

ภาคผนวกที่ 4

เอกสารสอบเทียบความถูกต้องของเครื่องมือ

**ตารางสรุปรายการเอกสารการสอบเทียบความถูกต้องของเครื่องมือเก็บตัวอย่าง
และเครื่องมือตรวจวิเคราะห์คุณภาพสิ่งแวดล้อม**

รายการตรวจวัด	เครื่องมือเก็บตัวอย่าง	เครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
1. คุณภาพอากาศจากปล่อง		
Styrene	Personal Pump SKC No. B69, B70, B77, R12, R13, R14, R15, R19, R28, R32, R33, R35, R37 Rotameter No. H-R02, R03	GC/FID
Acrylonitrile	Personal Pump SKC No. B69, B70, B77, R12, R13, R14, R15, R19, R28, R32, R33, R35, R37 Rotameter No. H-R02, R03	GC/FID
Sulfur Dioxide	Personal Pump SKC No. B62, B65, B69, R01, R12, R13, R14, R15, R19, R24, R32 Rotameter No. H-R02, R03	-
Oxides of Nitrogen	Vacuum Gauge	Spectrophotometer
2. คุณภาพอากาศในบรรยากาศ		
1,3-Butadiene	Mass Flow Meter	GC/MS
Acrylonitrile	Mass Flow Meter	GC/MS
Styrene	Mass Flow Meter	GC/MS
Nitrogen Dioxide	NO/NO ₂ /NO _x Analyzer No. B09, R03, R04, R06	NO/NO ₂ /NO _x Analyzer No. B09, R03, R04, R06
Sulfur Dioxide	SO ₂ Analyzer No. B07, B09, B14, R08	SO ₂ Analyzer No. B07, B09, B14, R08
3. คุณภาพน้ำ		
Temperature	-	Thermometer
pH	-	pH Meter
Total Suspended Solids	-	Digital Balance
Total Dissolved Solid	-	Digital Balance
BOD ₅	-	BOD Analyzer
COD	-	COD Reactor
Grease & Oil	-	Digital Balance
Cyanide	-	Spectrophotometer
1,3-Butadiene	-	GC/MS
Styrene	-	GC/MS
Acrylonitrile	-	GC/MS
Total Coliform Bacteria	-	Incubator/Water Bath
Nitrate-Nitrogen	-	Spectrophotometer

**ตารางสรุปรายการเอกสารการสอบเทียบความถูกต้องของเครื่องมือเก็บตัวอย่าง
และเครื่องมือตรวจวิเคราะห์คุณภาพสิ่งแวดล้อม (ต่อ)**

รายการตรวจวัด	เครื่องมือเก็บตัวอย่าง	เครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
4. ระดับเสียงในบริเวณชุมชน L_{eq} 24 hr และ L_{90}	Acoustic Calibrator Sound Level Meter No. ACO-C1-B04 Sound Level Meter No. CR-B02, B05	-
5. ระดับเสียงในพื้นที่โรงงาน L_{eq} 8 hr และ L_{max}	Acoustic Calibrator Sound Level Meter No. ACO-R40, R41, R50 Sound Level Meter No. CR-B05 Sound Level Meter No. NL 21-B01	-
6. คุณภาพอากาศในสถานประกอบการ Styrene	Personal Pump	GC/FID
Acrylonitrile	Personal Pump	GC/FID
1,3-Butadiene	Personal Pump	GC/MS

คุณภาพอากาศจากปล่อง



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด

S.P.S. CONSULTING SERVICE CO., LTD.

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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.)				
					1	2	3	1	2	3	y	R ²
B41	SKC	224-PCXR4	612669	07/01/2025	1,000	1,500	2,000	996	1,512	2,005	1.008x - 10.246	1.000
B42	SKC	224-PCXR4	626041	07/01/2025	1,000	1,500	2,000	995	1,499	2,002	1.002x - 2.343	1.000
B43	SKC	224-PCXR4	034636	03/01/2025	1,000	1,500	2,000	999	1,495	1,997	0.996x + 2.703	1.000
B44	SKC	224-PCXR8	529341	03/01/2025	1,000	1,500	2,000	998	1,510	2,003	1.009x - 16.871	0.999
B45	SKC	224-PCXR8	529594	03/01/2025	1,000	1,500	2,000	997	1,508	2,004	1.012x - 21.113	0.999
B46	SKC	224-PCXR8	566743	03/01/2025	1,000	1,500	2,000	996	1,497	2,003	1.010x - 16.955	1.000
B47	SKC	224-PCXR8	566747	03/01/2025	1,000	1,500	2,000	1,002	1,504	2,001	1.003x - 2.758	1.000
B48	SKC	224-PCXR8	566753	03/01/2025	1,000	1,500	2,000	998	1,512	2,002	1.008x - 13.876	0.999
B49	SKC	224-PCXR8	566780	03/01/2025	1,000	1,500	2,000	997	1,497	1,997	1.002x - 5.465	1.000
B50	SKC	224-PCXR8	500400	03/01/2025	1,000	1,500	2,000	996	1,503	1,999	1.003x - 7.316	1.000
B51	SKC	224-PCXR8	500363	06/01/2025	1,000	1,500	2,000	1,003	1,505	1,998	0.995x + 8.579	1.000
B52	SKC	224-PCXR8	093186	06/01/2025	1,000	1,500	2,000	1,002	1,496	1,999	0.999x - 0.396	1.000
B53	SKC	224-PCXR8	707670	07/01/2025	1,000	1,500	2,000	997	1,505	2,005	1.010x - 19.569	0.999
B54	SKC	224-PCXR3	509821	07/01/2025	1,000	1,500	2,000	1,004	1,506	2,002	1.002x - 0.736	1.000
B55	SKC	224-PCXR3	510710	07/01/2025	1,000	1,500	2,000	998	1,501	2,001	1.003x - 5.629	1.000
B56	SKC	224-PCXR3	511450	07/01/2025	1,000	1,500	2,000	995	1,509	2,007	1.013x - 22.400	0.999
B57	SKC	224-PCXR3	510798	07/01/2025	1,000	1,500	2,000	999	1,498	1,996	0.996x + 4.985	1.000
B58	SKC	224-PCXR3	509852	06/01/2025	1,000	1,500	2,000	1,002	1,503	2,005	1.009x - 13.249	1.000
B59	SKC	224-PCXR3	509862	06/01/2025	1,000	1,500	2,000	996	1,506	2,007	1.015x - 25.718	0.999
B60	SKC	224-PCXR3	512655	06/01/2025	1,000	1,500	2,000	1,012	1,504	2,001	0.995x + 10.338	1.000
B61	SKC	224-PCXR3	503915	03/01/2025	1,000	1,500	2,000	1,003	1,507	2,010	1.010x - 13.769	1.000
B62	SKC	224-PCXR3	505975	03/01/2025	1,000	1,500	2,000	1,004	1,505	2,008	1.012x - 17.586	0.999
B63	SKC	224-PCXR3	511432	03/01/2025	1,000	1,500	2,000	999	1,503	2,003	1.013x - 21.568	0.999
B64	SKC	224-PCXR3	508302	06/01/2025	1,000	1,500	2,000	996	1,506	2,006	1.010x - 15.623	1.000
B65	SKC	224-PCXR3	508310	06/01/2025	1,000	1,500	2,000	1,003	1,502	2,002	1.001x + 1.279	1.000
B66	SKC	224-PCXR3	509861	06/01/2025	1,000	1,500	2,000	1,004	1,505	2,008	1.004x - 7.200	1.000
B67	SKC	224-PCXR3	506295	06/01/2025	1,000	1,500	2,000	997	1,497	2,007	1.011x - 22.995	0.999
B68	SKC	224-PCXR3	505872	07/01/2025	1,000	1,500	2,000	1,001	1,493	1,999	0.998x - 1.515	1.000
B69	SKC	224-PCXR3	508375	07/01/2025	1,000	1,500	2,000	995	1,508	2,003	1.013x - 23.639	0.999
B70	SKC	224-PCXR3	510623	07/01/2025	1,000	1,500	2,000	1,004	1,502	2,007	1.011x - 17.470	0.999
B71	SKC	224-PCXR3	508367	06/01/2025	1,000	1,500	2,000	1,003	1,504	2,008	1.016x - 24.787	0.999
B72	SKC	224-PCXR3	505977	06/01/2025	1,000	1,500	2,000	1,008	1,496	2,007	1.001x + 0.904	1.000
B73	SKC	224-PCXR3	512606	06/01/2025	1,000	1,500	2,000	1,003	1,502	2,003	1.007x - 15.456	0.999
B74	SKC	224-PCXR3	505993	06/01/2025	1,000	1,500	2,000	1,004	1,501	1,999	1.000x - 0.624	1.000
B75	SKC	224-PCXR3	509820	06/01/2025	1,000	1,500	2,000	996	1,510	2,003	1.010x - 17.886	0.999
B76	SKC	224-PCXR3	509811	07/01/2025	1,000	1,500	2,000	994	1,509	2,008	1.013x - 21.308	1.000
B77	SKC	224-PCXR3	508301	07/01/2025	1,000	1,500	2,000	1,002	1,491	2,006	1.006x - 10.302	1.000
B78	SKC	224-PCXR3	510677	07/01/2025	1,000	1,500	2,000	1,005	1,504	2,007	1.012x - 19.937	0.999
B79	SKC	224-PCXR3	510920	06/01/2025	1,000	1,500	2,000	1,003	1,503	2,006	1.015x - 24.223	0.999

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

Peera Detudom
(Mr. Peera Detudom)



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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
B41	SKC	224-PCXR4	612669	03/04/2025	1,000	1,500	2,000	1,005	1,502	2,004	1.005x - 8.923	1.000
B42	SKC	224-PCXR4	626041	03/04/2025	1,000	1,500	2,000	1,004	1,501	2,008	1.009x - 13.856	1.000
B43	SKC	224-PCXR4	034636	01/04/2025	1,000	1,500	2,000	1,012	1,497	1,996	0.990x + 15.132	1.000
B44	SKC	224-PCXR8	529341	01/04/2025	1,000	1,500	2,000	1,011	1,511	2,008	1.002x - 0.860	0.999
B45	SKC	224-PCXR8	529594	04/04/2025	1,000	1,500	2,000	993	1,512	2,003	1.009x - 14.476	1.000
B46	SKC	224-PCXR8	566743	04/04/2025	1,000	1,500	2,000	1,008	1,508	2,008	1.000x - 0.100	0.999
B47	SKC	224-PCXR8	566747	04/04/2025	1,000	1,500	2,000	999	1,510	2,010	1.010x - 14.444	1.000
B48	SKC	224-PCXR8	566753	01/04/2025	1,000	1,500	2,000	1,010	1,506	2,006	0.999x + 2.782	1.000
B49	SKC	224-PCXR8	566780	04/04/2025	1,000	1,500	2,000	1,003	1,504	2,004	1.003x - 2.183	1.000
B50	SKC	224-PCXR8	500400	04/04/2025	1,000	1,500	2,000	1,002	1,493	1,995	0.994x + 5.841	1.000
B51	SKC	224-PCXR8	500363	04/04/2025	1,000	1,500	2,000	998	1,511	2,011	1.013x - 19.465	0.999
B52	SKC	224-PCXR8	093186	02/04/2025	1,000	1,500	2,000	997	1,505	2,006	1.008x - 12.641	1.000
B53	SKC	224-PCXR8	707670	02/04/2025	1,000	1,500	2,000	1,004	1,503	2,007	1.007x - 7.992	1.000
B54	SKC	224-PCXR3	509821	02/04/2025	1,000	1,500	2,000	1,005	1,504	2,008	1.010x - 15.060	0.999
B55	SKC	224-PCXR3	510710	02/04/2025	1,000	1,500	2,000	1,001	1,495	1,997	0.996x + 5.073	1.000
B56	SKC	224-PCXR3	511450	02/04/2025	1,000	1,500	2,000	1,005	1,494	1,996	0.991x - 13.385	1.000
B57	SKC	224-PCXR3	510798	03/04/2025	1,000	1,500	2,000	997	1,511	2,009	1.014x - 21.540	0.999
B58	SKC	224-PCXR3	509852	03/04/2025	1,000	1,500	2,000	1,006	1,493	2,002	1.001x - 4.094	1.000
B59	SKC	224-PCXR3	509862	03/04/2025	1,000	1,500	2,000	995	1,502	2,003	1.012x - 21.564	1.000
B60	SKC	224-PCXR3	512655	03/04/2025	1,000	1,500	2,000	998	1,507	2,004	1.010x - 18.510	0.999
B61	SKC	224-PCXR3	503915	03/04/2025	1,000	1,500	2,000	997	1,499	2,001	1.002x - 4.374	1.000
B62	SKC	224-PCXR3	505975	01/04/2025	1,000	1,500	2,000	1,002	1,503	2,005	1.008x - 11.138	1.000
B63	SKC	224-PCXR3	511432	04/04/2025	1,000	1,500	2,000	998	1,502	1,996	0.996x + 3.970	1.000
B64	SKC	224-PCXR3	508302	04/04/2025	1,000	1,500	2,000	1,005	1,509	2,008	1.009x - 10.402	1.000
B65	SKC	224-PCXR3	508310	04/04/2025	1,000	1,500	2,000	1,004	1,503	2,007	1.010x - 14.088	1.000
B66	SKC	224-PCXR3	509861	04/04/2025	1,000	1,500	2,000	1,003	1,504	2,010	1.008x - 12.369	1.000
B67	SKC	224-PCXR3	506295	04/04/2025	1,000	1,500	2,000	1,002	1,498	2,004	0.998x + 4.290	1.000
B68	SKC	224-PCXR3	505872	04/04/2025	1,000	1,500	2,000	999	1,504	1,998	1.000x + 0.436	1.000
B69	SKC	224-PCXR3	508375	02/04/2025	1,000	1,500	2,000	1,004	1,498	2,002	0.996x + 5.501	1.000
B70	SKC	224-PCXR3	510623	02/04/2025	1,000	1,500	2,000	996	1,497	2,005	1.005x - 8.735	1.000
B71	SKC	224-PCXR3	508367	02/04/2025	1,000	1,500	2,000	1,013	1,505	2,009	1.000x + 3.294	0.999
B72	SKC	224-PCXR3	505977	02/04/2025	1,000	1,500	2,000	997	1,494	2,003	1.006x - 11.350	1.000
B73	SKC	224-PCXR3	512606	01/04/2025	1,000	1,500	2,000	1,010	1,507	2,004	0.998x + 5.129	1.000
B74	SKC	224-PCXR3	505993	01/04/2025	1,000	1,500	2,000	998	1,499	2,010	1.009x - 11.942	1.000
B75	SKC	224-PCXR3	509820	01/04/2025	1,000	1,500	2,000	995	1,511	2,004	1.011x - 18.966	0.999
B76	SKC	224-PCXR3	509811	01/04/2025	1,000	1,500	2,000	998	1,504	2,010	1.012x - 20.993	0.999
B77	SKC	224-PCXR3	508301	03/04/2025	1,000	1,500	2,000	1,007	1,509	2,008	1.001x + 3.750	1.000
B78	SKC	224-PCXR3	510677	04/04/2025	1,000	1,500	2,000	998	1,508	2,001	1.003x - 3.278	1.000
B79	SKC	224-PCXR3	510920	04/04/2025	1,000	1,500	2,000	1,001	1,501	1,994	0.999x - 1.819	1.000

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136833

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
R01	SKC	224-PCXR4	602467	06/01/2025	1,000	1,500	2,000	996	1,508	2,002	1.011x - 20.041	0.999
R02	SKC	224-PCXR4	626450	03/01/2025	1,000	2,000	3,000	1,001	1,502	1,999	1.008x - 15.192	0.999
R03	SKC	224-PCXR4	691592	06/01/2025	1,000	1,500	2,000	1,002	1,501	2,003	1.002x - 1.783	1.000
R04	SKC	224-PCXR4	691672	06/01/2025	1,000	1,500	2,000	999	1,499	2,007	1.007x - 10.290	1.000
R05	SKC	224-PCXR4	798470	06/01/2025	1,000	1,500	2,000	1,003	1,502	2,004	1.006x - 13.257	0.999
R06	SKC	224-PCXR4	798456	03/01/2025	1,000	1,500	2,000	1,004	1,509	2,008	1.007x - 7.980	1.000
R07	SKC	224-PCXR4	798480	07/01/2025	1,000	1,500	2,000	998	1,511	2,016	1.018x - 26.801	0.999
R08	SKC	224-PCXR4	883215	07/01/2025	1,000	1,500	2,000	994	1,510	2,011	1.016x - 24.787	0.999
R09	SKC	224-PCXR4	034650	03/01/2025	1,000	1,500	2,000	1,002	1,498	2,003	1.004x - 5.905	1.000
R10	SKC	224-PCXR4	091765	03/01/2025	1,000	1,500	2,000	1,005	1,504	2,007	1.013x - 21.216	1.000
R11	SKC	224-PCXR4	091763	03/01/2025	1,000	1,500	2,000	1,003	1,503	2,009	1.017x - 27.421	0.999
R12	SKC	224-PCXR4	091568	03/01/2025	1,000	1,500	2,000	1,001	1,497	2,011	1.008x - 9.043	1.000
R13	SKC	224-PCXR4	091638	07/01/2025	1,000	1,500	2,000	1,002	1,506	2,006	1.010x - 17.347	0.999
R14	SKC	224-PCXR4	091764	07/01/2025	1,000	1,500	2,000	995	1,509	2,009	1.016x - 27.121	0.999
R15	SKC	224-PCXR8	529457	03/01/2025	1,000	1,500	2,000	1,000	1,506	1,998	0.998x + 6.229	1.000
R16	SKC	224-PCXR8	529643	03/01/2025	1,000	1,500	2,000	993	1,504	2,003	1.011x - 20.809	1.000
R17	SKC	224-PCXR8	529645	03/01/2025	1,000	1,500	2,000	1,003	1,503	2,008	1.009x - 12.157	1.000
R18	SKC	224-PCXR8	566756	03/01/2025	1,000	1,500	2,000	996	1,495	2,001	0.998x - 1.251	1.000
R19	SKC	224-PCXR8	566802	03/01/2025	1,000	1,500	2,000	999	1,498	1,999	1.003x - 10.418	1.000
R20	SKC	224-PCXR8	529089	07/01/2025	1,000	1,500	2,000	994	1,502	1,996	1.000x - 2.818	1.000
R21	SKC	224-PCXR8	665728	07/01/2025	1,000	1,500	2,000	999	1,507	2,004	1.008x + 14.204	1.000
R22	SKC	224-PCXR8	707444	07/01/2025	1,000	1,500	2,000	997	1,496	1,997	1.008x - 17.894	1.000
R23	SKC	224-PCXR8	761067	03/01/2025	1,000	1,500	2,000	1,005	1,503	2,011	1.007x - 10.071	0.999
R24	SKC	224-PCXR8	707893	06/01/2025	1,000	1,500	2,000	995	1,506	2,008	1.014x - 21.584	1.000
R25	SKC	224-PCXR8	761052	06/01/2025	1,000	1,500	2,000	999	1,494	2,012	1.010x - 15.128	1.000
R26	SKC	224-PCXR8	707956	06/01/2025	1,000	1,500	2,000	998	1,503	1,998	1.000x - 1.995	1.000
R27	SKC	224-PCXR8	707398	06/01/2025	1,000	1,500	2,000	997	1,506	1,999	1.008x - 16.975	0.999
R28	SKC	224-PCXR8	707481	03/01/2025	1,000	1,500	2,000	1,000	1,508	2,006	1.004x - 8.483	0.999
R29	SKC	224-PCXR8	707402	03/01/2025	1,000	1,500	2,000	999	1,506	2,005	1.009x - 15.919	1.000
R30	SKC	224-PCXR8	093811	03/01/2025	1,000	1,500	2,000	997	1,511	2,001	1.004x - 7.380	1.000
R31	SKC	224-PCXR8	093183	03/01/2025	1,000	1,500	2,000	998	1,506	1,998	1.001x - 4.701	1.000
R32	SKC	224-PCXR8	671950	07/01/2025	1,000	1,500	2,000	1,004	1,499	2,009	1.005x - 8.811	1.000
R33	SKC	224-PCXR4	626254	07/01/2025	1,000	1,500	2,000	1,003	1,504	2,010	1.008x - 11.562	1.000
R34	SKC	224-PCXR4	626131	07/01/2025	1,000	1,500	2,000	997	1,508	2,003	1.006x - 10.490	1.000
R35	SKC	224-PCXR8	707460	06/01/2025	1,000	1,500	2,000	996	1,504	1,997	1.004x - 13.077	0.999
R36	SKC	224-PCXR8	707446	06/01/2025	1,000	1,500	2,000	1,004	1,498	2,002	0.996x + 5.501	1.000
R37	SKC	224-PCXR8	707432	03/01/2025	1,000	1,500	2,000	995	1,496	2,001	1.007x - 12.737	1.000
R38	SKC	224-PCXR8	707349	03/01/2025	1,000	1,500	2,000	994	1,495	1,998	1.002x - 5.061	1.000
R39	SKC	224-PCXR8	761095	03/01/2025	1,000	1,500	2,000	998	1,504	2,010	1.013x - 18.994	1.000

