issue : 30 Mar. 2023

Ref : 2011266032701228001

End of Certificate

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Noise R_560/23

Sound Level Meter Calibration Report

Acoustic Calibrator Data

Brand	ACO	Number	AC 03/56
Model	2127	Serial No.	130006
Calibration Range	94 dB, 1000 Hz	Last Calibration	29 March 2023
		Due Date	29 March 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-R07	ACO	6236	00152080	17 October 2023	94.0	94.0
ACO-R15	ACO	6236	00172062	17 October 2023	94.1	94.0
ACO-R34	ACO	6236	00192046	17 October 2023	94.0	94.0
ACO-R35	ACO	6236	00192047	17 October 2023	94.0	94.0
ACO-R44	ACO	6236	00192056	17 October 2023	94.1	94.0
ACO-R47	ACO	6236	00192059	17 October 2023	94.0	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.94 ± 0.10 dB	

Calibrated by :



Approved by :



ระดับเสียงติดตัวบุคคล



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0639

MTC No. EEL. BP. 39/0866

CALIBRATION CERTIFICATE

Submitted by : S.P.S Consulting Services Co.,Ltd.

Address : 7 Soi Phaholyothin 24, Phaholyothin Road, Jompol, Chatuchak, Bangkok 10900.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.

: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Calibrator

Manufacturer : SVANTEK

Model : SV34

Serial No. : 33137

Ambient Environment

Temperature : (23 ± 3) °C

Relative Humidity : (50 ± 15) %

Ambient Pressure : (101.325 ± 1.500) kPa

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.

2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.

3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.

4. Digital Multimeter Agilent 34401A S/N MY44005560.

5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.

6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.

7. Condenser Microphone Bruel&Kjaer 4180 S/N 2633526.

Calibration Procedure: CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 11 Aug. 2023

Date of Calibration : 22 Aug. 2023

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0639

MTC No. EEL. BP. 39/0866

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 114 dB re 20μPa at 1000 Hz

Acoustic Output in dB re 20μPa , Corrected to Reference Conditions : 101.325 kPa , 23.0°C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	113.53	-0.47	± 0.10	±0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1000.0	0.0	± 1.5	±2.0%

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	0.39	± 0.50	±4.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

Approved by :



Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 22 Aug. 2023

Date of Issue : 24 Aug. 2023

Ref : 2011266081103146002

End of Certificate

2 / 2

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Noise Dose R_490/23

Noise Dose Meter Calibration Report

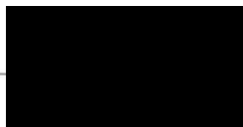
Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

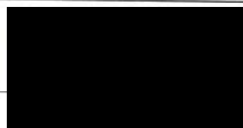
Calibration Data

Sound Level Meter Data					Calibration Data	
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-R05	SVANTEK	SV-104IS	60155	21 September 2023	113.5	113.5
NMD-R35	SVANTEK	SV-104IS	80873	21 September 2023	113.6	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :



Approved by :



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Noise Dose R_498/23

Noise Dose Meter Calibration Report

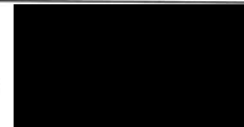
Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data					Calibration Data	
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-R26	SVANTEK	SV-104IS	80836	25 September 2023	113.5	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :



Approved by :





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Noise Dose R_499/23

Noise Dose Meter Calibration Report

Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-B01	SVANTEK	SV-104IS	80840	25 September 2023	113.6	113.5
NMD-B02	SVANTEK	SV-104IS	80842	25 September 2023	113.5	113.5
NMD-B04	SVANTEK	SV-104IS	80854	25 September 2023	113.5	113.5
NMD-B05	SVANTEK	SV-104IS	80856	25 September 2023	113.6	113.5
NMD-R02	SVANTEK	SV-104IS	60152	25 September 2023	113.5	113.5
NMD-R03	SVANTEK	SV-104IS	60153	26 September 2023	113.5	113.5
NMD-R05	SVANTEK	SV-104IS	60155	26 September 2023	113.5	113.5
NMD-R13	SVANTEK	SV-104IS	63438	26 September 2023	113.5	113.5
NMD-R27	SVANTEK	SV-104IS	80837	26 September 2023	113.6	113.5
NMD-R35	SVANTEK	SV-104IS	80873	26 September 2023	113.5	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :

Approved by :



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Noise Dose R_500/23

Noise Dose Meter Calibration Report

Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-B01	SVANTEK	SV-104IS	80840	26 September 2023	113.5	113.5
NMD-B02	SVANTEK	SV-104IS	80842	26 September 2023	113.6	113.5
NMD-B04	SVANTEK	SV-104IS	80854	26 September 2023	113.5	113.5
NMD-B05	SVANTEK	SV-104IS	80856	26 September 2023	113.5	113.5
NMD-R03	SVANTEK	SV-104IS	60153	26 September 2023	113.6	113.5
NMD-R05	SVANTEK	SV-104IS	60155	26 September 2023	113.5	113.5
NMD-R13	SVANTEK	SV-104IS	63438	26 September 2023	113.5	113.5
NMD-R20	SVANTEK	SV-104IS	70035	26 September 2023	113.5	113.5
NMD-R22	SVANTEK	SV-104IS	80801	26 September 2023	113.6	113.5
NMD-R26	SVANTEK	SV-104IS	80836	26 September 2023	113.5	113.5
NMD-R27	SVANTEK	SV-104IS	80837	26 September 2023	113.5	113.5
NMD-R35	SVANTEK	SV-104IS	80873	26 September 2023	113.5	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :

Approved by :



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Noise Dose R_503/23

Noise Dose Meter Calibration Report

Acoustic Calibrator Data						
Brand	SVANTEK		Number	SV 01/60		
Model	SV34		Serial No.	33137		
Calibration Range	114 dB, 1000 Hz		Last Calibration	22 August 2023		
			Due Date	22 August 2024		

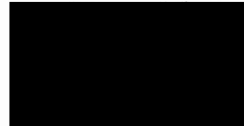
Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-R02	SVANTEK	SV-104IS	60152	27 September 2023	113.5	113.5
NMD-R03	SVANTEK	SV-104IS	60153	27 September 2023	113.6	113.5
NMD-R06	SVANTEK	SV-104IS	60146	27 September 2023	113.5	113.5
NMD-R13	SVANTEK	SV-104IS	63438	27 September 2023	113.5	113.5
NMD-R20	SVANTEK	SV-104IS	70035	27 September 2023	113.6	113.5
NMD-R27	SVANTEK	SV-104IS	80837	27 September 2023	113.5	113.5
NMD-R35	SVANTEK	SV-104IS	80873	27 September 2023	113.5	113.5

Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)	113.53± 0.10 dB
--	-----------------

Calibrated by :



Approved by :



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Noise Dose R_508/23

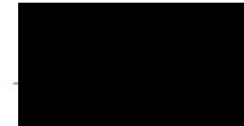
Noise Dose Meter Calibration Report

Acoustic Calibrator Data						
Brand	SVANTEK		Number	SV 01/60		
Model	SV34		Serial No.	33137		
Calibration Range	114 dB, 1000 Hz		Last Calibration	22 August 2023		
			Due Date	22 August 2024		

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-B01	SVANTEK	SV-104IS	80840	28 September 2023	113.6	113.5
NMD-B02	SVANTEK	SV-104IS	80842	28 September 2023	113.5	113.5
NMD-R02	SVANTEK	SV-104IS	60152	28 September 2023	113.5	113.5
NMD-R03	SVANTEK	SV-104IS	60153	28 September 2023	113.5	113.5
NMD-R05	SVANTEK	SV-104IS	60155	28 September 2023	113.5	113.5
NMD-R06	SVANTEK	SV-104IS	60146	28 September 2023	113.5	113.5
NMD-R13	SVANTEK	SV-104IS	63438	28 September 2023	113.5	113.5
NMD-R20	SVANTEK	SV-104IS	70035	28 September 2023	113.6	113.5
NMD-R22	SVANTEK	SV-104IS	80801	28 September 2023	113.5	113.5
NMD-R26	SVANTEK	SV-104IS	80836	28 September 2023	113.5	113.5
NMD-R27	SVANTEK	SV-104IS	80837	28 September 2023	113.6	113.5
NMD-R35	SVANTEK	SV-104IS	80873	28 September 2023	113.5	113.5

Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)	113.53± 0.10 dB
--	-----------------

Calibrated by :



Approved by :





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Noise Dose R_512/23

Noise Dose Meter Calibration Report

Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

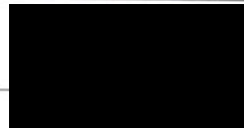
Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-B01	SVANTEK	SV-104IS	80840	01 October 2023	113.6	113.5
NMD-B02	SVANTEK	SV-104IS	80842	01 October 2023	113.5	113.5
NMD-B04	SVANTEK	SV-104IS	80854	01 October 2023	113.5	113.5
NMD-R02	SVANTEK	SV-104IS	60152	01 October 2023	113.5	113.5
NMD-R03	SVANTEK	SV-104IS	60153	01 October 2023	113.5	113.5
NMD-R05	SVANTEK	SV-104IS	60155	01 October 2023	113.6	113.5
NMD-R06	SVANTEK	SV-104IS	60146	01 October 2023	113.5	113.5
NMD-R13	SVANTEK	SV-104IS	63438	01 October 2023	113.5	113.5
NMD-R20	SVANTEK	SV-104IS	70035	01 October 2023	113.6	113.5
NMD-R22	SVANTEK	SV-104IS	80801	01 October 2023	113.5	113.5
NMD-R26	SVANTEK	SV-104IS	80836	01 October 2023	113.5	113.5
NMD-R35	SVANTEK	SV-104IS	80873	01 October 2023	113.5	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :



Approved by :



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Noise Dose R_514/23

Noise Dose Meter Calibration Report

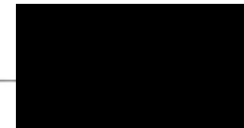
Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-B01	SVANTEK	SV-104IS	80840	02 October 2023	113.6	113.5
NMD-B02	SVANTEK	SV-104IS	80842	02 October 2023	113.5	113.5
NMD-B03	SVANTEK	SV-104IS	80852	02 October 2023	113.5	113.5
NMD-B04	SVANTEK	SV-104IS	80854	02 October 2023	113.6	113.5
NMD-B05	SVANTEK	SV-104IS	80856	02 October 2023	113.5	113.5
NMD-R02	SVANTEK	SV-104IS	60152	02 October 2023	113.5	113.5
NMD-R03	SVANTEK	SV-104IS	60153	02 October 2023	113.5	113.5
NMD-R05	SVANTEK	SV-104IS	60155	02 October 2023	113.6	113.5
NMD-R13	SVANTEK	SV-104IS	63438	02 October 2023	113.5	113.5
NMD-R22	SVANTEK	SV-104IS	80801	02 October 2023	113.5	113.5
NMD-R26	SVANTEK	SV-104IS	80836	02 October 2023	113.5	113.5
NMD-R35	SVANTEK	SV-104IS	80873	02 October 2023	113.5	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :



Approved by :



Noise Dose R_516/23

Noise Dose Meter Calibration Report

Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-R20	SVANTEK	SV-104IS	70035	03 October 2023	113.6	113.5
NMD-R27	SVANTEK	SV-104IS	80837	03 October 2023	113.5	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :

Approved by :

Noise Dose R_517/23

Noise Dose Meter Calibration Report

Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-R02	SVANTEK	SV-104IS	60152	03 October 2023	113.5	113.5
NMD-R03	SVANTEK	SV-104IS	60153	03 October 2023	113.5	113.5
NMD-R05	SVANTEK	SV-104IS	60155	03 October 2023	113.6	113.5
NMD-R06	SVANTEK	SV-104IS	60146	03 October 2023	113.5	113.5
NMD-R13	SVANTEK	SV-104IS	63438	03 October 2023	113.5	113.5
NMD-R35	SVANTEK	SV-104IS	80873	03 October 2023	113.5	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :

Approved by :



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Noise Dose R_518/23

Noise Dose Meter Calibration Report

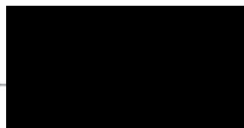
Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-R03	SVANTEK	SV-104IS	60153	04 October 2023	113.5	113.5
NMD-R06	SVANTEK	SV-104IS	60146	04 October 2023	113.6	113.5
NMD-R26	SVANTEK	SV-104IS	80836	04 October 2023	113.5	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :



Approved by :



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Noise Dose R_514/23

Noise Dose Meter Calibration Report

Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-R02	SVANTEK	SV-104IS	60152	04 October 2023	113.5	113.5
NMD-R05	SVANTEK	SV-104IS	60155	04 October 2023	113.6	113.5
NMD-R13	SVANTEK	SV-104IS	63438	04 October 2023	113.5	113.5
NMD-R20	SVANTEK	SV-104IS	70035	04 October 2023	113.6	113.5
NMD-R22	SVANTEK	SV-104IS	80801	04 October 2023	113.5	113.5
NMD-R27	SVANTEK	SV-104IS	80837	04 October 2023	113.5	113.5
NMD-R35	SVANTEK	SV-104IS	80873	04 October 2023	113.5	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :



Approved by :





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Noise Dose R_522/23

Noise Dose Meter Calibration Report

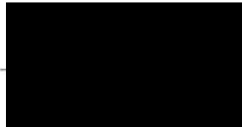
Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-R02	SVANTEK	SV-104IS	60152	05 October 2023	113.5	113.5
NMD-R03	SVANTEK	SV-104IS	60153	05 October 2023	113.5	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :



Approved by :



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Noise Dose R_523/23

Noise Dose Meter Calibration Report

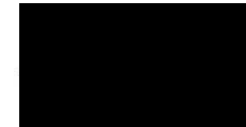
Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-R05	SVANTEK	SV-104IS	60155	05 October 2023	113.6	113.5
NMD-R06	SVANTEK	SV-104IS	60146	05 October 2023	113.5	113.5
NMD-R13	SVANTEK	SV-104IS	63438	05 October 2023	113.5	113.5
NMD-R27	SVANTEK	SV-104IS	80837	05 October 2023	113.5	113.5
NMD-R20	SVANTEK	SV-104IS	70035	05 October 2023	113.6	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :



Approved by :





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Noise Dose R_527/23

Noise Dose Meter Calibration Report

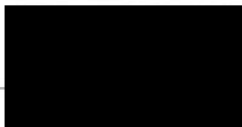
Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-R02	SVANTEK	SV-104IS	60152	08 October 2023	113.5	113.5
NMD-R03	SVANTEK	SV-104IS	60153	08 October 2023	113.5	113.5
NMD-R05	SVANTEK	SV-104IS	60155	08 October 2023	113.6	113.5
NMD-R06	SVANTEK	SV-104IS	60146	08 October 2023	113.5	113.5
NMD-R13	SVANTEK	SV-104IS	63438	08 October 2023	113.5	113.5
NMD-R27	SVANTEK	SV-104IS	80837	08 October 2023	113.6	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :



Approved by :



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Noise Dose R_530/23

Noise Dose Meter Calibration Report

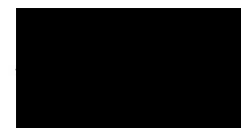
Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-R02	SVANTEK	SV-104IS	60152	09 October 2023	113.5	113.5
NMD-R03	SVANTEK	SV-104IS	60153	09 October 2023	113.5	113.5
NMD-R05	SVANTEK	SV-104IS	60155	09 October 2023	113.6	113.5
NMD-R06	SVANTEK	SV-104IS	60146	09 October 2023	113.5	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :



Approved by :





บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10900
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Noise Dose R_544/23

Noise Dose Meter Calibration Report

Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data					Calibration Data	
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-B14	SVANTEK	SV-104IS	80875	12 October 2023	113.5	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

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Approved by :

คุณภาพอากาศในสถานประกอบการ



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature : 25 ± 3 °C
Pressure : 1010 ± 15 mmbar

Personal Pump Data					Calibration Data									
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve			
					Setting			Actual (Q std.)			y		R ²	
					1	2	3	1	2	3				
B01	SKC	224-PCXR4	262101	02/10/2023	1,000	1,500	2,000	997	1,494	1,995	0.998x - 5.198	1.000		
B02	SKC	224-PCXR4	626166	02/10/2023	1,000	1,500	2,000	995	1,491	1,987	0.995x - 0.239	1.000		
B03	SKC	224-PCXR4	612968	02/10/2023	1,000	1,500	2,000	994	1,498	1,996	1.004x - 17.211	0.999		
B04	SKC	224-PCXR4	602804	03/10/2023	1,000	1,500	2,000	1,001	1,502	1,997	0.999x - 3.961	1.000		
B05	SKC	224-PCXR4	612693	03/10/2023	1,000	1,500	2,000	1,000	1,500	1,998	1.008x - 19.564	0.999		
B06	SKC	224-PCXR4	262188	04/10/2023	1,000	1,500	2,000	999	1,497	1,998	1.005x - 13.275	1.000		
B07	SKC	224-PCXR4	626262	04/10/2023	1,000	1,500	2,000	997	1,491	1,992	0.995x + 0.103	1.000		
B08	SKC	224-PCXR4	626100	03/10/2023	1,000	1,500	2,000	995	1,490	1,994	0.999x - 3.162	1.000		
B09	SKC	224-PCXR4	626479	04/10/2023	1,000	1,500	2,000	1,012	1,500	2,001	0.998x + 1.604	0.999		
B10	SKC	224-PCXR4	691950	05/10/2023	1,000	1,500	2,000	992	1,486	1,994	1.002x - 11.842	1.000		
B11	SKC	224-PCXR8	564315	05/10/2023	1,000	1,500	2,000	993	1,501	1,996	1.010x - 26.335	0.999		
B12	SKC	224-PCXR4	034656	05/10/2023	1,000	1,500	2,000	1,000	1,496	1,998	1.007x - 17.211	0.999		
B13	SKC	224-PCXR4	602073	04/10/2023	1,000	1,500	2,000	1,000	1,488	1,987	0.986x + 13.398	1.000		
B14	SKC	224-PCXR4	626513	04/10/2023	1,000	1,500	2,000	996	1,493	1,996	0.999x - 2.380	1.000		
B15	SKC	224-PCXR4	626474	04/10/2023	1,000	1,500	2,000	1,000	1,498	1,998	1.007x - 16.567	0.999		
B16	SKC	224-PCXR4	626477	06/10/2023	1,000	1,500	2,000	1,001	1,498	1,999	1.010x - 21.673	0.999		
B17	SKC	224-PCXR4	626860	06/10/2023	1,000	1,500	2,000	1,000	1,492	1,998	0.997x - 1.859	1.000		
B18	SKC	224-PCXR4	691484	03/10/2023	1,000	1,500	2,000	995	1,494	1,992	1.000x - 5.493	1.000		
B19	SKC	224-PCXR4	691599	02/10/2023	1,000	1,500	2,000	991	1,500	1,998	1.015x - 32.922	0.999		
B20	SKC	224-PCXR4	691587	02/10/2023	1,000	1,500	2,000	1,001	1,496	1,999	1.010x - 23.222	0.999		
B21	SKC	224-PCXR4	691531	03/10/2023	1,000	1,500	2,000	994	1,491	1,997	1.004x - 12.881	1.000		
B22	SKC	224-PCXR4	691654	03/10/2023	1,000	1,500	2,000	991	1,492	1,994	1.002x - 9.860	1.000		
B23	SKC	224-PCXR4	798593	02/10/2023	1,000	1,500	2,000	991	1,498	1,997	1.014x - 33.810	0.999		
B24	SKC	224-PCXR4	626363	02/10/2023	1,000	1,500	2,000	1,001	1,499	2,001	1.011x - 23.676	0.999		
B25	SKC	224-PCXR4	798489	04/10/2023	1,000	1,500	2,000	996	1,497	1,989	0.991x + 6.619	1.000		
B26	SKC	224-PCXR4	798479	05/10/2023	1,000	1,500	2,000	996	1,492	1,990	0.996x - 1.146	1.000		
B27	SKC	224-PCXR4	691673	09/10/2023	1,000	1,500	2,000	989	1,506	1,998	1.016x - 34.646	0.999		
B28	SKC	224-PCXR4	691570	09/10/2023	1,000	1,500	2,000	992	1,487	1,996	1.006x - 16.996	1.000		
B29	SKC	224-PCXR4	626472	09/10/2023	1,000	1,500	2,000	998	1,495	1,992	0.997x - 0.693	1.000		
B30	SKC	224-PCXR4	691489	03/10/2023	1,000	1,500	2,000	993	1,490	1,990	0.999x - 7.320	1.000		
B31	SKC	224-PCXR4	691509	03/10/2023	1,000	1,500	2,000	1,001	1,497	1,997	1.007x - 18.788	0.999		
B32	SKC	224-PCXR4	091567	04/10/2023	1,000	1,500	2,000	998	1,499	1,996	1.009x - 22.780	0.999		
B33	SKC	224-PCXR4	091756	05/10/2023	1,000	1,500	2,000	1,000	1,489	1,994	0.995x - 0.223	1.000		
B34	SKC	224-PCXR4	612962	05/10/2023	1,000	1,500	2,000	992	1,501	1,997	1.013x - 31.362	0.999		
B35	SKC	224-PCXR4	602682	03/10/2023	1,000	1,500	2,000	998	1,496	1,998	0.998x - 7.157	0.999		
B36	SKC	224-PCXR4	626164	07/10/2023	1,000	1,500	2,000	995	1,487	1,990	0.991x + 3.901	1.000		
B37	SKC	224-PCXR4	626256	02/10/2023	1,000	1,500	2,000	990	1,500	1,993	1.000x - 6.520	1.000		
B38	SKC	224-PCXR4	626167	03/10/2023	1,000	1,500	2,000	989	1,498	1,995	1.015x - 35.470	0.999		
B39	SKC	224-PCXR4	034637	09/10/2023	1,000	1,500	2,000	991	1,495	1,994	1.004x - 14.572	1.000		
B40	SKC	224-PCXR4	798349	07/10/2023	1,000	1,500	2,000	999	1,497	1,996	1.008x - 21.526	0.999		