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

Peera Detudom
(Mr. Peera Detudom)



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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 : 136833

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
R01	SKC	224-PCXR4	602467	02/04/2025	1,000	1,500	2,000	1,003	1,506	2,001	1.003x - 1.855	1.000
R02	SKC	224-PCXR4	626450	02/04/2025	1,000	2,000	3,000	994	1,501	2,002	1.006x - 11.866	1.000
R03	SKC	224-PCXR4	691592	01/04/2025	1,000	1,500	2,000	995	1,509	2,007	1.013x - 22.400	0.999
R04	SKC	224-PCXR4	691672	02/04/2025	1,000	1,500	2,000	996	1,502	1,996	0.999x + 0.668	1.000
R05	SKC	224-PCXR4	798470	04/04/2025	1,000	1,500	2,000	995	1,511	2,005	1.010x - 16.711	0.999
R06	SKC	224-PCXR4	798456	04/04/2025	1,000	1,500	2,000	1,002	1,499	2,003	1.004x - 5.745	1.000
R07	SKC	224-PCXR4	798480	04/04/2025	1,000	1,500	2,000	1,005	1,504	2,007	1.011x - 16.099	0.999
R08	SKC	224-PCXR4	883215	04/04/2025	1,000	1,500	2,000	1,002	1,503	2,004	1.014x - 23.623	0.999
R09	SKC	224-PCXR4	034650	02/04/2025	1,000	1,500	2,000	999	1,497	2,011	1.009x - 11.282	1.000
R10	SKC	224-PCXR4	091765	01/04/2025	1,000	1,500	2,000	1,002	1,505	2,003	1.012x - 20.705	0.999
R11	SKC	224-PCXR4	091763	02/04/2025	1,000	1,500	2,000	997	1,504	2,005	1.005x - 4.550	1.000
R12	SKC	224-PCXR4	091568	02/04/2025	1,000	1,500	2,000	998	1,513	2,004	1.015x - 25.798	0.999
R13	SKC	224-PCXR4	091638	03/04/2025	1,000	1,500	2,000	996	1,502	1,999	1.003x - 5.821	1.000
R14	SKC	224-PCXR4	091764	03/04/2025	1,000	1,500	2,000	1,002	1,503	1,997	0.997x + 5.785	1.000
R15	SKC	224-PCXR8	529457	01/04/2025	1,000	1,500	2,000	996	1,501	2,001	1.002x - 5.453	1.000
R16	SKC	224-PCXR8	529643	02/04/2025	1,000	1,500	2,000	999	1,506	1,998	0.998x + 4.829	1.000
R17	SKC	224-PCXR8	529645	02/04/2025	1,000	1,500	2,000	993	1,504	2,004	1.009x - 19.210	1.000
R18	SKC	224-PCXR8	566756	04/04/2025	1,000	1,500	2,000	1,005	1,503	2,008	1.007x - 9.639	1.000
R19	SKC	224-PCXR8	566802	04/04/2025	1,000	1,500	2,000	996	1,495	1,997	1.000x - 2.051	1.000
R20	SKC	224-PCXR8	529089	02/04/2025	1,000	1,500	2,000	999	1,498	1,999	1.004x - 12.497	1.000
R21	SKC	224-PCXR8	665728	02/04/2025	1,000	1,500	2,000	994	1,502	1,996	1.000x - 2.818	1.000
R22	SKC	224-PCXR8	707444	03/04/2025	1,000	1,500	2,000	999	1,507	2,004	1.009x - 16.603	0.999
R23	SKC	224-PCXR8	761067	03/04/2025	1,000	1,500	2,000	997	1,496	1,997	1.001x - 3.342	1.000
R24	SKC	224-PCXR8	707893	02/04/2025	1,000	1,500	2,000	1,005	1,504	2,012	1.008x - 11.430	0.999
R25	SKC	224-PCXR8	761052	01/04/2025	1,000	1,500	2,000	1,002	1,493	2,010	1.006x - 8.771	1.000
R26	SKC	224-PCXR8	707956	02/04/2025	1,000	1,500	2,000	997	1,504	1,997	1.001x - 2.663	1.000
R27	SKC	224-PCXR8	707398	02/04/2025	1,000	1,500	2,000	996	1,495	2,001	1.007x - 19.305	0.999
R28	SKC	224-PCXR8	707481	03/04/2025	1,000	1,500	2,000	1,013	1,507	2,004	0.996x + 9.887	1.000
R29	SKC	224-PCXR8	707402	04/04/2025	1,000	1,500	2,000	998	1,499	2,010	1.010x - 19.297	1.000
R30	SKC	224-PCXR8	093811	02/04/2025	1,000	1,500	2,000	1,008	1,505	2,008	1.006x - 6.261	1.000
R31	SKC	224-PCXR8	093183	02/04/2025	1,000	1,500	2,000	1,002	1,501	1,994	0.998x - 0.140	1.000
R32	SKC	224-PCXR8	671950	01/04/2025	1,000	1,500	2,000	1,001	1,498	1,997	0.997x + 3.786	1.000
R33	SKC	224-PCXR4	626254	01/04/2025	1,000	1,500	2,000	1,006	1,497	2,001	0.995x + 7.736	1.000
R34	SKC	224-PCXR4	626131	01/04/2025	1,000	1,500	2,000	994	1,506	2,006	1.009x - 17.998	1.000
R35	SKC	224-PCXR8	707460	01/04/2025	1,000	1,500	2,000	1,006	1,505	2,014	1.010x - 14.668	0.999
R36	SKC	224-PCXR8	707446	04/04/2025	1,000	1,500	2,000	998	1,500	1,995	1.000x - 2.067	1.000
R37	SKC	224-PCXR8	707432	02/04/2025	1,000	1,500	2,000	1,005	1,494	2,006	0.998x + 4.721	1.000
R38	SKC	224-PCXR8	707349	03/04/2025	1,000	1,500	2,000	996	1,511	2,007	1.012x - 19.485	0.999
R39	SKC	224-PCXR8	761095	02/04/2025	1,000	1,500	2,000	1,005	1,505	2,008	1.004x - 4.026	1.000

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)



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Rotameter Calibration Report (For Personal Pump High Flow Adjust)

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Calibration Data

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
H-R01	Dwyer	VFB-65	07/01/2025	500	1,000	2,000	502.9	997.5	1992.8	1.000x - 0.381	0.999
H-R02	Dwyer	VFB-65	06/01/2025	500	1,000	2,000	500.6	1001.4	1998.5	1.001x - 0.360	1.000
H-R03	Dwyer	VFB-65	03/01/2025	500	1,000	2,000	502.8	998.3	2002.4	0.998x + 2.822	1.000
H-R04	Dwyer	VFB-65	03/01/2025	500	1,000	2,000	498.4	998.1	2007.2	0.997x + 3.508	1.000
H-R05	Dwyer	VFB-65	07/01/2025	500	1,000	2,000	500.8	995.2	1996.6	1.001x - 2.464	1.000
H-R06	Dwyer	VFB-65	03/01/2025	500	1,000	2,000	502.0	997.4	1995.1	1.002x - 2.873	0.999

Calibrated by :

Adul Dangklom
 (Mr.Adul Dangklom)

Approved by :

Peera Detudom
 (Mr. Peera Detudom)



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Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com., www.spscon.com

Rotameter Calibration Report (For Personal Pump High 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
H-R01	Dwyer	VFB-65	02/04/2025	500	1,000	2,000	499.6	998.8	2004.8	1.001x - 3.678	1.000
H-R02	Dwyer	VFB-65	02/04/2025	500	1,000	2,000	501.7	997.1	1991.5	0.998x + 0.386	0.999
H-R03	Dwyer	VFB-65	01/04/2025	500	1,000	2,000	499.8	999.7	1992.8	1.000x + 1.316	1.000
H-R04	Dwyer	VFB-65	04/04/2025	500	1,000	2,000	500.2	999.4	1989.2	0.999x + 1.870	0.999
H-R05	Dwyer	VFB-65	04/04/2025	500	1,000	2,000	499.9	1000.8	1994.5	1.000x + 0.815	1.000
H-R06	Dwyer	VFB-65	03/04/2025	500	1,000	2,000	500.5	1001.3	1990.7	0.997x + 4.894	0.999

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)

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. : 240720076545
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

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

DATE OF RECEIVED : 20 July 2024

DATE OF ISSUED : 23 July 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Sittipong Pimdee
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory
23 July 2024



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. Q24076545

F3-011-05/12-23

page 1 of 3



@clccalibration

REPORT OF CALIBRATION

FOR

NOMENCLATURE	:	VACUUM GAUGE
MANUFACTURER	:	HI-LIGHT
MODEL / TYPE	:	N/A
SERIAL NO.	:	N/A[64-220088-1]
DATE OF CALIBRATION	:	22 July 2024
DUE DATE OF CALIBRATION	:	22 July 2025

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$

Relative Humidity : $(55 \pm 10) \% \text{RH}$

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-0040-24, Due Date 08 February 2025.

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. Q24076545

F3-011-05/12-23

page 2 of 3



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

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	-15.58	-15.58	-4.6	-4.6	+0.4	+0.4
-10	-32.51	-32.84	-9.6	-9.7	+0.4	+0.3
-15	-49.44	-49.77	-14.6	-14.7	+0.4	+0.3
-20	-66.70	-66.70	-19.7	-19.7	+0.3	+0.3
-25	-83.63	-83.97	-24.7	-24.8	+0.3	+0.2
-30	-100.90	-100.90	-29.8	-29.8	+0.2	+0.2

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 012 Page 43 of 67

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

End of Certificate

Certificate No. Q24076545

F3-011-05/12-23

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@clccalibration



GAS CHROMATOGRAPH TEST CERTIFICATION

Certificate No. : SV0824/22063

Instrument Type : Gas Chromatography

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 : 05/08/2024

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) = 156,955 Counts.



**Detector Sensitivity (FID)**

Detector Response	Result	Specification
Baseline Noise (μ V)	2.85	≤ 50
Baseline Drift (%)	0.09	≤ 1
Sensitivity (S/N for C15)	16,400	$\geq 1,024$

Temperature Specification

Temperature	Set	Result	Specification
Column Oven ($^{\circ}$ C)	80	80	± 5
Injector ($^{\circ}$ C)	220	220	± 5
Detector ($^{\circ}$ C)	300	300	± 5
Incubator ($^{\circ}$ C)	60	N/A	± 5

Relative Standard Deviation % (% RSD)

Checkout Procedure	Result	Specification
Area C15 (%)	1.71	≤ 5
Retention Time C15(%)	0	≤ 0.5

APPROVAL :

Signature: Suwarot.Engineer : Suwarot TrikainutDate : 05/08/2024



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

Results Integrated System Testing

Checkout Procedure	FID
Detector Position	Front
Inlet Type	1079 Injector
C15 Area 1	157,309
C15 Area 2	159,359
C15 Area 3	157,349
C15 Area 4	152,379
C15 Area 5	158,379
C15 Area Average	156,955
* % RSD (< 5 %)	1.71

* 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	Samarot.	
Date	05/08/2567	



Comments	-		
Reviewed by	Samar P.	Date	05/08/2024



VARIAN



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

Results Integrated System Testing

Checkout Procedure	FID
Detector Position	Front
Inlet Type	1079 Injector
C15 RT 1	4.128
C15 RT 2	4.128
C15 RT 3	4.128
C15 RT 4	4.128
C15 RT 5	4.128
C15 RT Average	4.128
* % RSD (< 0.5 %)	0

* 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	Sunnarot.	
Date	05/08/2024	



Comments	-		
Reviewed by	Sunnarot P.	Date	05/08/2024



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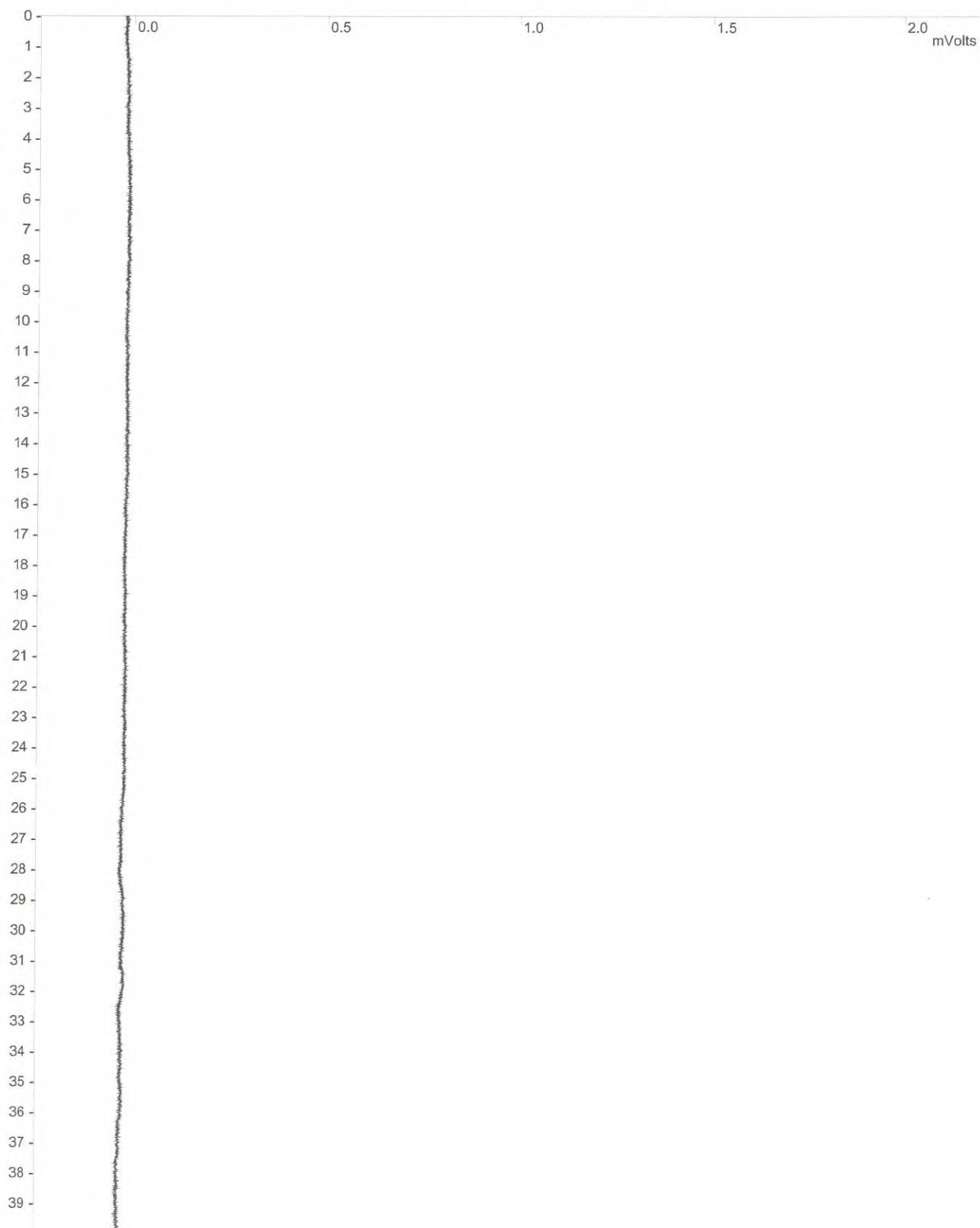
Title :
Run File : f:\ \sps2024\cal2024\baseline2024002.run
Method File : D:\Method-GC\star C\Star\TU\cal0203\baseline FID.mth
Sample ID : Baseline2024

Injection Date: 5/8/2567 14:01 Calculation Date: 5/8/2567 14:41

Operator : watsamon Detector Type: 3800 (10 Volts)
Workstation: Local Disk Bus Address : 44
Instrument : Sample Rate : 10.00 Hz
Channel : Front = FID Run Time : 39.960 min

** LC Workstation Version 6.20 ** 02511-7390-ae7-0265 **

Chart Speed = 0.56 cm/min Attenuation = 1 Zero Offset = 10%
Start Time = 0.000 min End Time = 39.960 min Min / Tick = 1.00



Title :
Run File : f:\ \sps2024\cal2024\baseline2024002.run
Method File : D:\Method-GC\star C\Star\TU\cal0203\baseline FID.mth
Sample ID : Baseline2024

Injection Date: 5/8/2567 14:01 Calculation Date: 5/8/2567 14:41

Operator : suwarot Detector Type: 3800 (10 Volts)
Workstation: Local Disk Bus Address : 44
Instrument : Sample Rate : 10.00 Hz
Channel : Front = FID Run Time : 39.960 min

** LC Workstation Version 6.20 ** 02511-7390-ae7-0265 **

Run Mode : Analysis
Peak Measurement: Peak Area
Calculation Type: External Standard

Peak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
----	-----	-----	-----	-----	-----	-----	-----	-----
----	-----	=====	-----	=====	=====	-----	-----	-----
	Totals:	0.0000		0.000	0			

Total Unidentified Counts : 0 counts

Detected Peaks: 0 Rejected Peaks: 0 Identified Peaks: 0

Multiplier: 1 Divisor: 1 Unidentified Peak Factor: 0

Baseline Offset: -16 microVolts LSB: 1 microVolts

Noise (used): 22 microVolts - monitored before this run

Manual injection

Data Handling: No peaks

Title :
Run File : f:\ \sps2024\cal2024\fid2024003.run
Method File : d:\caf2024003-front.mth
Sample ID : FID2024