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Approved by :



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature : 25 ± 3 °C
Pressure : 1010 ± 15 mmbar

Personal Pump Data				Calibration Data								
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3	y	R ²
B41	SKC	224-PCXR4	612669	10/10/2023	1,000	1,500	2,000	999	1,491	1,993	0.994x + 2.802	1.000
B42	SKC	224-PCXR4	626041	10/10/2023	1,000	1,500	2,000	994	1,490	1,989	0.995x - 1.759	1.000
B43	SKC	224-PCXR4	034636	07/10/2023	1,000	1,500	2,000	995	1,488	1,989	0.991x + 2.866	1.000
B44	SKC	224-PCXR8	529341	07/10/2023	1,000	1,500	2,000	992	1,503	1,998	1.009x - 23.051	0.999
B45	SKC	224-PCXR8	529594	10/10/2023	1,000	1,500	2,000	1,000	1,495	1,989	0.989x + 10.094	1.000
B46	SKC	224-PCXR8	566743	02/10/2023	1,000	1,500	2,000	1,000	1,500	1,998	1.008x - 19.564	0.999
B47	SKC	224-PCXR8	566747	02/10/2023	1,000	1,500	2,000	994	1,502	1,996	1.011x - 27.787	0.999
B48	SKC	224-PCXR8	566753	03/10/2023	1,000	1,500	2,000	1,000	1,495	2,000	1.005x - 13.577	1.000
B49	SKC	224-PCXR8	566780	02/10/2023	1,000	1,500	2,000	998	1,498	2,000	1.010x - 21.853	0.999
B50	SKC	224-PCXR8	500400	07/10/2023	1,000	1,500	2,000	999	1,495	1,989	0.991x + 5.640	1.000
B51	SKC	224-PCXR8	500363	07/10/2023	1,000	1,500	2,000	993	1,501	1,996	1.009x - 24.941	0.999
B52	SKC	224-PCXR8	093186	07/10/2023	1,000	1,500	2,000	994	1,500	1,991	0.996x + 2.910	1.000
B53	SKC	224-PCXR8	707670	06/10/2023	1,000	1,500	2,000	990	1,498	1,996	1.014x - 33.838	0.999
B54	SKC	224-PCXR3	509821	05/10/2023	1,000	1,500	2,000	991	1,499	1,995	1.012x - 30.494	0.999
B55	SKC	224-PCXR3	510710	05/10/2023	1,000	1,500	2,000	996	1,493	1,996	0.999x - 2.301	1.000
B56	SKC	224-PCXR3	511450	05/10/2023	1,000	1,500	2,000	992	1,487	1,996	1.006x - 16.797	1.000
B57	SKC	224-PCXR3	510798	04/10/2023	1,000	1,500	2,000	989	1,493	1,994	1.001x - 9.175	1.000
B58	SKC	224-PCXR3	509852	04/10/2023	1,000	1,500	2,000	1,000	1,497	1,997	1.009x - 21.172	0.999
B59	SKC	224-PCXR3	509862	04/10/2023	1,000	1,500	2,000	995	1,495	1,988	0.993x + 2.723	1.000
B60	SKC	224-PCXR3	512655	07/10/2023	1,000	1,500	2,000	992	1,498	1,997	1.013x - 31.979	0.999
B61	SKC	224-PCXR3	503915	07/10/2023	1,000	1,500	2,000	1,000	1,502	1,997	1.007x - 20.065	0.999
B62	SKC	224-PCXR3	505975	07/10/2023	1,000	1,500	2,000	996	1,489	1,991	0.990x + 6.791	1.000
B63	SKC	224-PCXR3	511432	07/10/2023	1,000	1,500	2,000	993	1,500	1,995	1.003x - 8.208	1.000
B64	SKC	224-PCXR3	508302	05/10/2023	1,000	1,500	2,000	991	1,496	1,988	0.998x - 5.262	1.000
B65	SKC	224-PCXR3	508310	05/10/2023	1,000	1,500	2,000	993	1,492	1,991	0.999x - 4.884	1.000
B66	SKC	224-PCXR3	509861	06/10/2023	1,000	1,500	2,000	996	1,493	1,985	0.992x + 2.675	1.000
B67	SKC	224-PCXR3	506295	04/10/2023	1,000	1,500	2,000	1,000	1,498	1,998	1.009x - 21.534	0.999
B68	SKC	224-PCXR3	505872	04/10/2023	1,000	1,500	2,000	994	1,493	1,987	0.993x + 3.176	1.000
B69	SKC	224-PCXR3	508375	07/10/2023	1,000	1,500	2,000	999	1,495	1,996	1.005x - 19.592	0.999
B70	SKC	224-PCXR3	510623	04/10/2023	1,000	1,500	2,000	992	1,486	1,995	1.002x - 11.762	1.000
B71	SKC	224-PCXR3	508367	05/10/2023	1,000	1,500	2,000	999	1,497	1,996	1.008x - 21.664	0.999
B72	SKC	224-PCXR3	505977	03/10/2023	1,000	1,500	2,000	993	1,490	1,990	0.997x - 4.295	1.000
B73	SKC	224-PCXR3	512606	05/10/2023	1,000	1,500	2,000	995	1,495	1,989	0.994x + 1.210	1.000
B74	SKC	224-PCXR3	505993	05/10/2023	1,000	1,500	2,000	997	1,496	1,986	0.987x + 12.602	1.000
B75	SKC	224-PCXR3	509820	05/10/2023	1,000	1,500	2,000	994	1,490	1,991	0.998x - 5.143	1.000
B76	SKC	224-PCXR3	509811	06/10/2023	1,000	1,500	2,000	1,000	1,497	1,999	1.010x - 23.063	0.999
B77	SKC	224-PCXR3	508301	06/10/2023	1,000	1,500	2,000	992	1,501	1,998	1.013x - 32.023	0.999
B78	SKC	224-PCXR3	510677	05/10/2023	1,000	1,500	2,000	1,001	1,498	1,997	1.007x - 18.549	0.999
B79	SKC	224-PCXR3	510920	03/10/2023	1,000	1,500	2,000	998	1,509	1,987	0.986x + 8.898	1.000