Injection Date: 5/8/2567 9:16

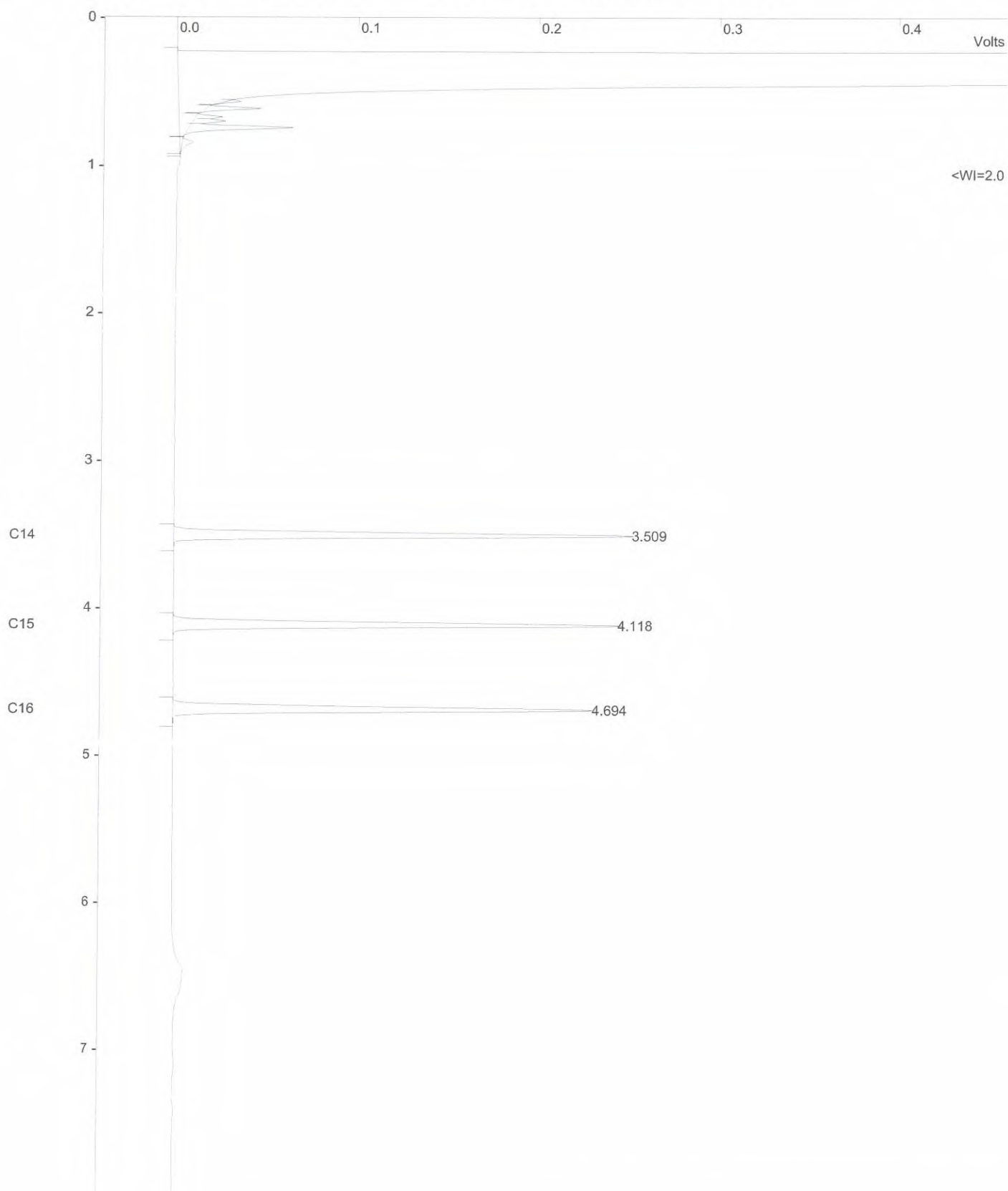
Calculation Date: 5/8/2567 9:26

Operator : suwarot
Workstation: GC-LAB
Instrument :
Channel : Front = FID

Detector Type: 3800 (10 Volts)
Bus Address : 44
Sample Rate : 10.00 Hz
Run Time : 7.993 min

** LC Workstation Version 6.20 ** 02511-7390-ae7-0265 **

Chart Speed = 2.83 cm/min Attenuation = 205 Zero Offset = 8%
Start Time = 0.000 min End Time = 7.993 min Min / Tick = 1.00



Title :
Run File : f:\ \sps2024\cal2024\fid2024003.run
Method File : d:\fid2024003-front.mth
Sample ID : FID2024

Injection Date: 5/8/2567 9:16 Calculation Date: 5/8/2567 9:26

Operator : suwarot Detector Type: 3800 (10 Volts)
Workstation: GC-LAB Bus Address : 44
Instrument : Sample Rate : 10.00 Hz
Channel : Front = FID Run Time : 7.993 min

** LC Workstation Version 6.20 ** 02511-7390-ae7-0265 **

Run Mode : Analysis
Peak Measurement: Peak Area
Calculation Type: External Standard

Peak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	C14	54.1202	3.509	-0.005	163565	BB	2.1	C
2	C15	53.5241	4.118	-0.005	157309	BB	2.2	C
3	C16	52.2361	4.694	0.001	146804	BB	2.3	C
Totals:		159.8804		-0.009	1704289			

Status Codes:
C - Out of calibration range

Total Unidentified Counts : 69332200 counts
Detected Peaks: 11 Rejected Peaks: 0 Identified Peaks: 3
Multiplier: 1 Divisor: 1 Unidentified Peak Factor: 0
Baseline Offset: -29 microVolts LSB: 1 microVolts
Noise (used): 28 microVolts - monitored before this run
Manual injection
Calib. out of range; No Recovery Action Specified

Sample ID: **fid std**

Operator (Inj): **suwarot**

Injection Date: **05/08/2024**

Calc Date: **05/08/2024**

Run Time (min): **7.993**

Workstation: **GC-LAB**

Instrument (Inj):



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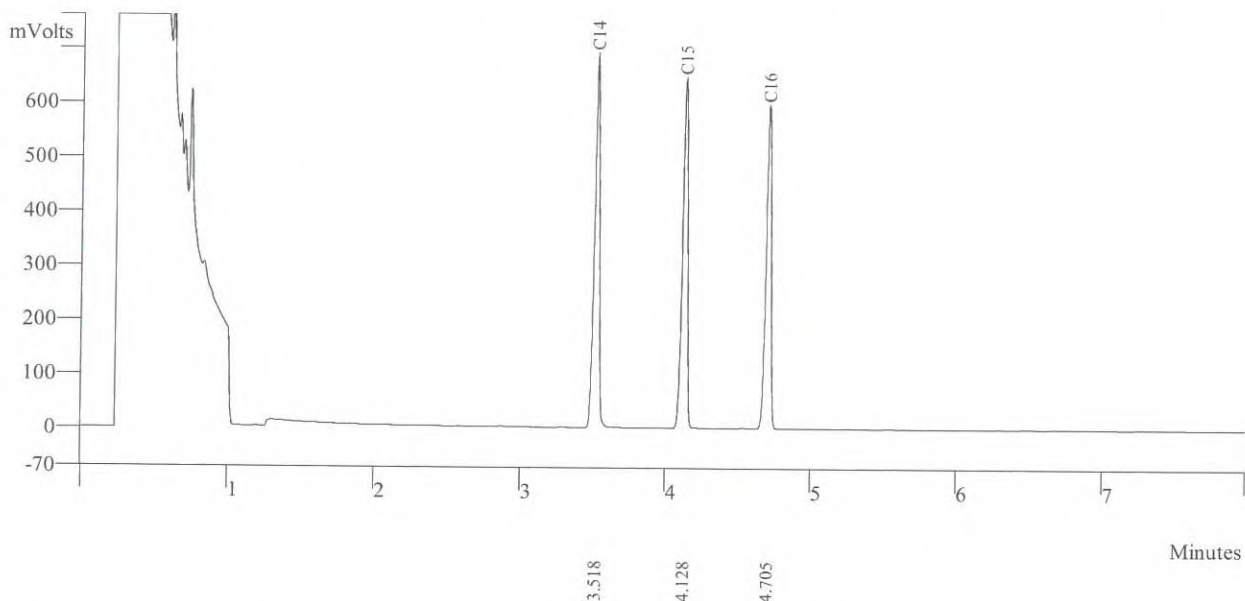
Run Mode: **Analysis**

Peak Measurement: **Peak Area**

Calculation Type: **External Std.**

c:\star\data\tu\cal2024\fid2024001.run

A = FID 10 V RESULTS



Peak No	Peak Name	Result ()	Ret Time (min)	Peak Area (counts)	Sep. Code	Width 1/2 (sec)
1	C14	152.6865	3.518	163565	BB	2.2
2	C15	147.1889	4.128	157309	BB	2.3
3	C16	138.7997	4.705	146804	BB	2.3
	Totals	438.6751		467678		



Sample ID: **fid std**

Operator (Inj): suwarot

Injection Date: 05/08/2024

Calc Date: 05/08/2024

Run Time (min): 7.993

Workstation: GC-LAB

Instrument (Inj):



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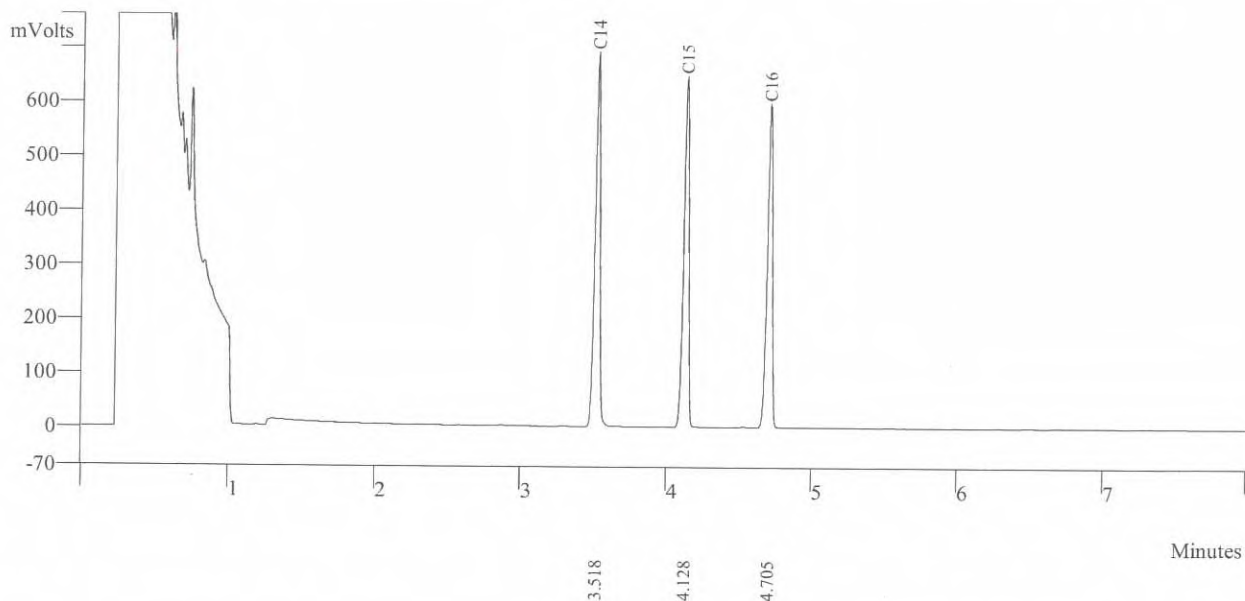
Run Mode: Analysis

Peak Measurement: Peak Area

Calculation Type: External Std.

c:\star\data\tu\cal2024\fid2024002.run

A = FID 10 V RESULTS



Peak No	Peak Name	Result ()	Ret Time (min)	Peak Area (counts)	Sep. Code	Width 1/2 (sec)
1	C14	152.6865	3.518	168565	BB	2.2
2	C15	137.1189	4.128	159359	BB	2.3
3	C16	128.7997	4.705	147834	BB	2.3
	Totals	418.6042		475758		



Sample ID: **fid std**

Operator (Inj): suwarot

Injection Date: 05/08/2024

Calc Date: 05/08/2024

Run Time (min): 7.993

Workstation: GC-LAB

Instrument (Inj):



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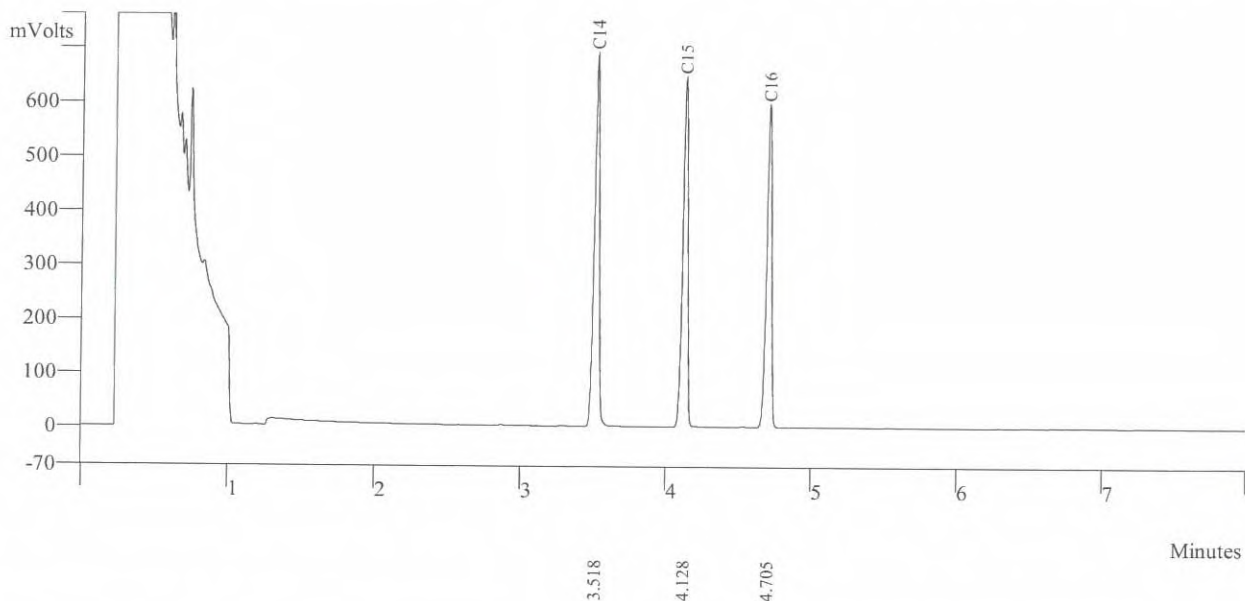
Run Mode: Analysis

Peak Measurement: Peak Area

Calculation Type: External Std.

c:\star\data\tu\cal2024\fid2024003.run

A = FID 10 V RESULTS



Peak No	Peak Name	Result ()	Ret Time (min)	Peak Area (counts)	Sep. Code	Width 1/2 (sec)
1	C14	152.7865	3.518	169535	BB	2.2
2	C15	197.1159	4.128	157349	BB	2.3
3	C16	128.5997	4.705	149834	BB	2.3
	Totals	478.5021		476718		



Sample ID: **fid std**

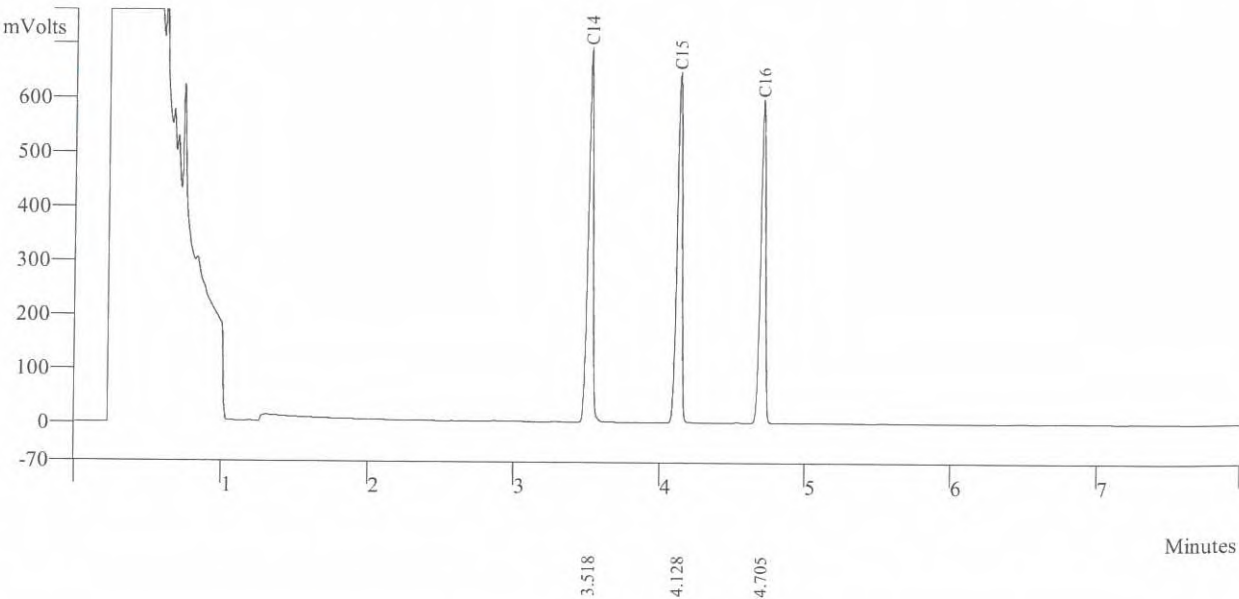
Operator (Inj): suwarot
Injection Date: 05/08/2024
Calc Date: 05/08/2024
Run Time (min): 7.993
Workstation: GC-LAB
Instrument (Inj):



Run Mode: Analysis
Peak Measurement: Peak Area
Calculation Type: External Std.

c:\star\data\tu\cal2024\fid2024004.run

A = FID 10 V RESULTS



Peak No	Peak Name	Result ()	Ret Time (min)	Peak Area (counts)	Sep. Code	Width 1/2 (sec)
1	C14	162.7865	3.518	165521	BB	2.2
2	C15	157.1159	4.128	152379	BB	2.3
3	C16	138.5997	4.705	146834	BB	2.3
Totals		458.5021		464734		





Agilent Technologies

Certificate of Analysis

FID-TCD Performance Evaluation Sample Kit

Agilent Part
Number: 5080-8842, 18710-60170

Sample Lot
Number: 0006750304

This analytical reference material was manufactured and verified in accordance with an ISO 9001 registered quality system, and the analyte concentrations were verified by an ISO 17025 accredited laboratory. The certified value for each analyte was determined gravimetrically.

Concentrations:

n-tetradecane	0.218 g/L ($\pm 0.5\%$)	0.033 w/w %
n-pentadecane	0.218 g/L ($\pm 0.5\%$)	0.033 w/w %
n-hexadecane	0.218 g/L ($\pm 0.5\%$)	0.033 w/w %

Solvent: hexane

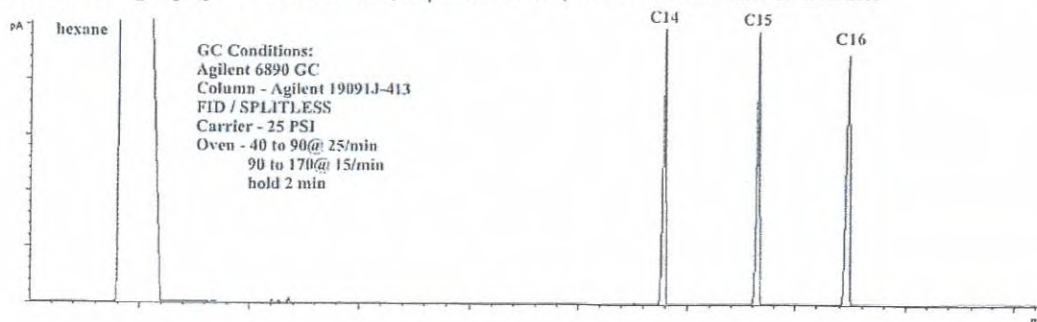
Calibrated Class A glassware and clean bottles were used in the manufacture of this standard. Balances used in the manufacture of this standard are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001.