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature : 25 ± 3 °C
Pressure : 1010 ± 15 mmbar

Personal Pump Data					Calibration Data									
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve			
					Setting			Actual (Q std.)			y		R ²	
					1	2	3	1	2	3				
R01	SKC	224-PCXR4	602467	02/10/2023	1,000	1,500	2,000	1,001	1,499	1,999	1.010x - 22.581		0.999	
R02	SKC	224-PCXR4	626450	06/10/2023	1,000	2,000	3,000	996	1,493	1,986	0.992x + 3.742		1.000	
R03	SKC	224-PCXR4	691592	06/10/2023	1,000	1,500	2,000	989	1,495	1,994	0.999x - 6.866		1.000	
R04	SKC	224-PCXR4	691672	06/10/2023	1,000	1,500	2,000	998	1,491	1,989	0.991x + 5.421		1.000	
R05	SKC	224-PCXR4	798470	06/10/2023	1,000	1,500	2,000	999	1,495	1,995	1.005x - 18.995		0.999	
R06	SKC	224-PCXR4	798456	02/10/2023	1,000	1,500	2,000	1,000	1,488	1,987	0.986x + 13.398		1.000	
R07	SKC	224-PCXR4	798480	02/10/2023	1,000	1,500	2,000	1,000	1,497	1,998	1.009x - 21.689		0.999	
R08	SKC	224-PCXR4	883215	05/10/2023	1,000	1,500	2,000	994	1,500	1,990	0.995x + 3.109		1.000	
R09	SKC	224-PCXR4	034650	05/10/2023	1,000	1,500	2,000	999	1,497	1,996	1.008x - 21.526		0.999	
R10	SKC	224-PCXR4	091765	05/10/2023	1,000	1,500	2,000	996	1,493	1,994	1.000x - 6.596		1.000	
R11	SKC	224-PCXR4	091763	04/10/2023	1,000	1,500	2,000	998	1,496	1,983	0.998x - 9.346		0.999	
R12	SKC	224-PCXR4	091568	04/10/2023	1,000	1,500	2,000	1,000	1,497	1,999	1.009x - 21.948		0.999	
R13	SKC	224-PCXR4	091638	02/10/2023	1,000	1,500	2,000	994	1,495	1,986	0.993x + 2.981		1.000	
R14	SKC	224-PCXR4	091764	06/10/2023	1,000	1,500	2,000	998	1,498	2,000	1.012x - 26.788		0.999	
R15	SKC	224-PCXR8	529457	06/10/2023	1,000	1,500	2,000	995	1,492	1,987	0.994x + 1.457		1.000	
R16	SKC	224-PCXR8	529643	04/10/2023	1,000	1,500	2,000	1,000	1,498	1,997	1.007x - 17.908		0.999	
R17	SKC	224-PCXR8	529645	07/10/2023	1,000	1,500	2,000	998	1,496	1,998	1.011x - 25.546		0.999	
R18	SKC	224-PCXR8	566756	03/10/2023	1,000	1,500	2,000	994	1,490	1,989	0.995x - 1.759		1.000	
R19	SKC	224-PCXR8	566802	02/10/2023	1,000	1,500	2,000	1,000	1,496	1,999	1.010x - 22.864		0.999	
R20	SKC	224-PCXR8	529089	06/10/2023	1,000	1,500	2,000	992	1,506	1,996	1.008x - 22.151		0.999	
R21	SKC	224-PCXR8	665728	02/10/2023	1,000	1,500	2,000	992	1,486	1,994	1.002x - 11.842		1.000	
R22	SKC	224-PCXR8	707444	03/10/2023	1,000	1,500	2,000	1,001	1,500	1,999	1.007x - 18.171		0.999	
R23	SKC	224-PCXR8	761067	06/10/2023	1,000	1,500	2,000	1,000	1,488	1,993	0.992x + 5.744		1.000	
R24	SKC	224-PCXR8	707893	05/10/2023	1,000	1,500	2,000	994	1,505	1,996	1.005x - 15.010		0.999	
R25	SKC	224-PCXR8	761052	06/10/2023	1,000	1,500	2,000	999	1,495	1,989	0.991x + 5.640		1.000	
R26	SKC	224-PCXR8	707956	07/10/2023	1,000	1,500	2,000	1,010	1,497	2,002	0.999x - 2.874		0.999	
R27	SKC	224-PCXR8	707398	07/10/2023	1,000	1,500	2,000	1,001	1,496	1,997	1.008x - 20.237		0.999	
R28	SKC	224-PCXR8	707481	07/10/2023	1,000	1,500	2,000	993	1,506	1,995	1.002x - 10.719		1.000	
R29	SKC	224-PCXR8	707402	04/10/2023	1,000	1,500	2,000	995	1,495	1,989	0.995x + 1.091		1.000	
R30	SKC	224-PCXR8	093811	04/10/2023	1,000	1,500	2,000	998	1,495	1,992	0.997x - 0.693		1.000	
R31	SKC	224-PCXR8	093183	06/10/2023	1,000	1,500	2,000	999	1,502	1,997	0.988x + 9.127		0.999	
R32	SKC	224-PCXR8	671950	07/10/2023	1,000	1,500	2,000	998	1,495	1,994	0.998x - 3.451		1.000	
R33	SKC	224-PCXR4	626254	07/10/2023	1,000	1,500	2,000	992	1,503	1,995	1.011x - 30.016		0.999	
R34	SKC	224-PCXR4	626131	03/10/2023	1,000	1,500	2,000	990	1,499	1,997	1.014x - 32.986		0.999	
R35	SKC	224-PCXR8	707460	07/10/2023	1,000	1,500	2,000	990	1,501	1,997	1.005x - 15.898		1.000	
R36	SKC	224-PCXR8	707446	05/10/2023	1,000	1,500	2,000	1,000	1,497	1,997	1.002x - 7.547		1.000	
R37	SKC	224-PCXR8	707432	02/10/2023	1,000	1,500	2,000	995	1,498	1,995	0.999x - 4.856		1.000	
R38	SKC	224-PCXR8	707349	02/10/2023	1,000	1,500	2,000	991	1,496	1,992	1.000x - 7.364		1.000	
R39	SKC	224-PCXR8	761095	06/10/2023	1,000	1,500	2,000	995	1,489	1,985	0.990x + 6.253		1.000	