Purities:

n-tetradecane	99.6%
n-pentadecane	99%
n-hexadecane	99.5%
hexane	99%

Typical Analytical Spectrum or Chromatography

GC Chromatography – n-tetradecane, n-pentadecane, and n-hexadecane in hexane



Date of release: 30 June 2023

Date of expiration: 31 July 2025

Monica Bourgeois

Monica Bourgeois
QMS Representative



Certificate of Calibration

Certificate No.: WK2312-031-1

Page 1 of 2

Customer : THAI UNIQUE CO., LTD.
80-82 PRACHATHIPATAI RD., BANGKHUNPHROM,
PRANAKORN, BANGKOK 10200

Instrument : AMD Flow Meter
Manufacturer : Agilent Technologies
Model : G6691A
Serial No. : MY16470347
Identity No. : SV-DF-001
Range : 0 ml/min to 750 ml/min
Resolution : See to data
Calibration Method : CP-WK-M10

Ambient Temperature : $(23 \pm 2) ^\circ\text{C}$
Humidity : $(50 \pm 15) \% \text{RH}$
Received Date : 6-Dec-23
Calibrated Date : 7-Dec-23
Issued Date : 12-Dec-23
Calibrated Location : In Lab

Reference standard instruments :

<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Flow Calibrator	140215-134	L202304114-001	18-Apr-25	MIT
Primary Flow Calibrator	1107-S	WK2305-049-5	22-May-24	WK Electric Co.,Ltd.

MIT : Miracle International Technology Co.,Ltd.

This result calibrate was found accurate as shown on date place of calibrate only

This certificate is traceability to the International System of Unit (SI)

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

Calibrated by : Mr.Taywanat Hansuwankul

Approved by :

Ms. Budsagorn Patcha
Authorized Signatory



This certificate may not be reproduced except in full unless permission for the reproduction has been obtained in writing from the laboratory.



Calibration Results

Certificate No. : WK2312-031-1

Page 2 of 2

Calibration Result of the Accuracy

Function : Flow Measurement

Range : 0 ml/min to 750 ml/min

Resolution : 0.01 / 0.1 / 1 ml/min

Unit : ml/min

UUC Setting		STD Reading	Error	Uncertainty (\pm)	Tolerance Limit Values (ml/min)
Scale	ml/min				
0	0.00	0.00	0.00	3.3	-0.20 ~ 0.20
50	50.7	51.15	-0.45	3.3	48.80 ~ 51.20
300	300	300.4	-0.4	3.3	293.8 ~ 306.2
450	450	450.7	-0.7	3.3	440.8 ~ 459.2
550	550	549.5	0.5	3.3	533.5 ~ 566.5
650	650	649.3	0.7	3.3	630.5 ~ 669.5
700	700	699.2	0.8	3.3	679.0 ~ 721.0

(X) Without Adjustment () After Adjustment

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**** End of Certificate****



Measuretronix Limited
2425/2 Lat Phrao Road, Saphan Song
Wangthonglang, Bangkok 10310, Thailand
Phone : 0-2514-1000, 0-2514-1234
Fax : 0-2514-0001, 0-2514-0003
Website : www.measuretronix.com



Certificate of Calibration

Certificate Number : LF24-0278
Equipment : Thermometer
Manufacturer : Fluke
Model : 51
Serial Number : 5910857
Asset Number : 5910857
Customer : Thai Unique Co., Ltd.
80-82 Prachathipatai Road,
Bangkhunphrom, Pranakorn,
Bangkok 10200
Date of Calibrate : 26-Jun-2024
Date of Issue : 27-Jun-2024

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

This calibration certificate applies only to the item identified and shall not be reproduced other than in full, without specific written approved by Measuretronix Cal-Lab. Calibration certificates without signature are not valid.

The measurements marked with an asterisk () in this certificate are outside our range of accreditation. They have been included for completeness.*

The Calibration interval (Cal.Due) is the responsibility of the end user.

Calibrated by

Nanthiya Ngampring
Mrs. Nanthiya Ngampring
Metrology Technician

Approved by

A B..
Mrs. Arunee Bamrungtham
Cal-Lab Manager



Measuretronix Limited

Calibration Report

UUC : Fluke 51 Thermometer

Serial No. : 5910857

Asset No. : 5910857

Procedure : CP-LF-04:Rev.02

Note : Refer to Fluke 51,52 Operator's Manual Rev 1 3/86, Oct 1985

Customer : Thai Unique Co., Ltd.

Address : 80-82 Prachathipatai Road,
Bangkhunphrom, Pranakorn,
Bangkok 10200

Certificate No. : LF24-0278

Report data type : As-Found

Date of Calibrate : 26-Jun-2024

Date of Receive : 17-Jun-2024

Environment condition

Temperature : 23 °C ± 3 °C

Humidity : 50 %RH ± 20 %RH

Measuretronix Cal-Lab certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). The measurements are traceable to national or international measurement standards or accept fundamental or natural physical constants or have been derived by approved ratio techniques as state in the Standard Used below. The policies and procedures used comply with ISO/IEC 17025:2017.

This report applies only to the item identified and shall not be reproduced other than in full, without specific written approved by Measuretronix Cal-Lab.

The uncertainties shown are the expanded uncertainties, which calculated from the standard uncertainties multiplied by a coverage factor of $k = 2$, providing a measurement confidence level of approximately 95%.

No statement of compliance with specifications is made or implied on this certificate.

Remark : The units of uncertainty values in this report are referred to the below details :

"Volt" or "V" for voltage, "Ampere" or "A" for current, "Ohm" or "Ω" for resistance, "Farad" or "F" for capacitance, "Hertz" or "Hz" for frequency, "deg C" or "°C" for degree Celsius, "deg F" or "°F" for degree Fahrenheit, etc.

Standard Used

Serial/Asset	Description	Traceable	Cert.No.	Cal.Date	Due Date
6400011	Fluke 5500A Calibrator	NIMT	EE-0017-24	7-Mar-2024	6-Mar-2025

Test Data

TEST	RANGE	Nominal Value	UUC Tol. (+/-)	Test Result	Error	Uncertainty (+/-)
THERMOCOUPLE MEASUREMENT CALIBRATION						
TYPE K THERMOCOUPLE						
1		-195.0 °C*	0.9 °C	-195.4 °C	-0.4 °C	0.27 °C
2		-100.0 °C	0.8 °C	-100.5 °C	-0.5 °C	0.21 °C
3		-50.0 °C	0.8 °C	-50.2 °C	-0.2 °C	0.21 °C
4		0.0 °C	0.7 °C	0.0 °C	0.0 °C	0.21 °C
5		100.0 °C	0.8 °C	100.1 °C	0.1 °C	0.21 °C
6		300.0 °C	1.0 °C	300.2 °C	0.2 °C	0.21 °C
7		500.0 °C	1.2 °C	500.1 °C	0.1 °C	0.21 °C
8		1365.0 °C	2.1 °C	1365.2 °C	0.2 °C	0.32 °C
TYPE J THERMOCOUPLE						
9		-195.0 °C*	1.0 °C	-194.4 °C	0.6 °C	0.22 °C
10		-100.0 °C	0.9 °C	-99.3 °C	0.7 °C	0.18 °C
11		-50.0 °C	0.9 °C	-49.4 °C	0.6 °C	0.18 °C
12		0.0 °C	0.8 °C	0.5 °C	0.5 °C	0.18 °C
13		100.0 °C	0.9 °C	100.4 °C	0.4 °C	0.18 °C
14		300.0 °C	1.1 °C	300.8 °C	0.8 °C	0.18 °C
15		755.0 °C	1.6 °C	755.3 °C	0.3 °C	0.18 °C

End of Calibration Report

Certificate

It is hereby certified that

Suwarot Trikainut

Has successfully completed the Application Training for

Basic Gas Chromatography and Sampler

Training Contents were:

Hardware Operation, Software Operation, Data analysis and

Troubleshooting : Model

CP-3800, 3900, 450-GC, 430-GC, 456-GC, 436-GC

At Thai Unique Co., Ltd, Bangkok, Thailand

On 15th March, 2019



S. Pohtongkam

Service Manager

Cert. No. : SP24020

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 : WET CHEMISTRY LABORATORY IV

Ambient Temperature : (28.1 \pm 5) °C

Relative Humidity : (47.2 \pm 25) %

Received Date : 27 AUGUST 2024

Calibration Date : 27 AUGUST 2024

Date of Issue : 27 AUGUST 2024

Calibrated by : Nathakorn Pisutpaisan

Approved by :


(Thanakul Petchurai)

SITHIPORN ASSOCIATES CO., LTD.

CALIBRATION LABORATORY

451-451/1 Sirinthorn Road, Bangbumru, Bangplud, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email : calibration@sithiporn.com

SITHIPORN
associates



Cert. No. : SP24020

Job No. : VC67SP0013

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-0185-24	14/05/2026

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	361.4	0.15	0.16	2.00
	467.82	467.7	-0.12	0.16	2.00
	536.56	536.5	-0.06	0.16	2.00
	640.50	640.4	-0.10	0.16	2.00
RM-DL	740.09	739.9	-0.19	0.16	2.00
	864.94	865.2	0.26	0.16	2.00

UUC* = Unit Under Calibration

G. Petch

SITHIPORN ASSOCIATES CO., LTD.

CALIBRATION LABORATORY

451-451/1 Sirinthorn Road, Bangbunru, Bangplud, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email : calibration@sithiporn.com

SITHIPORN
associates



Cert. No. : SP24020

Job No. : VC67SP0013

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	1.0550	0.0033	0.0029	2.00
		29914	0.7	0.7445	0.7460	0.0015	0.0029	2.00
		29381	0.5	0.5416	0.5431	0.0015	0.0030	2.00
	546.1	29360	1.0	0.9821	0.9820	-0.0001	0.0028	2.00
		29914	0.7	0.6961	0.6958	-0.0003	0.0028	2.00
		29381	0.5	0.5073	0.5080	0.0007	0.0029	2.00
	590.0	29360	1.0	1.0222	1.0210	-0.0012	0.0028	2.00
		29914	0.7	0.7237	0.7221	-0.0016	0.0029	2.00
		29381	0.5	0.5361	0.5361	0.0000	0.0031	2.00
	635.0	29360	1.0	0.9753	0.9745	-0.0008	0.0028	2.00
		29914	0.7	0.6910	0.6900	-0.0010	0.0029	2.00
		29381	0.5	0.5211	0.5210	-0.0001	0.0032	2.00
Material	Wavelength (nm)	Solution (mg/l)	Certified Absorbance (A)	UUC* Reading Absorbance (A)	Error (A)	Uncertainty ± (A)	k Factor	
RM-0204060810	235.0	20	0.2422	0.2418	-0.0004	0.0101	2.00	
		40	0.4866	0.4852	-0.0014	0.0115	2.00	
		60	0.7414	0.7389	-0.0025	0.0067	2.00	
		80	0.9858	0.9842	-0.0016	0.0093	2.00	
		100	1.2442	1.2414	-0.0028	0.0086	2.00	

UUC* = Unit Under Calibration

Condition of this result of calibration : Spectrophotometer PERKINELMER Model Lambda 25 S/N 501S14123010

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)
0.0117	3.8659

**Specific Acceptance :

Transmission \leq 1.0 T(%), Absorbance \geq 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

T. Ketch

คุณภาพอากาศในบรรยากาศ



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

214 Bangwack Rd. Bangpai Bangkae Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Page 1 of 4

Certificate No. : L202412119-0001

Date Issued : 13-Dec-24

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

Equipment : Mass Flow meter

Manufacturer : Dwyer

Model : GMF-2101

Serial No. : -

ID No./Tag No. : MF01/51

Date Received : 11-Dec-24

Date Calibrated : 12-Dec-24

Calibrated by : Saruth Srichutikul

Calibration Method or Calibration Procedure Used

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

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

Result of Calibration

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

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

Approved by: 
(Sarayuth Tochua)



Certificate No. : L202412119-0001

Ambient Temperature : $(25 \pm 2)^{\circ}\text{C}$ Relative Humidity : $(50 \pm 15)\%\text{RH}$

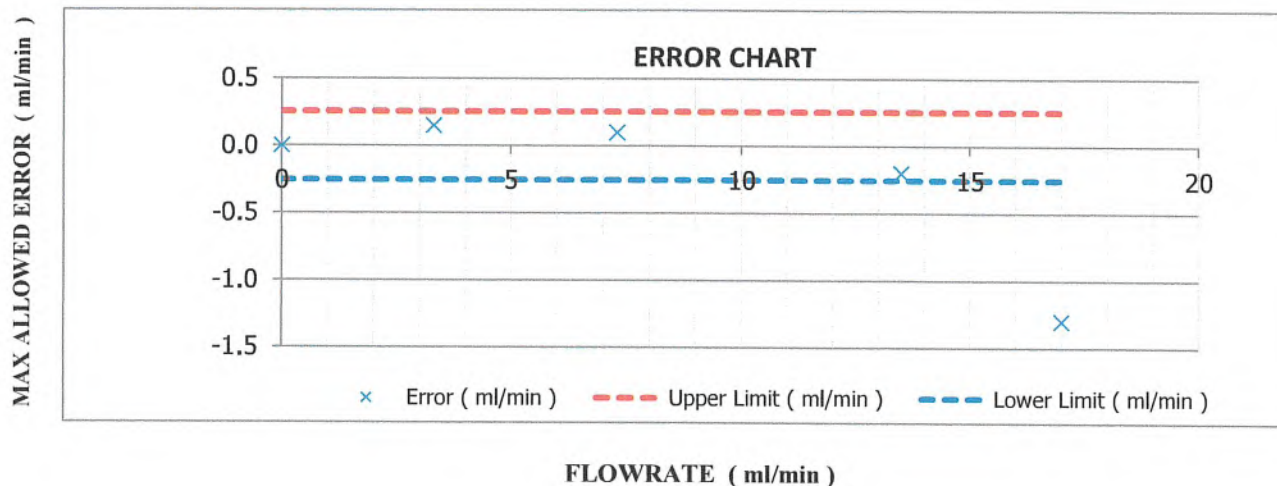
Capacity Range : 17 ml/min

Calibration Media : Air

Type : Mass Flowmeter

Unit Under Calibration Reference Condition : Pressure 101.325 kPa(abs) , 21 $^{\circ}\text{C}$, Nitrogen**Before Adjustment**

Temperature ($^{\circ}\text{C}$)	Pressure (kPa)	UUC Reading (ml/min)	STD Reading (ml/min)	Error (ml/min)	Uncertainty (\pm ml/min)
24.00	100.46	0.00	0.000 *	0.000	0.063
24.10	100.62	3.30	3.149	0.151	0.13
24.10	100.78	7.30	7.2	0.10	0.14
24.20	101.07	13.50	13.7	-0.20	0.15
24.20	101.30	17.00	18.3	-1.30	0.19

Error = Unit Under Calibration - Standard

Certificate No. : L202412119-0001

Ambient Temperature : $(25 \pm 2)^{\circ}\text{C}$

Relative Humidity : $(50 \pm 15)\%\text{RH}$

Capacity Range : 17 ml/min

Calibration Media : Air

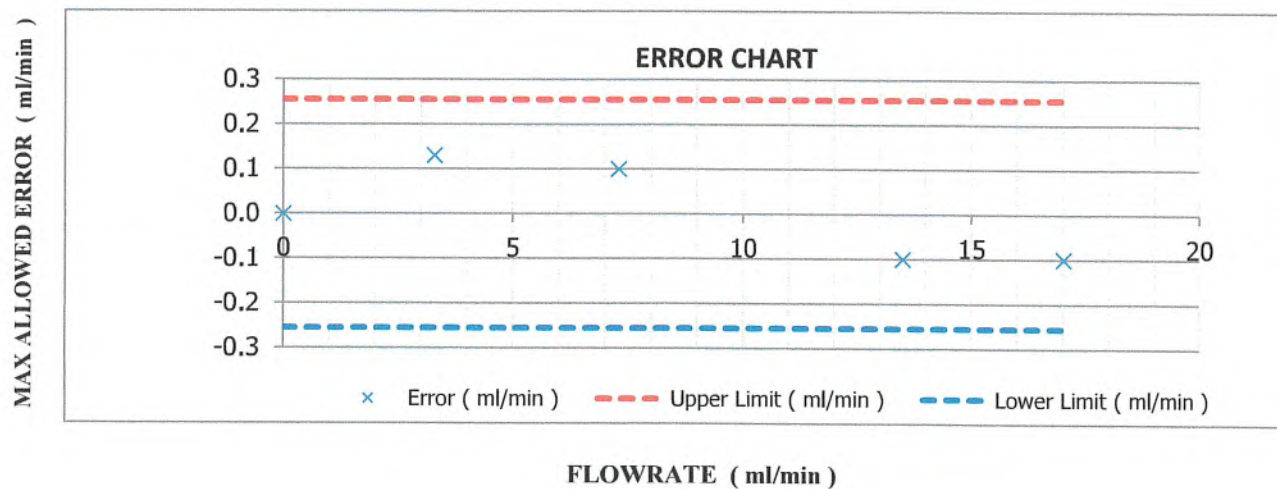
Type : Mass Flowmeter

Unit Under Calibration Reference Condition : Pressure 101.325 kPa(abs) , 21 $^{\circ}\text{C}$, Nitrogen

After Adjustment

Temperature ($^{\circ}\text{C}$)	Pressure (kPa)	UUC Reading (ml/min)	STD Reading (ml/min)	Error (ml/min)	Uncertainty (\pm ml/min)
24.00	100.45	0.00	0.000 *	0.000	0.063
24.10	100.62	3.30	3.170	0.130	0.13
24.10	100.78	7.30	7.2	0.10	0.14
24.20	101.01	13.50	13.6	-0.10	0.15
24.00	101.19	17.00	17.1	-0.10	0.18

Error = Unit Under Calibration - Standard



Certificate No. : L202412119-0001

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

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

; Q = Flow rate

; P = Absolute pressure

; T = Absolute temperature

; Subscript "Meas" = Measurement condition

; Subscript "Ref" = Reference condition

Condition As-Received : Used Item

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

Traceability of Certificate :

The International System of Units (SI) through

NIMT Certificate No. MW-0047-24, MW-0048-24 for Gas Flow meter Serial No. M5209179B/M5209179A, Due 03-Jul-25

End of Certificate



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Tel : (662) 939-4370-72. Fax : (662) 513-4221, E-mail : sale@spscon.com., www.spscon.com

CALIBRATION REPORT

CHEMILUMINESCENT NO / NO₂ / NO_x ANALYZER

DATE : 20 April 2025

BRAND : API

MODEL : 200E

NO. NOX-B09

SERIAL NO. 4412

Calibrator (Dilution System)

Brand : Teledyne

Model : 700

Last Cal. Date : 29 October 2024

Serial No. : 421

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 50

CALIBRATION SETTING

Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	-0.10	-	0	-
NO Span	400	399.6	-0.100	400.0	1.004
NO _x Span	400	399.8	-0.050	400.0	1.007

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	103.2	mV	-20 - 150
AZERO	93.9	mV	-20 - 150
HVPS	673	V	420 - 900 constant
RCELL TEMP	50.2	°C	50 ± 1
BOX TEMP	29.5	°C	8 - 48
PMT TEMP	7.1	°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	1.004	-	1.0 ± 0.3
NO _x Slope	1.007	-	1.0 ± 0.3
NO Offset	0.9	mV	-20 to +150
NO _x Offset	0.5	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 :