Calibrated by :

Approved by :



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature : 25 ± 3 °C
Pressure : 1010 ± 15 mmbar

Personal Pump Data					Calibration Data									
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve			
					Setting			Actual (Q std.)			y		R ²	
					1	2	3	1	2	3				
R40	SKC	224-PCXR4	612753	07/10/2023	1,000	1,500	2,000	999	1,496	1,996	1.008x - 21.287		0.999	
R41	SKC	224-PCXR4	626140	03/10/2023	1,000	1,500	2,000	990	1,499	1,996	1.013x - 31.991		0.999	
R42	SKC	224-PCXR4	626463	07/10/2023	1,000	1,500	2,000	998	1,493	1,994	0.998x - 4.088		1.000	
R43	SKC	224-PCXR4	626129	07/10/2023	1,000	1,500	2,000	1,001	1,498	1,999	1.010x - 21.673		0.999	
R44	SKC	224-PCXR4	602753	07/10/2023	1,000	1,500	2,000	994	1,492	1,990	0.997x - 4.275		1.000	
R45	SKC	224-PCXR4	626137	06/10/2023	1,000	1,500	2,000	992	1,487	1,996	1.006x - 16.996		1.000	

Calibrated by :

Approved by :



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Rotameter Calibration Report (For Personal Pump Low Flow Adjust)

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Calibration Data

Rotameter Data			Calibration Data								
No.	Brand	Model	Date	Flow Rate (mL/min)						Value From Calibration Curve	
				Flow Rate (Reading)			Actual (Q std.)				
				1	2	3	1	2	3	y	R ²
L-R01	Dwyer	VFA-21	02/10/2023	50	100	200	50.4	98.3	200.4	0.989x + 0.553	1.000
L-R02	Dwyer	VFA-21	06/10/2023	50	100	200	49.3	100.6	199.3	1.002x - 1.123	0.999
L-R03	Dwyer	VFA-21	04/10/2023	50	100	200	50.1	99.3	200.7	1.001x - 0.261	1.000
L-R04	Dwyer	VFA-21	02/10/2023	50	100	200	50.1	100.7	200.6	1.006x - 1.002	0.999
L-R05	Dwyer	VFA-21	03/10/2023	50	100	200	49.8	101.4	200.7	0.995x + 1.282	1.000
L-R06	Dwyer	VFA-21	05/10/2023	50	100	200	50.3	101.1	199.7	1.004x - 0.716	0.999

Calibrated by :

Approved by :

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: CN10630014
Organization Name: S.P.S. Consulting Service Co., Ltd.
Organization Location: 7 Soi Phaholyothin 24 Bangkok 10900

Date: September 1, 2023 2:41:39 PM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.50, GCMS.02.50
Overall Qualification Status: Pass

System Inspection and Basic Safety and Operation

Name: 6890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Decay

Name: 6890

Front

SSL

Setpoint Status:

Pass

Pressure:

25.0

psi

Pressure Change:

-0.2

psi

/5 minutes

Agilent Recommended:

>=

-2.0

and

<=

0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 6890

Front

SSL

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Setpoint Status: Pass

Setpoint Actual
Inlet Pressure: 25.0 psi 24.8 psi
Accuracy: 0.2 psi
Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Inlet Pressure Accuracy

Name: 6890
Back SSL

Setpoint Status: Pass

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

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 6890
Front FID

Setpoint Status: Pass

Flow Type: Fuel
Setpoint: 30.0 mL/min Measured Flow: 30.8 mL/min
Accuracy: 0.8 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

Flow Type: Oxidizer
Setpoint: 400.0 mL/min Measured Flow: 395.3 mL/min
Accuracy: 4.7 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: 24.7 mL/min
Accuracy: 0.3 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: 6890

Setpoint Status: Pass

Zone: Oven
Setpoint/Actual
Temperature: 230.0 229.5 °C
Accuracy: -0.5 °C
Agilent Recommended: ≥ -1.0 % setpoint in K (-5.0 °C)
≤ 1.0 % setpoint in K (5.0 °C)

Setpoint Status: **Pass**

Zone: **Oven**

Setpoint/Actual

Temperature: **100.0** **99.8** °C

Accuracy: **-0.2** °C

Agilent Recommended: **>= -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: **6890**

Setpoint Status: **Pass**

Setpoint/Average

Temperature: **100.0** **99.83333** °C

Stability: **0.1** °C

Agilent Recommended: **<= 0.5**

Overall GC Oven Temperature Stability Test Status

Pass

Scouting Run

Tested Combination1 **Front** **SSL** / **Front** **FID**

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** **FID**

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Name: **6890**

Setpoint Status: **Pass**

Base Signal: **15.8** pA

ASTM Noise **443.17** counts

Drift **18437.04** counts/Hr

Agilent Recommended: **<= 768.00**

Status: **Pass**

Agilent Recommended: **<= 19200.00**

Status: **Pass**

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1 **Front** **SSL** / **Front** **FID**

Name: **7683B**

Setpoint Status: **Pass**

Injection Volume on Column: **1.0** uL

Area RSD: **0.67** %

Retention Time RSD: **0.02** %

Agilent Recommended: **<= 3.00**

Agilent Recommended: **<= 1.00**

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination1 **Front** **SSL** / **Front** **FID**

Injection Tower

Name: **6890**

Setpoint Status: **Pass**

Signal to Noise: **671482**

Agilent Recommended: **>= 300000**

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Overall Signal to Noise Test Status

Pass

Log Amp

Tested Combination2 Back SSL / External SQ

Name: 5975A

Setpoint Status: Pass

Overall Log Amp Test Status

Pass

RFPA

Tested Combination2 Back SSL / External SQ

Name: 5975A

Setpoint Status: Pass

Amu: 1050 m/z

Drift After Five Minutes:

12 mV

RFPA Voltage:

466 mV

Agilent Recommended:

>= -100 and <= 100

<= 1100

Overall RFPA Test Status

Pass

Tune EI

Tested Combination2 Back SSL / External SQ

Name: 5975A

Setpoint Status: Pass

Filament: 1

Setpoint Status: Pass

Filament: 2

Overall Tune EI Test Status

Pass

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Signal to Noise EI

Tested Combination2 Back SSL / External SQ

Name: 5975A

Source: EI - Inert

Filament:

1

Setpoint Status: Pass

Signal to Noise: 113

Agilent Recommended: >= 80

Source: EI - Inert

Filament:

2

Setpoint Status: Pass

Signal to Noise: 183

Agilent Recommended: >= 80

Overall Signal to Noise EI Test Status

Pass

Date: September 1, 2023 2:41:39 PM
System ID: CN10630014

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	CN10630014
Manufacturer	Agilent Technologies
Name	6890

Tested Combination1

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

Tested Combination2

Injection Technique	Manual Injection
Inlet	Back
Detector	External
LTM Included?	No

Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7683B
Model Number	G2913A
Serial Number	CN64136101
Firmware Revision	A.11.02
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

Sampler 2

Manufacturer	Agilent Technologies
Type	Manual Injection
Usage	Sample Injection
Syringe Volume (µL)	10

Mainframe 1

Manufacturer	Agilent Technologies
Name	6890
Model Number	G1530N
Serial Number	CN630014
Firmware Revision	N.06.07
Oven Type	Standard

Inlet 1

Manufacturer	Agilent Technologies
Name	6890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Inlet 2

Manufacturer	Agilent Technologies
Name	6890
Type	SSL
Location	Back
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1

Manufacturer	Agilent Technologies
Name	6890
Type	FID
Adapter	Packed
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen

Detector 2

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5975A
Serial Number	US61633454
Firmware Revision	5.02.09
High Vacuum System	Turbo Pump
Scouting Run Standard	OFN Std

MS EI Source 1

Manufacturer	Agilent Technologies
Source Type	EI - Inert
Number of filaments	2

Electronic Signature

Purpose

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Details

Full Name of Signer:	Adirek Rattanawijit
Logged On User Name:	adirek.rattanawijit@non.agilent.com
Signature Creation Date:	September 1, 2023
Reason for Signature:	Executed protocol and published this original version of document

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User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:29:16 PM	Audit	SessionCreated	Session	None
September 1, 2023 1:29:16 PM	Start	Configuration	Session	None
September 1, 2023 1:29:16 PM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
September 1, 2023 1:32:47 PM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.50/Gc.02.50.eqp], EQP File Name: [Gc.02.50.eqp], EQP Name: [AgilentRecommended] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.50/GcMs.02.50.eqp], EQP File Name: [GcMs.02.50.eqp], EQP Name: [AgilentRecommended]
September 1, 2023 1:32:50 PM	Configuration	Session	Session	None
September 1, 2023 1:32:54 PM	Start	Qualification	Session	OQ
September 1, 2023 1:32:54 PM	Execution	System Inspection and Basic Safety and Operation - 6890 - Qualitative Test - No setpoints associated	System Inspection and Basic Safety and Operation - 6890 - Qualitative Test - No setpoints associated	None
September 1, 2023 1:33:23 PM	End	Execution	System Inspection and Basic Safety and Operation - 6890 - Qualitative Test - No setpoints associated	Run Count : 1

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:33:26 PM	Start	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
September 1, 2023 1:33:34 PM	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
September 1, 2023 1:33:37 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
September 1, 2023 1:33:41 PM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
September 1, 2023 1:33:43 PM	Start	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
September 1, 2023 1:33:50 PM	End	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
September 1, 2023 1:33:53 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None
September 1, 2023 1:34:00 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
September 1, 2023 1:34:02 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
September 1, 2023 1:34:12 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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User Name: adirek.rattanawijit
 Hostname: C814-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:34:14 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
September 1, 2023 1:34:21 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
September 1, 2023 1:34:23 PM	Start	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
September 1, 2023 1:34:50 PM	Audit	Data	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
September 1, 2023 1:34:52 PM	End	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
September 1, 2023 1:34:55 PM	Start	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
September 1, 2023 1:35:33 PM	Audit	Data	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
September 1, 2023 1:35:35 PM	End	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
September 1, 2023 1:35:37 PM	Start	Execution	GC Oven Temperature Stability - 6890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None

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User Name: adirek.rattanawijit
 Hostname: C814-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:36:42 PM	Audit	Data	GC Oven Temperature Stability - 6890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
September 1, 2023 1:36:44 PM	End	Execution	GC Oven Temperature Stability - 6890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
September 1, 2023 1:36:47 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
September 1, 2023 1:37:18 PM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Data files Path : C:\Users\Win 10 Home\Desktop\IQPV_GC\IS PS\IQPV2023\IQPV2023\IS COUT_001.D\FID1A.CH
September 1, 2023 1:37:41 PM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Run Count : 1
September 1, 2023 1:37:44 PM	Start	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
September 1, 2023 1:38:02 PM	Audit	Data	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : C:\Users\Win 10 Home\Desktop\IQPV_GC\IS PS\IQPV2023\IQPV2023\IN D_001.D\FID1A.CH
September 1, 2023 1:38:08 PM	End	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1

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User Name: adirek.rattanawijit
 Hostname: C614-QA
 System ID: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:38:23 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 80	None
September 1, 2023 1:38:23 PM	Start	Execution	Tune EI - 5975A SQ: - Source: - None EI - Inert Filament 2 (Qualitative - No setpoints associated)	
September 1, 2023 1:38:58 PM	End	Execution	Tune EI - 5975A SQ: - Source: - Run Count : 1 EI - Inert Filament 2 (Qualitative - No setpoints associated)	
September 1, 2023 1:39:01 PM	Start	Execution	Tune EI - 5975A SQ: - Source: - None EI - Inert Filament 1 (Qualitative - No setpoints associated)	
September 1, 2023 1:39:16 PM	End	Execution	Tune EI - 5975A SQ: - Source: - Run Count : 1 EI - Inert Filament 1 (Qualitative - No setpoints associated)	
September 1, 2023 1:39:18 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 80	None
September 1, 2023 1:39:27 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 80	Data files Path : C:\Users\Win10 Home\Desktop\OQPV_GCIS PSIOQPV2023\OQPV2023\IS N_F1_001.D\data.ms
September 1, 2023 1:40:37 PM	End	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 80	Run Count : 1
September 1, 2023 1:40:41 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	None

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

User Name: adirek.rattanawijit
 Hostname: C614-QA

System ID: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 1:41:07 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	Data files Path : C:\Users\Win10 Home\Desktop\OQPV_GCIS PSIOQPV2023\OQPV2023\IS N_F2_001.D\data.ms
September 1, 2023 1:43:13 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	None
September 1, 2023 1:43:24 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	None
September 1, 2023 1:43:36 PM	End	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 80	Run Count : 1
September 1, 2023 1:43:41 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
September 1, 2023 1:57:52 PM	Audit	AccRestarted	Session	None
September 1, 2023 2:01:02 PM	Audit	SessionReloaded	Session	None
September 1, 2023 2:01:05 PM	Start	Qualification	Session	OQ
September 1, 2023 2:01:06 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\IP_002.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\IP_003.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\IP_004.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\IP_005.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\IP_006.D\FID 1A.CH
September 1, 2023 2:01:39 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\IP_007.D\FID 1A.CH
September 1, 2023 2:01:51 PM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 2:01:54 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	None
September 1, 2023 2:02:04 PM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Data files Path : C:\Users\Win 10 Home\Desktop\OQPV_GCIS PS\OQPV2023\SN_001.D\FID 1A.CH
September 1, 2023 2:02:16 PM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Run Count : 1
September 1, 2023 2:03:19 PM	Start	Execution	Log Amp - 5975A SQ: - Source: EI - Inert	None
September 1, 2023 2:06:05 PM	End	Execution	Log Amp - 5975A SQ: - Source: EI - Inert	Run Count : 1
September 1, 2023 2:06:07 PM	Start	Execution	RFPA - 5975A SQ: - Source: EI - Inert	None
September 1, 2023 2:17:21 PM	End	Qualification	Session	OQ
September 1, 2023 2:17:21 PM	Start	Reporting	Session	None
September 1, 2023 2:24:55 PM	End	Reporting	Session	None
September 1, 2023 2:24:55 PM	Start	Qualification	Session	OQ
September 1, 2023 2:25:10 PM	Start	Execution	RFPA - 5975A SQ: - Source: EI - Inert	None
September 1, 2023 2:34:26 PM	End	Execution	RFPA - 5975A SQ: - Source: EI - Inert	Run Count : 1
September 1, 2023 2:39:18 PM	End	Qualification	Session	OQ

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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User Name: adirek.rattanawijit
 Hostname: C614-QA

System Id: CN10630014
 Print Date: September 1, 2023 2:41:42 PM

SPS_OQGCMS_CN10630014_2023 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 1, 2023 2:36:18 PM	Start	Reporting	Session	None
September 1, 2023 2:40:24 PM	Audit	Reporting	Session	Report Generated : Certificate

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Date: September 1, 2023 2:41:39 PM
 System ID: CN10630014

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บริษัท ไทยยูนิค จำกัด THAI UNIQUE CO., LTD.

80-82 ถนนประชาธิปไตย แขวงบางขุนพรหม เขตพระนคร กรุงเทพฯ 10200

80-82 Prachathipatai Rd., Bangkhunphrom, Pranakorn, Bangkok 10200

Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawatt@thaiunique.com, Website : www.thaiunique.com

GAS CHROMATOGRAPH TEST CERTIFICATION

Certificate No. : SV0823/21044

Instrument Type : GC

Model : CP-3800

Serial Number : 00734

Organization : S.P.S. Consulting Service Co., Ltd.

Address : 7 Phahonyothin Soi 24 Phahonyothin Rd. Ladyao Chatuchak Bangkok 10900

Date : 09/08/2023

ELECTRONIC TEST

CPU	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
LCD TEST	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
VENT TEST	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
KEY ECHO TEST	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
DESTRUCTION RAM TEST	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RUN CHROMATOGRAM TEST

DETECTOR : Flame Ionization Detector (FID Channel Front)

INJECTOR : Capillary Injector Model 1079

GC CONDITION:

Column	80 °C hold 1 min., rate 20 °C/min. to 200 °C hold 1min.
Injector	220 °C
Detector	300 °C
Column flow	5 mL/min
Makeup flow	25 mL/min
Air flow	300 mL/min
Hydrogen flow	30 mL/min

Column:Capillary Column CP sil 5 CB 0.25 ID x 15 M

Sample: 1 µL Injection FID Test Sample 0.218 g/L C14,C15,C16 in hexane

SENSITIVITY TEST: C15. (Area count) = 362,972 Counts.



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SERVICE DEPARTMENT
 FR-SV-029 Rev. 04



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THAI UNIQUE CO., LTD.

80-82 ถนนประชาธิปไตย แขวงบางขุนพรหม เขตพระนคร กรุงเทพฯ 10200

80-82 Prachathipatai Rd., Bangkhunphrom, Pranakorn, Bangkok 10200

Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawatt@thaiunique.com, Website : www.thaiunique.com

Detector Sensitivity (FID)

Detector Response	Result	Specification
Baseline Noise (µV)	1.47	≤ 50
Baseline Drift (%)	0.09	≤ 1
Sensitivity (S/N for C15)	19,600	≥ 1,024

Temperature Specification

Temperature	Set	Result	Specification
Column Oven (° C)	80	80	± 5
Injector (° C)	220	220	± 5
Detector (° C)	300	300	± 5
Incubator (° C)	60	N/A	± 5

Relative Standard Deviation % (% RSD)

Checkout Procedure	Result	Specification
Area C15 (%)	1.52	≤ 5
Retention Time C15(%)	0.01	≤ 0.5

APPROVAL :

Signature:

Engineer

Date : 09/08/2023



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SERVICE DEPARTMENT
FR-SV-029 Rev.04



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Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawatt@thaiunique.com, Website : www.thaiunique.com

Results Integrated System Testing

Checkout Procedure	FID
Detector Position	Front
Inlet Type	1079 Injector
C15 Area 1	357,863
C15 Area 2	357,824
C15 Area 3	367,724
C15 Area 4	361,724
C15 Area 5	369,724
C15 Area Average	362,972
* % RSD (< 5 %)	1.52

* The precision specification should be less than 2.0 % RSD ** (Relative Standard Deviation) for an Auto sampler injection and less than 5 % for Manual injections. To calculate the %RSD, select the C15 peak area for each of the five (5) samples.

** (Relative Standard Deviation is determined by dividing the standard deviation by the average and multiplying by 100.)

$$\% \text{ RSD} = (\text{std.dev} / \text{avg}) * 100$$

Compliance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
Performance by		
Date		



Comments			
Reviewed by		Date	09/08/2023



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SERVICE DEPARTMENT



Results Integrated System Testing

Checkout Procedure	FID
Detector Position	Front
Inlet Type	1079 Injector
C15 RT 1	4.125
C15 RT 2	4.125
C15 RT 3	4.125
C15 RT 4	4.124
C15 RT 5	4.124
C15 RT Average	4.122
* % RSD (< 0.5 %)	0.01

* The precision specification should be less than 0.5 % RSD ** (Relative Standard Deviation) for an Auto sampler injection and less than 0.5 % for Manual injections. To calculate the %RSD, select the RT C15 peak for each of the five (5) samples.

** (Relative Standard Deviation is determined by dividing the standard deviation by the average and multiplying by 100.)

$$\% \text{ RSD} = (\text{std.dev} / \text{avg}) * 100$$

Compliance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
Performance by	[REDACTED]	
Date		



Comments	[REDACTED]		
Reviewed by	[REDACTED]	Date	09/08/2023