Adul Dangklom

(Mr.Adul Dangklom)

Approved by :

Peer Detudom

(Mr.Peera Detudom)



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CALIBRATION REPORT

CHEMILUMINESCENT NO / NO₂ / NO_x ANALYZER

DATE : 20 April 2025

BRAND : API

MODEL : 200E

NO. NOX-R03

SERIAL NO. 4410

Calibrator (Dilution System)

Brand : Teledyne

Model : 700E

Last Cal. Date : 28 October 2024

Serial No. : 201-S

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 50

CALIBRATION SETTING

Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	0.10	-	0	-
NO Span	400	399.7	-0.075	400.0	1.004
NO _x Span	400	399.9	-0.025	400.0	1.008

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	510	cc/min	500 ± 50
OZONE FLOW	79	cc/min	80 ± 15
PMT	103.4	mV	-20 - 150
AZERO	94.0	mV	-20 - 150
HVPS	675	V	420 - 900 constant
RCCELL TEMP	50.1	°C	50 ± 1
BOX TEMP	29.0	°C	8 - 48
PMT TEMP	7.5	°C	7 ± 2
MOLY TEMP	314.8	°C	315 ± 5
RCCELL PRESS	8.4	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	1.004	-	1.0 ± 0.3
NO _x Slope	1.008	-	1.0 ± 0.3
NO Offset	1.1	mV	-20 to +150
NO _x Offset	0.6	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 :

Adul Dangklom

(Mr.Adul Dangklom)

Approved by :

Peer Detudom

(Mr.Peera Detudom)



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CALIBRATION REPORT

CHEMILUMINESCENT NO / NO₂ / NO_x ANALYZER

DATE : 20 April 2025

BRAND : API

MODEL : 200E

NO. NOX-R04

SERIAL NO. 4411

Calibrator (Dilution System)

Brand : Teledyne

Model : 700E

Last Cal. Date : 28 October 2024

Serial No. : 201-S

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 50

CALIBRATION SETTING

Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	-0.10	-	0	-
NO Span	400	399.5	-0.125	400.0	1.003
NO _x Span	400	399.8	-0.050	400.0	1.007

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	102.9	mV	-20 - 150
AZERO	93.7	mV	-20 - 150
HVPS	674	V	420 - 900 constant
RCELL TEMP	50.2	°C	50 ± 1
BOX TEMP	29.3	°C	8 - 48
PMT TEMP	7.4	°C	7 ± 2
MOLY TEMP	315.1	°C	315 ± 5
RCELL PRESS	8.3	IN-Hg-A	2 - 10 constant
SAMPLE PRESS	28.5	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	1.003	-	1.0 ± 0.3
NO _x Slope	1.007	-	1.0 ± 0.3
NO Offset	1.0	mV	-20 to +150
NO _x Offset	0.5	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 :

Adul Dangklom

(Mr.Adul Dangklom)

Approved by :

Peer Detudom

(Mr.Peera Detudom)



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CALIBRATION REPORT

CHEMILUMINESCENT NO / NO₂ / NO_x ANALYZER

DATE : 20 April 2025

BRAND : API

MODEL : 200E

NO. NOX-R06

SERIAL NO. 4466

Calibrator (Dilution System)

Brand : Teledyne

Model : 700E

Last Cal. Date : 28 October 2024

Serial No. : 201-5

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 50

CALIBRATION SETTING

Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	-0.10	-	0	-
NO Span	400	399.9	-0.025	400.0	1.008
NO _x Span	400	400.1	0.025	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	506	cc/min	500 ± 50
OZONE FLOW	78	cc/min	80 ± 15
PMT	103.3	mV	-20 - 150
AZERO	94.1	mV	-20 - 150
HVPS	673	V	420 - 900 constant
RCELL TEMP	50.0	°C	50 ± 1
BOX TEMP	28.9	°C	8 - 48
PMT TEMP	7.3	°C	7 ± 2
MOLY TEMP	314.9	°C	315 ± 5
RCELL PRESS	8.2	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	1.3	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 :

Adul Dangklom

(Mr.Adul Dangklom)

Approved by :

Peera Detudom

(Mr.Peera Detudom)



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CALIBRATION REPORT					
SO ₂ FLUORESCENT ANALYZER					
DATE :	20 April 2025	BRAND :	API	MODEL :	100E
NO.	SO ₂ -B07			SERIAL NO.	1706
Calibrator (Dilution System)					
Brand	: Teledyne			Model	: 700
Last Cal. Date	: 29 October 2024			Serial No.	: 421
Reference Standard Gas					
Standard Gas	: Sulphur Dioxide (SO ₂)			Cylinder No.	: A00814SK
Certified Date	: 21 June 2021	Expired Date	: 21 June 2029	Cylinder Conc.	: 49.8 ppm
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
			% RH	50	
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	-
SO ₂ Span	400.0	399.6	-0.100	400.0	1.003
API Model 100E SO ₂ Analyzer Check list					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	0-500		
SAMPLE PRESS	28.5	in-Hg	25-35		
SAMPLE FLOW	660	cc/min	650 ± 10%		
PMT	103.4	mV	-20-150 with Zero Air		
UV LAMP	3041.5	mV	1000-4900		
STR. LGT	61.9	PPB	<100		
DRK PMT	63.4	mV	-50 - 200		
DRK LMP	58.1	mV	-50 - 200		
HVPS	670	V	550-900 constant		
DCPS	2523	mV	2500 ± 200		
RCELL TEMP	50.1	°C	50 ± 1		
BOX TEMP	29.3	°C	5-40		
PMT TEMP	7.4	°C	7 ± 2.0		
SO ₂ Span Conc	400	PPB	20-20,000		
SO ₂ Slope	1.003	-	1.0 ± 0.3		
SO ₂ Offset	21.9	mV	<250		
Stability at Zero	0.1	PPB	<0.2		
Stability at Span	0.2	PPB	0.5% of reading (above 50 ppb)		

Calibrated by :

Adul Dangklom
(Mr.Adul Dangklom)

Approved by :

Peera Detudom
(Mr.Peera Detudom)



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CALIBRATION REPORT					
SO ₂ FLUORESCENT ANALYZER					
DATE :	20 April 2025	BRAND :	Thermo	MODEL :	43C
NO.	SO2-B09	SERIAL NO.	43C-59325-322		
Calibrator (Dilution System)					
Brand	: Teledyne			Model	: 700
Last Cal. Date	: 29 October 2024			Serial No.	: 421
Reference Standard Gas					
Standard Gas	: Sulphur Dioxide (SO ₂)			Cylinder No.	: A00814SK
Certified Date	: 21 June 2021	Expired Date	: 21 June 2029	Cylinder Conc.	: 49.8 ppm
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
% RH	50				
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	
Zero	0	0.11	-	0	
SO ₂ Span	400.0	400.3	0.075	400.0	
INSTRUMENT STATUS					
CHAMBER TEMP	44.2 °C		FLOW	1.0 LPM	
PRESSURE	728.6 mm Hg				

Calibrated by :

Adul Dangklom

(Mr.Adul Dangklom)

Approved by :

Peera Detudom

(Mr.Peera Detudom)



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CALIBRATION REPORT					
SO ₂ FLUORESCENT ANALYZER					
DATE :	20 April 2025	BRAND :	API	MODEL :	100E
NO.	SO ₂ -B14			SERIAL NO.	3415
Calibrator (Dilution System)					
Brand	: Teledyne			Model	: 700E
Last Cal. Date	: 28 October 2024			Serial No.	: 201-S
Reference Standard Gas					
Standard Gas	: Sulphur Dioxide (SO ₂)			Cylinder No.	: A00814SK
Certified Date	: 21 June 2021	Expired Date	: 21 June 2029	Cylinder Conc.	: 49.8 ppm
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
			% RH	50	
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	-
SO ₂ Span	400.0	400.2	0.050	400.0	1.014
API Model 100E SO ₂ Analyzer Check list					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	0-500		
SAMPLE PRESS	28.6	in-Hg	25-35		
SAMPLE FLOW	655	cc/min	650 ± 10%		
PMT	103.0	mV	-20-150 with Zero Air		
UV LAMP	3018.5	mV	1000-4900		
STR. LGT	61.9	PPB	<100		
DRK PMT	63.4	mV	-50 - 200		
DRK LMP	58.0	mV	-50 - 200		
HVPS	673	V	550-900 constant		
DCPS	2529	mV	2500 ± 200		
RCELL TEMP	50.1	°C	50 ± 1		
BOX TEMP	29.4	°C	5-40		
PMT TEMP	7.3	°C	7 ± 2.0		
SO ₂ Span Conc	400	PPB	20-20,000		
SO ₂ Slope	1.014	-	1.0 ± 0.3		
SO ₂ Offset	21.7	mV	<250		
Stability at Zero	0.1	PPB	<0.2		
Stability at Span	0.2	PPB	0.5% of reading (above 50 ppb)		

Calibrated by :

Adul Dangklom
(Mr.Adul Dangklom)

Approved by :

Peera Detudom
(Mr.Peera Detudom)



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S.P.S. CONSULTING SERVICE CO., LTD.
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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

CALIBRATION REPORT					
SO ₂ FLUORESCENT ANALYZER					
DATE :	20 April 2025	BRAND :	TELEDYNE	MODEL :	TML-60
NO.	SO ₂ -R08	SERIAL NO.	TRS1064		
Calibrator (Dilution System)					
Brand	: Teledyne			Model	: 700E
Last Cal. Date	: 28 October 2024			Serial No.	: 201-S
Reference Standard Gas					
Standard Gas	: Sulphur Dioxide (SO ₂)			Cylinder No.	: A00814SK
Certified Date	: 21 June 2021	Expired Date	: 21 June 2029	Cylinder Conc.	: 49.8 ppm
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
% RH	50				
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	-
SO ₂ Span	400.0	400.1	0.025	400.0	1.012
API Model TML-60 SO ₂ Analyzer Check list					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	0-500		
SAMPLE PRESS	28.7	in-Hg	25-35		
SAMPLE FLOW	653	cc/min	650 ± 10%		
PMT	103.0	mV	-20-150 with Zero Air		
UV LAMP	3021.8	mV	1000-4900		
STR. LGT	61.5	PPB	<100		
DRK PMT	62.9	mV	-50 - 200		
DRK LMP	57.6	mV	-50 - 200		
HVPS	669	V	550-900 constant		
DCPS	2520	mV	2500 ± 200		
RCELL TEMP	50.4	°C	50 ± 1		
BOX TEMP	29.3	°C	5-40		
PMT TEMP	7.2	°C	7 ± 2.0		
SO ₂ Span Conc	400	PPB	20-20,000		
SO ₂ Slope	1.012	-	1.0 ± 0.3		
SO ₂ Offset	21.8	mV	<250		
Stability at Zero	0.1	PPB	<0.2		
Stability at Span	0.2	PPB	0.5% of reading (above 50 ppb)		

Calibrated by :


Adul Dangklom
(Mr.Adul Dangklom)

Approved by :

Peera Detudom
(Mr.Peera Detudom)

Turbomass/Clarus Mass/ SQ8 MS Preventive Maintenance (PM)

Company Name:	S.P.S. Consulting Service Co.,Ltd		
Address (Instrument Location):	7 Soi Phaholyothin24 Phaholyothin Road, Jompol, Chatuchak, Bangkok, 10900.		
Serial Number:	648N4050804	PM Number:	2 of 2
Customer Name (if applicable):	Ms. Naruecha	Telephone Number:	NA
Service Engineer Name:	Monchai Kitcharoenkeat	Service Order Number:	WO-02927336
Date PM Performed: (DD-MMM-YYYY)	22-Aug-2024	Next PM Due Date: (DD-MMM-YYYY)	22-Feb-2025

Part Number	Release	Publication Date	
TH09370064	C	March 2013	

Scope

The purpose of this PM is to ensure the continued functionality of the Turbomass / Clarus MS SQ8 MS by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. 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 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
Clarus680	680S14042502	Totalchrom6.3 ⁺	PSS,PSS,FID
Clarus SQ8	648N4050804	Turbomass 6.4 ⁺	
Atom X	US14113002	Tekma AtomX ⁺	

Parts lists

Parts Included with the PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A				

Additional Tools Required for PM				
Part Number (if applicable)	Description	Quantity	Serial #	Calibration Due Date (MM/YY)
N/A				
Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A				

Procedure Checklist

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

General:

- ☒ Column type Elite 624.
- ☒ Carrier gas flow rate 1 ml/min.
- ☒ Review the instrument performance with the customer and document any recent problems.
- ☒ Inspect the customer log book and make any appropriate PM entries.
- ☒ Check incoming AC line voltage for proper levels and grounding.

Mechanical:

- ☒ Inspect and clean all fans and filters.
- ☒ Check the level of FC-43 calibration compound in reference gas bulb and fill if necessary.
- ☒ Change the oil in the fore pump.
- ☒ Inspect cartridge in fore pump vacuum filter; replace adsorbent bead if necessary.
- ☒ Replace the exhaust vapor mist filter on the fore pump.
- ☒ Remove and clean the ion source assembly. Use the Insulator Replacement Kit and/or Optics Replacement Kit if necessary
- ☒ Replace the filament.
- ☒ Remove and clean the pre-quad rods.
- ☒ Observe Wide Range Gauge pressure; clean/adjust if required.
- ☒ Inspect and clean as needed all PC boards and bottom inside of MS chassis.

Electrical:

- ☒ Check head amp offset. Adjust if necessary for proper value (Service Manual).

Operational Tests:

- ☒ Vacuum pressure.
- ☒ Air/water leak check
- ☒ AutoTune and mass calibration.
- ☒ Make a Chromatographic injection to verify peak shape and integrity only (not meant for sensitivity test).

PC Maintenance:

- ☒ Delete all unnecessary temporary files.
- ☒ Empty deleted files from recycle bin.
- ☒ Perform hard drive defragmentation.

Review:

- ☒ Review with the customer PM work performed.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer-supplied materials to have on hand.

Additional Comments


Additional Comments Regarding the PM

Review

<i>The preventive maintenance checks and if applicable performance tests for Turbomass/ Clarus Mass/ SQ8 have been completed.</i>		
<i>This Turbomass/ClarusMS/SQ8 Pass the preventive maintenance.</i>		
Review of Preventive Maintenance:		
Authorized PerkinElmer Representative Monchai Kitcharoenkeat	Monchai	Date: 22-Aug-2024 (DD-MMM-YYYY)
Authorized Customer Representative: Ms. Naruecha	Narucha	Date: 22-Aug-2024 (DD-MMM-YYYY)

GC Clarus 600/680 Preventive Maintenance (PM)

Company Name:	S.P.S. Consulting Service Co.,Ltd		
Address (Instrument Location):	7 Soi Phaholyothin24 Phaholyothin Road, Jompol, Chatuchak, Bangkok, 10900.		
Serial Number:	680S14042502	Service Tag:	N68APSSFEMP
Customer Name (if applicable):	Ms.Naruecha	PM number:	1 of 2
Service Engineer Name:	Monchai Kitcharoenkeat	Service Order Number:	WO-
Date PM Performed: (DD-MMM-YYYY)	22-Feb-2025	Next PM Due Date: (DD-MMM-YYYY)	22-Aug-2025

Part Number	Release	Publication Date	
TH09370070	C	August 2016	

Scope

The purpose of this PM is to ensure the continued functionality of the Clarus 600 and Clarus 680 GC by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. 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 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
Clarus680	680S14042502	Totalchrom6.3.2	PSS, PSS, FID,
Clarus SQ8T	648N4050804	Turbomass 6.4	
AtomX	US14113002	Tekma AtomX	

Parts Lists

Additional Tools Required for PM				
Part Number (if applicable)	Description	Quantity	Serial #	Calibration Due Date (MM/YY)
N/A				
Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A				

Procedure Checklist

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

1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.

- ☒ Check incoming AC line voltage for proper levels and grounding.

L-N 220 Volt

L-G 220 Volt

N-G 0.33 Volt

**Neutral to ground not more than 0.5 volts peak to peak*

- ☒ Inspect all gas line filters and traps; Replace if necessary with customer supplied spares.

Carrier gas ☒ Helium ☐ Nitrogen ☐ Hydrogen

Moisture level ☒ Good ☐ Need to replace ☐ Other _____

Detector gas ☒ Air Zero ☒ Hydrogen ☐ Nitrogen ☐ Helium

Moisture level ☒ Good ☐ Need to replace ☐ Other _____

- ☒ Inspect the customer log book and make any appropriate PM entries.

- ☒ Leak check all fittings from the gas source to instrument.

Gas leakage ☒ Pass ☐ Fail Comment _____

- ☒ Perform general inspection of system for cleanliness.

- ☒ Inspect for functional and clean electronic cooling and oven vent fans

Electronic cooling fan ☒ Yes ☐ No

Oven cooling fan ☒ Yes ☐ No

2. Electronic :

- ☒ Check oven temperature. Calibrate if necessary.

Oven temperature set point 150 °C ☒ Pass ☐ Fail

- ☐ Check sub-ambient option. (If installed).

Oven temperature set point 5 °C ☐ Pass ☐ Fail

- ☒ Perform routine maintenance on detector/injector. Replace parts as necessary with customer supplied spares.

- ☒ Check flows, including split flows if applicable. Calibrate if necessary.

Carrier flow	Pass
Split flow	Pass
- ☒ Check detector gas flows and adjust if necessary.

Detector flow	Pass
---------------	------
- ☒ Autosampler installed ☒ Yes ☐ No

Check autosampler sensor for wear and replace if necessary.	
Vial sensor	Pass
Door sensor	Pass
Tower sensor	Pass
Plunger sensor	Pass
Elevator sensor	Pass
- ☒ Remove syringe, manually flush. Replace with customer supplied spare if necessary.
- ☒ Check firmware version. Upgrade to current levels if necessary.

Firmware version	<u>6.5</u>
------------------	------------
- ☒ Measure all accessible power supply voltages.

5 Volt	Pass
+15 Volt	Pass
-15 Volt	Pass
24 Volt	Pass
- ☒ Record all detector voltage signal.

Detector Channel A	<u>1.12</u>	mV.
Detector Channel B	<u>NA</u>	mV.

3. Diagnostics Tests:

- ☒ Run instrument diagnostics.

<input checked="" type="checkbox"/> BRAM	Pass
<input checked="" type="checkbox"/> EPROM	Pass
- ☒ Run Autosampler diagnostics.

<input checked="" type="checkbox"/> BRAM	Pass
<input checked="" type="checkbox"/> EPROM	Pass

4. Review:

- ☒ Review with the customer PM work performed.
- ☒ 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

<p><i>The preventive maintenance checks and if applicable performance tests for Clarus600/680 GC have been completed.</i></p>		
<p><i>This Clarus600/680 GC Pass the preventive maintenance.</i></p>		
<p>Review of Preventive Maintenance:</p>		
<p>Authorized PerkinElmer Representative:</p> <p>Monchai Kitcharoenkeat</p>	<p><i>Monchai</i></p>	<p>Date:</p> <p>22-Feb-2025 (DD-MMM-YYYY)</p>
<p>Authorized Customer Representative:</p> <p>Ms.Naruecha</p>	<p><i>Naruecha</i></p>	<p>Date:</p> <p>22-Feb-2025 (DD-MMM-YYYY)</p>

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Certificate of Calibration

Certificate No. : 67-400037-2

Page : 1 of 2

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

7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900

Equipment : Liquid in Glass Thermometer

Manufacturer : SK

Model : N/A

Range : 0 °C to 100 °C

Resolution : 1 °C

Serial No. : N/A

Immersion : Total

ID No. : TM21/59

Environment : Ambient Temperature : (23 ± 2) °C

Relative Humidity : (50 ± 15) %

Line Voltage : (220 ± 22) VAC

Date of Received : 23 January 2024

Date of Calibration : 03 February 2024

Date of Issue : 03 February 2024

Calibrated by : Chortip Samchusri

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4001 based on ASTM E77-07 by compared with PRT in the liquid bath at the constant controlled temperature.

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
400001	TT-0016-22	07 Feb 2024	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400003	23E1866	01 Jun 2025	National Institute of Metrology Thailand (NIMT)
400004	23E1866	01 Jun 2025	National Institute of Metrology Thailand (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-400037-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Ice point check : UUC* reading 0 °C Standard reading 0.4336 °C

Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
20.5609	20	0.6	0.31

Remark

UUC : Unit Under Calibration

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

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

- o()o -



Certificate of Calibration

Certificate No. : 68-400046-2

Page : 1 of 2

Submitted by : S. P. S Consulting Service Co., Ltd.
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900

Equipment : Liquid in Glass Thermometer
Manufacturer : SK Model : N/A
Range : 0 °C to 100 °C Resolution : 1 °C
Serial No. : N/A Immersion : Total
ID No. : TM21/59

Environment : Ambient Temperature : (23 ± 2) °C
Relative Humidity : (50 ± 15) %
Line Voltage : (220 ± 22) VAC

Date of Received : 21 January 2025

Date of Calibration : 24 January 2025

Date of Issue : 24 January 2025

Calibrated by : Chortip Samchusri

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4001 based on ASTM E77-07 by compared with PRT in the liquid bath at the constant controlled temperature.

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
400001	TT-0023-24	16 Feb 2026	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400003	23E1866	01 Jun 2025	National Institute of Metrology Thailand (NIMT)
400004	23E1866	01 Jun 2025	National Institute of Metrology Thailand (NIMT)

Approved by :



(Permpoon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400046-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Ice point check : UUC* reading 0 °C Standard reading 0.4429 °C

Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
20.4801	20	0.5	0.31

Remark

UUC : Unit Under Calibration

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

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

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CERTIFICATE No : 24E6416
REFERENCE No : 73694-1

PAGE : 1 OF 3

Certificate of Calibration

EQUIPMENT : pH METER
MANUFACTURER : HANNA
MODEL : HI 3512
SERIAL No : TH118035
ID No : pH 04/56
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : ATSAWIN Y.

CALIBRATION DATE : 27-Jun-24

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 27-Jun-24

RECEIVED DATE : 24-Jun-24



QUALITY CALIBRATION CO., LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 24E6416

PAGE : 2 OF 3

Calibration Report

EQUIPMENT : pH METER
MANUFACTURER : HANNA
ID No : pH 04/56
RECEIVED DATE : 24-Jun-24
AMBIENT TEMPERATURE : 23 ° C ± 3 ° C
MODEL : HI 3512
SERIAL NUMBER : TH118035
CALIBRATION DATE : 27-Jun-24
RELATIVE HUMIDITY : 50 % RH ± 10% RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASUREMENT METHOD BASED ON WI-TQ-062 AND WI-TQ-063. THE DISPLAY UNIT WAS TESTED BY GENERATING STANDARD VOLTAGE TO THE UNIT AND READING THE VALUE COMPARED WITH THE CALCULATED VALUE. THE DISPLAY AND ELECTROD WAS CALIBRATED BY USING STANDARD pH BUFFER
2. REFERENCE STANDARD INSTRUMENTS :-

<u>INSTRUMENT</u>	<u>MODEL</u>	<u>SERIAL No/</u> <u>LOT No</u>	<u>CERTIFICATE No</u>	<u>DUE DATE</u>
1) pH STANDARD SOLUTION	00651-06	CC784945	4880-14413915	24-Aug-25
2) pH STANDARD SOLUTION	00651-08	CC785578	4881-14430633	31-Aug-25
3) pH STANDARD SOLUTION	00651-10	CC787086	4882-14483317	21-Sep-25
4) PROCESS CALIBRATOR	CA150	91S6079	24E1251	09-Apr-25
5) BATH	260014	1247 48074	23T9014	13-Sep-24
6) THERMOMETER WITH PROBE	421504	55000379	23T9623	13-Sep-24

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO SI UNIT MAINTAINED AT :-
 - NATIONAL INSTITUTE OF STANDARD AND TECHNOLOGY, USA.
 - NATIONAL INSTUTITE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION : ADJUSTMENT

1. DISPLAY UNIT ONLY

SLOPE FACTOR $k = 2.303 RT/F = 59 \text{ mV/pH}$

mV APPLIED	UUC READING (mV)	CORRECTION (mV)	UUC READING (pH)	UNCERTAINTY OF MEASUREMENT (± mV)	COVERAGE FACTOR k
414.11	414.8	-0.69	-0.115	0.15	2.00
354.95	355.5	-0.55	0.884	0.15	2.00
295.80	296.4	-0.60	1.885	0.15	2.00
236.64	237.1	-0.46	2.886	0.15	2.00
177.48	178.0	-0.52	3.887	0.15	2.00
118.32	118.8	-0.48	4.887	0.15	2.00
59.16	59.6	-0.44	5.887	0.15	2.00
0.00	0.4	-0.40	6.888	0.15	2.00
-59.16	-58.7	-0.46	8.101	0.15	2.00
-118.32	-117.9	-0.42	9.345	0.15	2.00
-177.48	-177.4	-0.08	10.589	0.15	2.00
-236.64	-236.4	-0.24	11.834	0.15	2.00
-295.80	-294.5	-1.30	13.077	0.15	2.00
-354.95	-354.7	-0.25	14.322	0.15	2.00
-414.11	-413.9	-0.21	15.565	0.15	2.00

END OF CALIBRATION REPORT PAGE 2 OF 3



QUALITY CALIBRATION CO., LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

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CERTIFICATE No : 24E6416

PAGE : 3 OF 3

Calibration Report

RESULT OF CALIBRATION (CONTINUE):

2. DISPLAY UNIT WITH pH ELECTRODE S/N: 09081C6M

STANDARD pH BUFFER SOLUTION (pH)	UUC READING (pH)	CORRECTION (pH)	VALUE BEFORE ADJUSTMENT	UNCERTAINTY OF MEASUREMENT (\pm pH)	COVERAGE FACTOR k
4.015	4.011	0.004	3.905	0.012	2.00
7.003	7.003	0.000	6.972	0.012	2.00
10.009	10.014	-0.005	9.570	0.014	2.00

3. DISPLAY UNIT WITH TEMPERATURE

STANDARD READING ($^{\circ}$ C)	UUC READING ($^{\circ}$ C)	CORRECTION ($^{\circ}$ C)	VALUE BEFORE ADJUSTMENT	UNCERTAINTY OF MEASUREMENT (\pm $^{\circ}$ C)	COVERAGE FACTOR k
25.004	25.0	0.004	---	0.0085	2.00

4. PERCENT SLOPE 100%

UUC : UNIT UNDER CALIBRATION

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



CERTIFICATE No : 24M2229

REFERENCE No : 72448-3

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE

MANUFACTURER : SARTORIUS

MODEL : BSA224S-CW

SERIAL No : 36591843

ID No : BA 09/61

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : ATSAWIN Y.

CALIBRATION DATE : 08-Mar-24

APPROVED BY :  PONGSAK J.

ISSUED DATE : 14-Mar-24

RECEIVED DATE : 08-Mar-24



CERTIFICATE No : 24M2229

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE **MODEL** : BSA224S-CW
MANUFACTURER : SARTORIUS **S/N** : 36591843
ID No : BA 09/61 **RECEIVED DATE** : 08-Mar-24
AIR PRESSURE : 1010mbar \pm 1mbar **CALIBRATION DATE** : 08-Mar-24
AMBIENT TEMPERATURE : 25° C \pm 1° C **RELATIVE HUMIDITY** : 55 %RH \pm 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS NOT ADJUSTED BEFORE CALIBRATION. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.

2. REFERENCE STANDARD INSTRUMENTS :-

<u>INSTRUMENT</u>	<u>MODEL</u>	<u>SERIAL No</u>	<u>CERTIFICATE No</u>	<u>DUE DATE</u>
1) STANDARD WEIGHT SET	E2	QK-I-151	M2302013S	02-Feb-25
2) STANDARD WEIGHT	E2	15843	M2302014S	02-Feb-25

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.

4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH CENTRAL BUREAU OF WEIGHTS&MEASURES

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

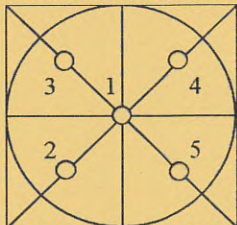
2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 200 g WAS 0 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.0	0.0000	0.0000	0.000082
0.1	0.1000	0.0000	0.000083
0.2	0.2000	0.0000	0.000083
0.5	0.5000	0.0000	0.000083
1.0	1.0000	0.0000	0.000084
2.0	2.0000	0.0000	0.000084
5.0	5.0000	0.0000	0.000086
10.0	10.0000	0.0000	0.000089
20.0	20.0001	-0.0001	0.000094
50.0	50.0000	0.0000	0.00012
100.0	100.0001	-0.0001	0.00019
200.0	200.0000	0.0000	0.00032

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	100.0000
2	100.0000
3	100.0000
4	100.0000
5	100.0000
OFF-CENTER LOADING	0.0000

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



CERTIFICATE No : 25M2256
REFERENCE No : 76365-3

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE

MANUFACTURER : SARTORIUS

MODEL : BSA224S-CW

SERIAL No : 36591843

ID No : BA09/61

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : ATSAWIN Y.

CALIBRATION DATE : 07-Mar-25

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 13-Mar-25

RECEIVED DATE : 07-Mar-25

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.





CERTIFICATE No : 25M2256

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : BSA224S-CW
MANUFACTURER : SARTORIUS S/N : 36591843
ID No : BA09/61 RECEIVED DATE : 07-Mar-25
AIR PRESSURE : 1009mbar \pm 1mbar CALIBRATION DATE : 07-Mar-25
AMBIENT TEMPERATURE : 24° C \pm 1° C RELATIVE HUMIDITY : 52 %RH \pm 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS NOT ADJUSTED BEFORE CALIBRATION. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.

2. REFERENCE STANDARD INSTRUMENTS :-

<u>INSTRUMENT</u>	<u>MODEL</u>	<u>SERIAL No</u>	<u>CERTIFICATE No</u>	<u>DUE DATE</u>
1) STANDARD WEIGHT SET	E2	QK-I-151	C02250116	28-Jan-27
2) STANDARD WEIGHT	E2	15843	C02250117	29-Jan-27

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.

4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

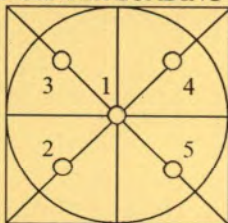
2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 200 g WAS 0.000071 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.00	0.0000	0.0000	0.00012
0.10	0.1000	0.0000	0.00012
0.20	0.2000	0.0000	0.00012
0.50	0.5000	0.0000	0.00012
1.00	1.0000	0.0000	0.00012
2.00	2.0000	0.0000	0.00012
5.00	5.0000	0.0000	0.00012
10.00	10.0000	0.0000	0.00012
20.00	20.0001	-0.0001	0.00012
50.00	50.0000	0.0000	0.00014
100.00	100.0001	-0.0001	0.00019
200.00	200.0001	-0.0001	0.00032

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	100.0000
2	100.0000
3	100.0000
4	100.0000
5	100.0000
OFF-CENTER LOADING	0.0000

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA
THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



CERT.No.: HS-V015C

Calibration Date : 20 Mar 24
 Submitted by : ASIA LAB @ CONSULTANT CO.,LTD
 184 Soi Phutthamonthon Sai 2 Soi 12,
 Bangphai, Bangkadee, Bangkok 10160

Avg Room Temp : 20 °C
 Avg Water Temp : 20 °C
 Air Pressure : 760.00 mmHg
 Salinity : 0 ppt

Model : YSI 5000
 S/N : 15B100751
 Probe : YSI 5010
 S/N : 22D100097
 ID NO. : -
 Air Temp ref : S/N. F8065C26
 Barometric ref : S/N. F8065C26
 Water Temp ref : S/N. 11430
 Technician : Kittipong M.

Calibration Details

Calibration Point	100% air sat. (@20 °C, DO = 9.09 mg/l)	(status)	(status)
Measurement 1 (mg/l)	9.08	(PASS)	-
Measurement 2 (mg/l)	9.08	(PASS)	-
Measurement 3 (mg/l)	9.08	(PASS)	-
Measurement 4 (mg/l)	9.08	(PASS)	-
Measurement 5 (mg/l)	9.08	(PASS)	-
Measurement 6 (mg/l)	9.08	(PASS)	-
Measurement 7 (mg/l)	9.08	(PASS)	-
Measurement 8 (mg/l)	9.08	(PASS)	-
Measurement 9 (mg/l)	9.08	(PASS)	-
Measurement 10 (mg/l)	9.08	(PASS)	-

Mean Measurement	9.08	mg/l	-	-
Inaccuracy	0.01	mg/l	-	-

Overall Status (PASS)


Manufacturer Specification

Accuracy = +/- 0.02 mg/l

- 1) This certificate is issued based on the result that are found as shown on date and place of test only.
- 2) The calibration procedure followed in accordance with Harikul Science Co., Ltd.
- 3) This result shall not be used for advertising purpose.



Technician Signature
 (Kittipong Maekwong)



Laboratory Manager
 (Supreecha Sumaritam)

CERT.No.: HS-W015C

Calibration Date : 18 Mar 25
 Submitted by : S.P.S CONSULTING SERVICE CO.,LTD
 7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol,
 Chatuchak, Bangkok, Thailand 10900

Avg Room Temp : 20 °C
 Avg Water Temp : 20 °C
 Air Pressure : 760.00 mmHg
 Salinity : 0 ppt

Model : YSI 5000
 S/N : 15B100751
 Probe : YSI 5010
 S/N : 22D100097
 ID NO. : -
 Air Temp ref : S/N. F8065C26
 Barometric ref : S/N. F8065C26
 Water Temp ref : -
 ID NO. HS001
 Technician : Kittipong M.

Calibration Details

Calibration Point	100% air sat. (@20 °C, DO = 9.09 mg/l)	(status)	(status)
Measurement 1 (mg/l)	9.08	(PASS)	-
Measurement 2 (mg/l)	9.08	(PASS)	-
Measurement 3 (mg/l)	9.08	(PASS)	-
Measurement 4 (mg/l)	9.07	(PASS)	-
Measurement 5 (mg/l)	9.07	(PASS)	-
Measurement 6 (mg/l)	9.07	(PASS)	-
Measurement 7 (mg/l)	9.07	(PASS)	-
Measurement 8 (mg/l)	9.07	(PASS)	-
Measurement 9 (mg/l)	9.07	(PASS)	-
Measurement 10 (mg/l)	9.07	(PASS)	-

Mean Measurement	9.07	mg/l	-	-
Inaccuracy	0.02	mg/l	-	-

Overall Status (PASS)

Manufacturer Specification

Accuracy = +/- 0.02 mg/l

- 1) This certificate is issued based on the result that are found as shown on date and place of test only.
- 2) The calibration procedure followed in accordance with Harikul Science Co., Ltd.
- 3) This result shall not be used for advertising purpose.



Technician Signature
 (Kittipong Maekwong)



Laboratory Manager
 (Natenapha Pisatkunchon)



QUALITY CALIBRATION CO.,LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.com

CERTIFICATE No : 24T0774

REFERENCE No : 71986-2

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : COD REACTOR

MANUFACTURER : HACH

MODEL : DRB 200


SERIAL No : 15110C0235

ID No : CRB 05/59

SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : CHAICHARN CH.

CALIBRATION DATE : 5-Feb-24

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 5-Feb-24

RECEIVED DATE : 5-Feb-24

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.

F-G010 REV : 02



CERTIFICATE No : 24T0774

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : COD REACTOR
MANUFACTURER : HACH
ID NUMBER : CRB 05/59
RECEIVED DATE : 5-Feb-24
AMBIENT TEMPERATURE : 23° C ± 1° C

MODEL : DRB 200
SERIAL NUMBER : 15110C0235
CALIBRATION DATE : 5-Feb-24
RELATIVE HUMIDITY : 52 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

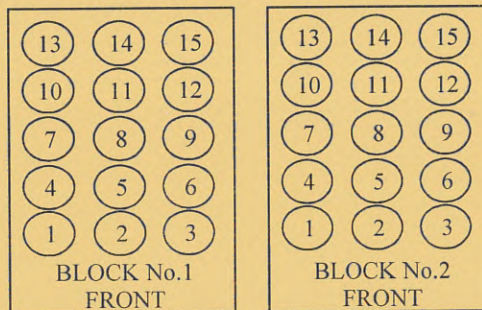
1. THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASUREMENT TEMPERATURE RECORDER WITH THERMOCOUPLE TYPE K UNDER NO LOAD CONDITION. THE THERMOCOUPLES WERE PLACED ON 15 POINTS AND LOCATED ONE THERMOCOUPLE IN EACH OF THE FOUR CORNERS OF THE REACTOR AND PLACED THE EIGHTH THERMOCOUPLE AT THE CENTER OF THE REACTOR.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH TC TYPE K	HYDRA 2635A	8009008	23T6640	14-Jul-24

3. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO.,LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



TEMPERATURE MEASUREMENT ACCURACY TEST

Block No.	1	2
Controller temperature (°C)	145	145
Indicating Temperature	145	145
Measured Temperature (°C) at Spread Locations	1	150.2
	2	150.2
	3	150.2
	4	149.9
	5	150.1
	6	150.7
	7	149.9
	8	149.9
	9	150.8
	10	149.5
	11	150.2
	12	150.0
	13	149.5
	14	149.5
	15	149.6
Uncertainty of Measurement(± °C)	0.86	0.86

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k =2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



QUALITY CALIBRATION CO., LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.com

CERTIFICATE No : 25T0520

REFERENCE No : 75853-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : COD REACTOR

MANUFACTURER : HACH

MODEL : DRB 200

SERIAL No : 15110C0497


ID No : DRB 05/59

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : CHAICHARN CH.

CALIBRATION DATE : 27-Jan-25

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 27-Jan-25

RECEIVED DATE : 15-Jan-25

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.



F-G010 REV : 03



QUALITY CALIBRATION CO., LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 25T0520

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : COD REACTOR
MANUFACTURER : HACH
ID NUMBER : DRB 05/59
RECEIVED DATE : 15-Jan-25
AMBIENT TEMPERATURE : 23° C ± 1° C
MODEL : DRB 200
SERIAL NUMBER : 15110C0497
CALIBRATION DATE : 27-Jan-25
RELATIVE HUMIDITY : 53 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

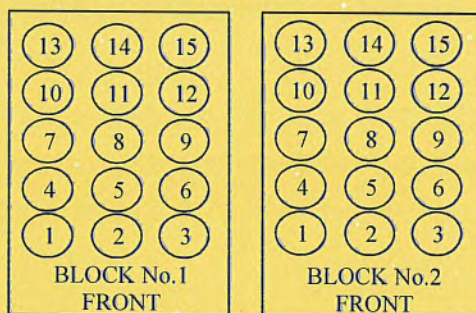
1. THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASUREMENT METHOD WITH CALIBRATED THERMOCOUPLE TYPE K UNDER NO LOAD CONDITION. THE THERMOCOUPLES WERE PLACED ON POINTS AND LOCATED AS THE PICTURE.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH TC TYPE K	HYDRA 2635A	6635300	24T6468	26-Jun-25

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



Block No.	1	2
Calibration Point (°C)	150	150
Controller temperature (°C)	144	144
Indicating Temperature	144	144
Measured Temperature (°C) at Spread Locations	1	150.01
	2	150.69
	3	150.40
	4	150.22
	5	150.27
	6	150.51
	7	150.24
	8	150.20
	9	150.14
	10	149.70
	11	149.58
	12	149.46
	13	148.77
	14	148.99
	15	149.02
Uncertainty of Measurement(± °C)	0.87	0.87

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : LOCATION 10 WAS REFERENCE LOCATION.

NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



Cert. No. : SP24020

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 : WET CHEMISTRY LABORATORY IV

Ambient Temperature : (28.1 \pm 5) °C

Relative Humidity : (47.2 \pm 25) %

Received Date : 27 AUGUST 2024

Calibration Date : 27 AUGUST 2024

Date of Issue : 27 AUGUST 2024

Calibrated by : Nathakorn Pisutpaisan

Approved by :


(Thanakul Petchurai)

SITHIPORN ASSOCIATES CO., LTD.

CALIBRATION LABORATORY

451-451/1 Sirinthorn Road, Bangbumru, Bangplud, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email : calibration@sithiporn.com

SITHIPORN
associates



Cert. No. : SP24020

Job No. : VC67SP0013

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-0185-24	14/05/2026

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	361.4	0.15	0.16	2.00
	467.82	467.7	-0.12	0.16	2.00
	536.56	536.5	-0.06	0.16	2.00
	640.50	640.4	-0.10	0.16	2.00
RM-DL	740.09	739.9	-0.19	0.16	2.00
	864.94	865.2	0.26	0.16	2.00

UUC* = Unit Under Calibration

G. Petch

SITHIPORN ASSOCIATES CO., LTD.

CALIBRATION LABORATORY

451-451/1 Sirinthorn Road, Bangbunru, Bangplud, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email : calibration@sithiporn.com

SITHIPORN
associates



Cert. No. : SP24020

Job No. : VC67SP0013

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	1.0550	0.0033	0.0029	2.00
		29914	0.7	0.7445	0.7460	0.0015	0.0029	2.00
		29381	0.5	0.5416	0.5431	0.0015	0.0030	2.00
	546.1	29360	1.0	0.9821	0.9820	-0.0001	0.0028	2.00
		29914	0.7	0.6961	0.6958	-0.0003	0.0028	2.00
		29381	0.5	0.5073	0.5080	0.0007	0.0029	2.00
	590.0	29360	1.0	1.0222	1.0210	-0.0012	0.0028	2.00
		29914	0.7	0.7237	0.7221	-0.0016	0.0029	2.00
		29381	0.5	0.5361	0.5361	0.0000	0.0031	2.00
	635.0	29360	1.0	0.9753	0.9745	-0.0008	0.0028	2.00
		29914	0.7	0.6910	0.6900	-0.0010	0.0029	2.00
		29381	0.5	0.5211	0.5210	-0.0001	0.0032	2.00
Material	Wavelength (nm)	Solution (mg/l)	Certified Absorbance (A)	UUC* Reading Absorbance (A)	Error (A)	Uncertainty ± (A)	k Factor	
RM-0204060810	235.0	20	0.2422	0.2418	-0.0004	0.0101	2.00	
		40	0.4866	0.4852	-0.0014	0.0115	2.00	
		60	0.7414	0.7389	-0.0025	0.0067	2.00	
		80	0.9858	0.9842	-0.0016	0.0093	2.00	
		100	1.2442	1.2414	-0.0028	0.0086	2.00	

UUC* = Unit Under Calibration

Condition of this result of calibration : Spectrophotometer PERKINELMER Model Lambda 25 S/N 501S14123010

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)
0.0117	3.8659

**Specific Acceptance :

Transmission \leq 1.0 T(%), Absorbance \geq 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

T. Ketch

Turbomass/Clarus Mass/ SQ8 MS Preventive Maintenance (PM)

Company Name:	S.P.S. Consulting Service Co.,Ltd		
Address (Instrument Location):	7 Soi Phaholyothin24 Phaholyothin Road, Jompol, Chatuchak, Bangkok, 10900.		
Serial Number:	648N4050804	PM Number:	2 of 2
Customer Name (if applicable):	Ms. Naruecha	Telephone Number:	NA
Service Engineer Name:	Monchai Kitcharoenkeat	Service Order Number:	WO-02927336
Date PM Performed: (DD-MMM-YYYY)	22-Aug-2024	Next PM Due Date: (DD-MMM-YYYY)	22-Feb-2025

Part Number	Release	Publication Date	
TH09370064	C	March 2013	

Scope

The purpose of this PM is to ensure the continued functionality of the Turbomass/Clarus MS SQ8 MS by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. 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 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
Clarus680	680S14042502	Totalchrom6.3 ⁺	PSS,PSS,FID
Clarus SQ8	648N4050804	Turbomass 6.4 ⁺	
Atom X	US14113002	Tekma AtomX ⁺	

Parts lists

Parts Included with the PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A				

Additional Tools Required for PM				
Part Number (if applicable)	Description	Quantity	Serial #	Calibration Due Date (MM/YY)
N/A				
Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A				

Procedure Checklist

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

General:

- ☒ Column type Elite 624.
- ☒ Carrier gas flow rate 1 ml/min.
- ☒ Review the instrument performance with the customer and document any recent problems.
- ☒ Inspect the customer log book and make any appropriate PM entries.
- ☒ Check incoming AC line voltage for proper levels and grounding.

Mechanical:

- ☒ Inspect and clean all fans and filters.
- ☒ Check the level of FC-43 calibration compound in reference gas bulb and fill if necessary.
- ☒ Change the oil in the fore pump.
- ☒ Inspect cartridge in fore pump vacuum filter; replace adsorbent bead if necessary.
- ☒ Replace the exhaust vapor mist filter on the fore pump.
- ☒ Remove and clean the ion source assembly. Use the Insulator Replacement Kit and/or Optics Replacement Kit if necessary
- ☒ Replace the filament.
- ☒ Remove and clean the pre-quad rods.
- ☒ Observe Wide Range Gauge pressure; clean/adjust if required.
- ☒ Inspect and clean as needed all PC boards and bottom inside of MS chassis.

Electrical:

- ☒ Check head amp offset. Adjust if necessary for proper value (Service Manual).

Operational Tests:

- ☒ Vacuum pressure.
- ☒ Air/water leak check
- ☒ AutoTune and mass calibration.
- ☒ Make a Chromatographic injection to verify peak shape and integrity only (not meant for sensitivity test).

PC Maintenance:

- ☒ Delete all unnecessary temporary files.
- ☒ Empty deleted files from recycle bin.
- ☒ Perform hard drive defragmentation.

Review:

- ☒ Review with the customer PM work performed.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer-supplied materials to have on hand.

Additional Comments


Additional Comments Regarding the PM

Review

<i>The preventive maintenance checks and if applicable performance tests for Turbomass/ Clarus Mass/ SQ8 have been completed.</i>		
<i>This Turbomass/ClarusMS/SQ8</i>	<i>Pass</i>	<i>the preventive maintenance.</i>
Review of Preventive Maintenance:		
Authorized PerkinElmer Representative Monchai Kitcharoenkeat	<i>Monchai</i>	Date: 22-Aug-2024 (DD-MMM-YYYY)
Authorized Customer Representative: Ms. Naruecha	<i>Narucha</i>	Date: 22-Aug-2024 (DD-MMM-YYYY)

GC Clarus 600/680 Preventive Maintenance (PM)

Company Name:	S.P.S. Consulting Service Co.,Ltd		
Address (Instrument Location):	7 Soi Phaholyothin24 Phaholyothin Road, Jompol, Chatuchak, Bangkok, 10900.		
Serial Number:	680S14042502	Service Tag:	N68APSSFEMP
Customer Name (if applicable):	Ms.Naruecha	PM number:	1 of 2
Service Engineer Name:	Monchai Kitcharoenkeat	Service Order Number:	WO-
Date PM Performed: (DD-MMM-YYYY)	22-Feb-2025	Next PM Due Date: (DD-MMM-YYYY)	22-Aug-2025

Part Number	Release	Publication Date	
TH09370070	C	August 2016	

Scope

The purpose of this PM is to ensure the continued functionality of the Clarus 600 and Clarus 680 GC by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. 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 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
Clarus680	680S14042502	Totalchrom6.3.2	PSS, PSS, FID,
Clarus SQ8T	648N4050804	Turbomass 6.4	
AtomX	US14113002	Tekma AtomX	

Parts Lists

Additional Tools Required for PM				
Part Number (if applicable)	Description	Quantity	Serial #	Calibration Due Date (MM/YY)
N/A				
Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A				

Procedure Checklist

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

1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.

- ☒ Check incoming AC line voltage for proper levels and grounding.

L-N 220 Volt

L-G 220 Volt

N-G 0.33 Volt

**Neutral to ground not more than 0.5 volts peak to peak*

- ☒ Inspect all gas line filters and traps; Replace if necessary with customer supplied spares.

Carrier gas ☒ Helium ☐ Nitrogen ☐ Hydrogen

Moisture level ☒ Good ☐ Need to replace ☐ Other _____

Detector gas ☒ Air Zero ☒ Hydrogen ☐ Nitrogen ☐ Helium

Moisture level ☒ Good ☐ Need to replace ☐ Other _____

- ☒ Inspect the customer log book and make any appropriate PM entries.

- ☒ Leak check all fittings from the gas source to instrument.

Gas leakage ☒ Pass ☐ Fail Comment _____

- ☒ Perform general inspection of system for cleanliness.

- ☒ Inspect for functional and clean electronic cooling and oven vent fans

Electronic cooling fan ☒ Yes ☐ No

Oven cooling fan ☒ Yes ☐ No

2. Electronic :

- ☒ Check oven temperature. Calibrate if necessary.

Oven temperature set point 150 °C ☒ Pass ☐ Fail

- ☐ Check sub-ambient option. (If installed).

Oven temperature set point 5 °C ☐ Pass ☐ Fail

- ☒ Perform routine maintenance on detector/injector. Replace parts as necessary with customer supplied spares.

- ☒ Check flows, including split flows if applicable. Calibrate if necessary.

Carrier flow	Pass
Split flow	Pass
- ☒ Check detector gas flows and adjust if necessary.

Detector flow	Pass
---------------	------
- ☒ Autosampler installed ☒ Yes ☐ No

Check autosampler sensor for wear and replace if necessary.	
Vial sensor	Pass
Door sensor	Pass
Tower sensor	Pass
Plunger sensor	Pass
Elevator sensor	Pass
- ☒ Remove syringe, manually flush. Replace with customer supplied spare if necessary.
- ☒ Check firmware version. Upgrade to current levels if necessary.

Firmware version	<u>6.5</u>
------------------	------------
- ☒ Measure all accessible power supply voltages.

5 Volt	Pass
+15 Volt	Pass
-15 Volt	Pass
24 Volt	Pass
- ☒ Record all detector voltage signal.

Detector Channel A	<u>1.12</u>	mV.
Detector Channel B	<u>NA</u>	mV.

3. Diagnostics Tests:

- ☒ Run instrument diagnostics.

<input checked="" type="checkbox"/> BRAM	Pass
<input checked="" type="checkbox"/> EPROM	Pass
- ☒ Run Autosampler diagnostics.

<input checked="" type="checkbox"/> BRAM	Pass
<input checked="" type="checkbox"/> EPROM	Pass

4. Review:

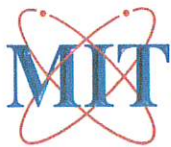
- ☒ Review with the customer PM work performed.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer-supplied materials to have on hand
- ☒ Attach PM sticker.
- ☒ Update Logbook.

Additional Comments

Additional Comments Regarding the PM

Review

<p><i>The preventive maintenance checks and if applicable performance tests for Clarus600/680 GC have been completed.</i></p>		
<p><i>This Clarus600/680 GC Pass the preventive maintenance.</i></p>		
<p>Review of Preventive Maintenance:</p>		
<p>Authorized PerkinElmer Representative:</p> <p>Monchai Kitcharoenkeat</p>	<p><i>Monchai</i></p>	<p>Date:</p> <p>22-Feb-2025 (DD-MMM-YYYY)</p>
<p>Authorized Customer Representative:</p> <p>Ms.Naruecha</p>	<p><i>Naruecha</i></p>	<p>Date:</p> <p>22-Feb-2025 (DD-MMM-YYYY)</p>



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

214 Bangwack Rd. Bangpai Bangkae Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No. : S2024090374-0003

Date Issued : 23-Sep-24

Customer

: S.P.S. CONSULTING SERVICE CO., LTD.

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

Equipment

: Incubator

Manufacturer

: BINDER

Model

: BD 115

Serial No.

: 12-16967

ID No./Tag No.

: IN 05/56

Date Received

: 16-Sep-24

Date Calibrated

: 16-Sep-24

Calibrated by

: Anusak Songliam

Calibration Method or Calibration Procedure Used

Standard method : CP-05 TLAS G-20.

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

Result of Calibration

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

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

Approved by:

Saroyuth T.
(Saroyuth Tochua)



Certificate No. : S2024090374-0003

Environment : Ambient Temperature : Start record 23.7 °C, Stop record 23.5 °C
Relative Humidity : Start record 54.6 %RH, Stop record 54.4 %RH

Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
35	35.0	35.0	0.04	0.21	0.38
41.5	41.5	41.5	0.07	0.19	0.30

Without adjustment

Calibration Temperature (°C)	STD No. 1 (°C)	STD No. 2 (°C)	STD No. 3 (°C)	STD No. 4 (°C)	STD No. 5 (°C)	STD No. 6 (°C)	STD No. 7 (°C)	STD No. 8 (°C)	STD No. 9 (°C)	Uncertainty ⁴ (±°C)
35	34.81	35.12	34.93	34.92	35.02	34.82	34.92	35.13	34.98	0.23
41.5	41.31	41.49	41.33	41.34	41.41	41.31	41.52	41.32	41.46	0.23

Decision Rule with Guard Band

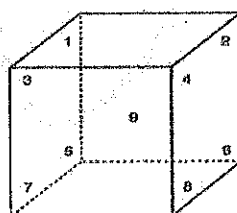
Calibration Temperature (°C)	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	MPE (±°C)
35	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	0.5
41.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	0.5

Pass = $|\text{error}| + |\text{uncertainty}| \leq |\text{MPE}|$ MPE = Maximum Permissible Error

Fail = $|\text{error}| + |\text{uncertainty}| > |\text{MPE}|$

Note : Probe No. 9 is Reference Probe

Setting Air Fresh No. 0



Condition As-Received : Used Item

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

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202407373-0005 for Temperature Indicator with Sensor Serial No. US37020317, Due 31-Jan-25

- Notes :
1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
 2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.
 3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
 4. The uncertainty of measurement is included temperature stability.
 5. The temperature uniformity, stability, overall variation and indicating temperature is applicable to all air or gas filled temperature controlled enclosures at atmospheric pressure.

End of Certificate

**QUALITY CALIBRATION CO.,LTD.**

235 Petchkasem 63/2 Road, Laksong, Bangkai, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.com

NSC-TISI-TIS17025
CALIBRATION 0049

CERTIFICATE No : 24T2234

REFERENCE No : 72448-8

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : WATER BATH

MANUFACTURER : MEMMERT

MODEL : WNB29

SERIAL No : L614.0123

ID No : WB-05/58

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : CHAICHARN CH.

CALIBRATION DATE : 08-Mar-24

APPROVED BY : PONGSAK J.

ISSUED DATE : 14-Mar-24

RECEIVED DATE : 08-Mar-24

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.



CERTIFICATE No : 24T2234

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
ID NUMBER : WB-05/58
RECEIVED DATE : 08-Mar-24
AMBIENT TEMPERATURE : 25 °C ± 1 °C
MODEL : WNB29
SERIAL NUMBER : L614.0123
CALIBRATION DATE : 08-Mar-24
RELATIVE HUMIDITY : 56 %RH ± 10 % RH

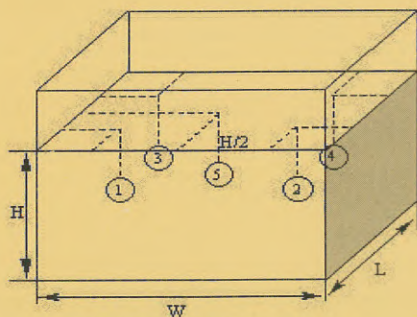
CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO ASTM E715-80 (REAPPROVED 2001) BY COMPARISON WITH CALIBRATED RTD. THE PROBES WERE PLACED ON FIVE POINTS AND LOCATED ONE PROBE IN EACH OF THE FOUR CORNERS OF THE BATH AND PLACED THE FIFTH RTD WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE WATER VOLUME (REFERENCE LOCATION) UNDER NO LOAD CONDITION.
2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH RTD	2635A	7286308	23T6641	14-Jul-24

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO.,LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



PROBE INSTALLATION
POSITION IN THE BATH

GENERAL INFORMATION

Overall Variation of Ambient Temperature around the Bath (°C) : 2.1
Overall Variation of Line Voltage (V) : 14
Instrument Condition : Normal
Bath Inner Size (W*L*H) : 60*40*6 cm

BATH PERFORMANCE

Controller Temperature (°C)	Temperature Stability (±°C)	Radius Uniformity (°C)	Axial Uniformity (°C)	Overall Variation (°C)
50.0	0.05	0.06	0.04	0.11
60.0	0.07	0.19	0.03	0.30

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	
50.0	50.0	49.61	49.62	49.63	49.67	49.65	0.15
60.0	60.0	59.48	59.67	59.52	59.60	59.59	0.16

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE BATH.

NOTE 2 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



CERTIFICATE No : 25T2261
REFERENCE No : 76365-8


PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
MODEL : WNB29
SERIAL No : L614.0123
ID No : WB 05/58
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : SUCHART S.

CALIBRATION DATE : 07-Mar-25

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 13-Mar-25

RECEIVED DATE : 07-Mar-25

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CERTIFICATE No : 25T2261

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
ID NUMBER : WB 05/58
RECEIVED DATE : 07-Mar-25
AMBIENT TEMPERATURE : 24 °C ± 1 °C

MODEL : WNB29
SERIAL NUMBER : L614.0123
CALIBRATION DATE : 07-Mar-25
RELATIVE HUMIDITY : 51 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

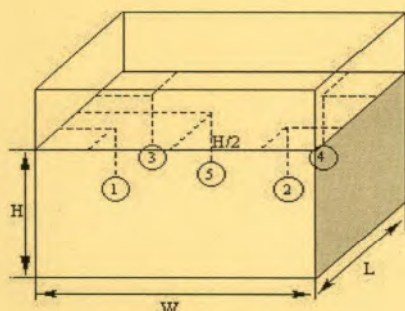
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO ASTM E715-80 (REAPPROVED 2001) BY COMPARISON WITH CALIBRATED RTD. THE PROBES WERE PLACED ON FIVE POINTS AND LOCATED ONE PROBE IN EACH OF THE FOUR CORNERS OF THE BATH AND PLACED THE FIFTH RTD WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE WATER VOLUME (REFERENCE LOCATION) UNDER NO LOAD CONDITION.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH RTD	2625A	6603614	24T6473	01-Jul-25

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



PROBE INSTALLATION
POSITION IN THE BATH

GENERAL INFORMATION

Overall Variation of Ambient Temperature around the Bath (°C) : 0.6
Overall Variation of Line Voltage (V) : 12
Instrument Condition : Normal
Bath Inner Size (W*L*H) : 60*40*10 cm

BATH PERFORMANCE

Calibration Point (°C)	Controller Temperature (°C)	Temperature Stability (±°C)	Radius Uniformity (°C)	Axial Uniformity (°C)	Overall Variation (°C)
50.0	50.2	0.06	0.05	0.03	0.16
60.0	60.2	0.06	0.08	0.04	0.17

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	
50.2	50.2	49.84	49.88	49.86	49.88	49.89	0.15
60.2	60.2	59.83	59.84	59.85	59.86	59.91	0.16

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE BATH.

NOTE 2 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



ระดับเสียงในบริเวณชุมชน



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0220

MTC No. EEL. BP. 44/0268

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

Ambient Environment

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

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

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

- 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 B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be 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 : 19 Feb. 2025

Date of Calibration : 21 Feb. 2025

1 / 2
W

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

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FM.BL.MTC.002 Rev.5

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9036
Fax. (66) 0 2577 9009

Office/Laboratory

668 Mu 2 Tambon Bangpoomai, Amphoe Muang Samutprakan,
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9440
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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0220

MTC No. EEL. BP. 44/0268

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 °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	93.81	-0.19	± 0.10	± 0.40 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	0.95	± 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 :


(Mr. Weerachai Deechaiyae)

Approved by :


(Mr. Prawate Kluaypa)
Director

Date of Calibration : 21 Feb. 2025

Date of Issue : 24 Feb. 2025

Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Ref : 2011268021900739001

End of Certificate

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FM.BL.MTC.002 Rev.5

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S.P.S. CONSULTING SERVICE CO., LTD.
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Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com., www.spscon.com

Noise R_278/25

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	21 February 2025
		Due Date	21 February 2026

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-R15	ACO	6236	00172062	28 April 2025	93.9	93.9
ACO-R22	ACO	6236	00182010	28 April 2025	93.9	93.9
ACO-R31	ACO	6236	00192043	28 April 2025	94.0	93.9
ACO-R34	ACO	6236	00192046	28 April 2025	94.0	93.9
ACO-C1-B01	ACO	6238	00223038	28 April 2025	93.9	93.9
ACO-C1-B02	ACO	6238	00223039	28 April 2025	93.9	93.9
ACO-C1-B03	ACO	6238	00223040	28 April 2025	93.9	93.9
ACO-C1-B04	ACO	6238	00223041	28 April 2025	93.9	93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.81 ± 0.10 dB	

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

Peera Detudom
(Mr. Peera Detudom)



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0220

MTC No. EEL. BP. 45/0268

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 : Acoustic Calibrator

Manufacturer : Cirrus Research plc

Model : CR:515

Serial No. : 92002

Ambient Environment

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

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

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

- 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 B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be 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 : 19 Feb. 2025

Date of Calibration : 21 Feb. 2025

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FM.BL.MTC.002 Rev.5

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0220

MTC No. EEL. BP. 45/0268

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 °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	93.98	-0.02	± 0.10	± 0.40 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	1000.1	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	0.65	± 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 :


.....
(Mr. Weerachai Deechaiyae)

Approved by :



.....
(Mr. Prawate Kluaypa)
Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 21 Feb. 2025

Date of Issue : 24 Feb. 2025

Ref : 2011268021900739002

End of Certificate

2 / 2

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FM.BL.MTC.002 Rev.5

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Noise R_279/25

Sound Level Meter Calibration Report

Acoustic Calibrator Data

Brand	CIRRUS	Number	AC-CR01/63
Model	CR515	Serial No.	92002
Calibration Range	94 dB, 1000 Hz	Last Calibration	21 February 2025
		Due Date	21 February 2026

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
CR-B02	Cirrus	CR161B	G301157	28 April 2025	94.0	94.0
CR-B04	Cirrus	CR161B	G301404	28 April 2025	94.0	94.0
CR-B05	Cirrus	CR161B	G301134	28 April 2025	94.1	94.0
CR-B06	Cirrus	CR161B	G301151	28 April 2025	94.0	94.0
CR-B07	Cirrus	CR161B	G301167	28 April 2025	94.0	94.0
CR-B08	Cirrus	CR161B	G301397	28 April 2025	94.0	94.0
CR-B09	Cirrus	CR161B	G301401	28 April 2025	94.0	94.0
CR-B10	Cirrus	CR161B	G301407	28 April 2025	94.0	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.98 ± 0.10 dB	

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

Peera Detudom
(Mr. Peera Detudom)

ระดับเสียงในพื้นที่โรงงาน



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0304

MTC No. EEL. BP. 109/0267

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

Ambient Environment

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

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

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

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 Keithley 2015-P S/N4106495.
7. Condenser Microphone B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be 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 : 22 Feb. 2024

Date of Calibration : 4 Mar. 2024

1 / 2 ✓

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FM.BL.MTC.002 Rev.4

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Fax. (66) 0 2579 8592

E-mail : sumalee@tistr.or.th

Request No. 21-67/0304

MTC No. EEL. BP. 109/0267

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 °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	93.85	-0.15	± 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	999.9	-0.1	± 1.5	$\pm 2.0\%$

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1.65	± 0.50	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

.....
(Mr. Weerachai Deechaiyae)

Approved by :

.....
(Mr. Prawate Kluaypa)
Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 4 Mar. 2024

Date of Issue : 5 Mar. 2024

Ref : 2011267022200795001

End of Certificate

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Noise R_002/25

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	04 March 2024
		Due Date	04 March 2025

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-R40	ACO	6236	00192052	08 January 2025	93.9	93.9
ACO-R51	ACO	6236	00192063	08 January 2025	93.9	93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.85 ± 0.10 dB	

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

Peera Detudom
(Mr. Peera Detudom)



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Tel : (662) 939-4370-72. Fax : (662) 513-4221. E-mail : sale@spscon.com, www.spscon.com

Noise R_012/25

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	04 March 2024
		Due Date	04 March 2025

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-R50	ACO	6236	00192062	14 January 2025	93.9	93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.85 ± 0.10 dB	

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

Peera Detudom
(Mr. Peera Detudom)



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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Noise R_011/25

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	04 March 2024
		Due Date	04 March 2025

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-R40	ACO	6236	00192052	14 January 2024	93.9	93.9
ACO-R41	ACO	6236	00192053	14 January 2024	93.9	93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.85 ± 0.10 dB	

Calibrated by :

Adul Dangklom
(Mr.Adul Dangklom)

Approved by :

Peera Detudom
(Mr. Peera Detudom)



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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Noise R_021/25

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	04 March 2024
		Due Date	04 March 2025

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-R40	ACO	6236	00192052	15 January 2025	93.9	93.9
ACO-R41	ACO	6236	00192053	15 January 2025	93.9	93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.85 ± 0.10 dB	

Calibrated by :

Adul Dangklom

(Mr. Adul Dangklom)

Approved by :

Peera Detudom

(Mr. Peera Detudom)



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Noise R_076/25

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	04 March 2024
		Due Date	04 March 2025

Calibration Data

Sound Level Meter Data				Calibration Data	
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]
					Before Adjustment After Adjustment
ACO-R50	ACO	6236	00192062	26 January 2025	93.9 93.9
ACO-R52	ACO	6236	00192064	26 January 2025	93.9 93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.85 ± 0.10 dB

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

Peera Detudom
(Mr. Peera Detudom)



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0220

MTC No. EEL. BP. 44/0268

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

Ambient Environment

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

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

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

- 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 B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be 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 : 19 Feb. 2025

Date of Calibration : 21 Feb. 2025

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FM.BL.MTC.002 Rev.5

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0220

MTC No. EEL. BP. 44/0268

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 °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	93.81	-0.19	± 0.10	± 0.40 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	0.95	± 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 :


(Mr. Weerachai Deechaiyae)

Approved by :



(Mr. Prawate Kluaypa)
Director

Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 21 Feb. 2025

Date of Issue : 24 Feb. 2025

Ref : 2011268021900739001

End of Certificate

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Tel : (662) 939-4370-72 Fax : (662) 513-4221 E-mail : sale@spscon.com, www.spscon.com

Noise R_189/25

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	21 February 2025
		Due Date	21 February 2026

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-R40	ACO	6236	00192052	01 April 2025	93.9	93.9
ACO-R50	ACO	6236	00192062	01 April 2025	93.9	93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.81 ± 0.10 dB	

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

Peera Detudom
(Mr. Peera Detudom)



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Noise R_188/25

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	21 February 2025
		Due Date	21 February 2026

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-R40	ACO	6236	00192052	01 April 2025	93.9	93.9
ACO-R41	ACO	6236	00192053	01 April 2025	93.9	93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.81 ± 0.10 dB	

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

Peera Detudom
(Mr. Peera Detudom)



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Noise R_239/25

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	21 February 2025	
				Due Date	21 February 2026	

Calibration Data						
Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-R40	ACO	6236	00192052	16 April 2025	93.9	93.9
ACO-R41	ACO	6236	00192053	16 April 2025	93.9	93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.81 ± 0.10 dB	

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

Peera Detudom
(Mr. Peera Detudom)



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0220

MTC No. EEL. BP. 45/0268

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 : Acoustic Calibrator

Manufacturer : Cirrus Research plc

Model : CR:515

Serial No. : 92002

Ambient Environment

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

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

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

- 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 B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be 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 : 19 Feb. 2025

Date of Calibration : 21 Feb. 2025

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0220

MTC No. EEL. BP. 45/0268

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 °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	93.98	-0.02	± 0.10	± 0.40 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	1000.1	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	0.65	± 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 :


.....
(Mr. Weerachai Deechaiyae)

Approved by :



.....
f (Mr. Prawate Kluaypa)
Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 21 Feb. 2025

Date of Issue : 24 Feb. 2025

Ref : 2011268021900739002

End of Certificate

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Noise R_196-1/25

Sound Level Meter Calibration Report

Acoustic Calibrator Data

Brand	CIRRUS	Number	AC-CR01/63
Model	CR515	Serial No.	92002
Calibration Range	94 dB, 1000 Hz	Last Calibration	21 February 2025
		Due Date	21 February 2026

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
CR-B05	Cirrus	CR161B	G301134	02 April 2025	94.0	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.98 ± 0.10 dB	

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

(Signature)
(Mr. Peera Detudom)



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0562

MTC No. EEL. BP. 70/0767

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 :

Ambient Environment

Description : Sound Level Calibrator

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

Manufacturer : RION

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

Model : NC-73

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

Serial No. : 10727909

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 : 31 Jul. 2024

Date of Calibration : 6 Aug. 2024

1 / 2

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FM.BL.MTC.002 Rev.4

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0562

MTC No. EEL. BP. 70/0767

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°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	94.31	0.31	± 0.10	± 0.40 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	977.5	-22.5	± 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	2.80	± 0.70	$\pm 3.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :


(Mr. Weerachai Deechaiyae)

Approved by :


(Mr. Prawate Kluaypa)
Director
TISTR

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 6 Aug. 2024

Date of Issue : 7 Aug. 2024

Ref : 2011267073102836001

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FM.BL.MTC.002 Rev.4

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Noise R_197-1/25

Sound Level Meter Calibration Report

Acoustic Calibrator Data

Brand	RION	Number	AC 02/40
Model	NC-73	Serial No.	10727909
Calibration Range	94 dB, 1000 Hz	Last Calibration	06 August 2024
		Due Date	06 August 2025

Calibration Data

Sound Level Meter Data				Calibration Data	
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]
					Before Adjustment After Adjustment
NL 21-B01	RION	NL-21	00554245	02 April 2025	94.3 94.3
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					94.31 ± 0.10 dB

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

Peera Detudom
(Mr. Peera Detudom)

คุณภาพอากาศในสถานประกอบการ



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Workplace	Acrylonitrile	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
		DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	12
		Air Sampling Pump	RYG_FS0108	6-Apr-25	6-Jul-25	3
		Air Sampling Pump	RYG_FS0111	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0124	6-Apr-25	6-Jul-25	3
		Air Sampling Pump	RYG_FS0127	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0130	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0136	7-Apr-25	7-Jul-25	3
		GC-FID	BKK_EN0126	22-Oct-24	22-Apr-26	18
Workplace	Styrene	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
		DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	12
		Air Sampling Pump	RYG_FS0110	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0114	6-Apr-25	6-Jul-25	3
		Air Sampling Pump	RYG_FS0126	6-Apr-25	6-Jul-25	3
		Air Sampling Pump	RYG_FS0128	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0135	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0139	6-Apr-25	6-Jul-25	3
		GC-MSD	BKK_EN0049	25-Oct-24	25-Apr-26	18
Workplace	1,3-Butadiene	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
		DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	12
		Air Sampling Pump	RYG_FS0362	6-Apr-25	6-Jul-25	3
		Air Sampling Pump	RYG_FS0365	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0366	6-Apr-25	6-Jul-25	3
		Air Sampling Pump	RYG_FS0367	7-Apr-25	7-Jul-25	3
		GC-MSD	BKK_EN0049	25-Oct-24	25-Apr-26	18

INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
7/139 MOO 13, SOI SUNTINAKORN 11 TAMBON BANG KAE0,
AMPHOE BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL: (66)0-2116-5860-1 FAX: (66)0-2116-7140



Page 1/3

Certificate of Calibration

Customer

Name : ALS Laboratory Group Thailand Co., Ltd.
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang,
Bangkok 10250

Certificate No : 25-AFM-023

Request No : Req-2025-0169

Unit Under Calibration Details

Measurement Item : Air Flow Meter

Manufacturer : Mesa Labs

Accuracy : 1% of Reading

Model : 200-510L

Sensor Model : -

Serial Number : 130027

Sensor Serial Number : -

ID : RYG_FS0208

Instrument Status : Used

Location of Calibration : LAB 4 AIR VELOCITY METER

Calibration Environment and Details

Temperature : 23 °C ± 3 °C

Humidity : 55 %RH ± 20 %RH

Barometric Pressure : 1013 hPa ± 10 hPa

Received Date : 21 January 2025

Calibration Date : 27 January 2025

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	2 August 2025
Temperature meter	GT 11	08000057	Qreborn	1 March 2025
Pressure meter	CPG2400	41000KDU/651882	TPA	21 October 2025

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

Note :

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

Calibration By :
Mr. Noppadon Luangart
Service Calibration Engineer

Approved By :
Mr. Pacit Mathavorn
Calibration Engineer Supervisor
Issue Date : 27 January 2025

Certificate No : 25-AFM-023
Request No : Req-2025-0169

Result of Calibration : Without Adjustment

Temperature (^o C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
22.50	100.90	20	19.854	-0.1	1.3	0.2	Pass1
22.50	100.90	50	49.732	-0.3	3.3	0.5	Pass1
22.60	100.90	101	100.77	-0.2	2.8	1.0	Pass1
22.70	100.90	151	150.23	-0.8	4.2	1.5	Pass1
22.70	100.90	201	200.39	-0.6	5.6	2.0	Pass1
22.70	100.90	301	300.69	-0.3	8.4	3.0	Pass1
22.80	100.90	400	402.96	3.0	11	4.0	Pass1
23.10	100.90	500	504.62	4.6	7.2	5.0	Pass1

Note STD : Standard UUC : Unit Under Calibration
- UUC Reference Condition : At atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{\text{meas}} = Q_{\text{ref}} \times \frac{P_{\text{ref}}}{P_{\text{meas}}} \times \frac{T_{\text{meas}}}{T_{\text{ref}}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature
 Meas = Measurement Condition ref = Standard Condition

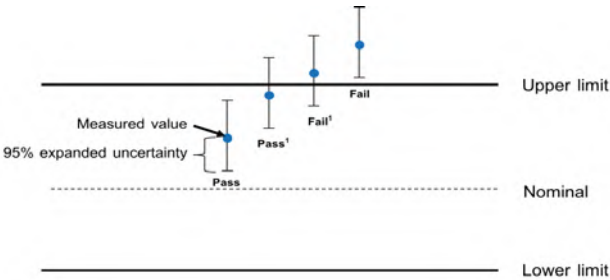
* Indicates non accredited
MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)
N/A = Not Aavailable, Customer does not require a statement of conformity.

Certificate No : 25-AFM-023
Request No : Req-2025-0169

Decision Rule for Statements of Conformity

The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

- Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.
- Pass¹ = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.
- Fail¹ = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.
- Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Certificate



Certificate of Calibration

Customer

Name : ALS Laboratory Group Thailand Co., Ltd.
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang,
Bangkok 10250

Certificate No : 24-AFM-179
Request No : Req-2024-1987

Unit Under Calibration Details

Measurement Item : Air Flow Meter
Manufacturer : MesaLabs
Model : Defender 510-M
Serial Number : I51114
ID : BKK_FS0614
Location of Calibration : LAB 4 AIR VELOCITY METER
Accuracy : 1% of Reading
Sensor Model : -
Sensor Serial Number : -
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 3 °C
Humidity : 55 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 30 August 2024
Calibration Date : 9 September 2024

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator



Reference Standard	Model	Serial Number	Traceble	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	2 August 2025
Temperature meter	GT 11	08000057	Qreborn	1 March 2025
Pressure meter	CPG2400	41000KDU/651882	TPA	9 November 2024

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

Note :

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

Calibration By : Mr. Noppadon Luangart
Service Calibration Engineer

Approved By : Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 9 September 2024



Certificate No : 24-AFM-179
Request No : Req-2024-1987

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
24.70	100.95	100	100.41	0.4	2.8	1.0	N/A
24.90	100.90	502	500.47	-1.5	7.1	5.0	N/A
24.90	100.97	1003	1001.3	-2	14	10.0	N/A
25.00	100.92	2014	2009.9	-4	29	20.1	N/A
25.20	101.03	3043	3058.3	15	44	30.4	N/A
25.30	101.10	4043	4005.1	-38	57	40.4	N/A
25.50	101.15	5052	5003.9	-48	74	50.5	N/A

Note
STD : Standard UUC : Unit Under Calibration
- UUC Reference Condition : At atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{ref}} \times \frac{T_{meas}}{T_{ref}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature
Meas = Measurement Condition ref = Standard Condition

* Indicates non accredited
MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)
N/A = Not Aavailable, Customer does not require a statement of conformity.

Certificate No : 24-AFM-179

Request No : Req-2024-1987

Decision Rule for Statements of Conformity

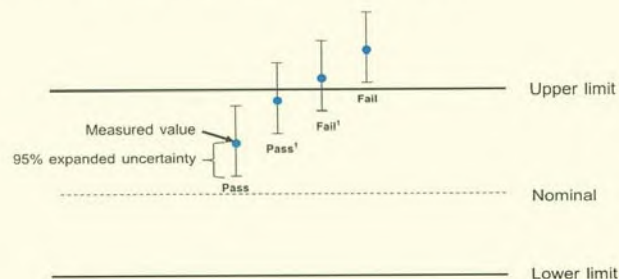
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass¹ = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail¹ = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Certificate

ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd.,
Phatthanakan, Suan Luang, Bangkok 10250
T +66 2 760 3000 F +66 2 760 3197



Certificate of Calibration

Certificate No. C-060425-RYG_FS0108

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gillan
Model/Type : GilAir Plus
Equipment ID : RYG_FS0108
Serial No. : 20150310157
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)	
	1	2	3					
Low Flow								
20	20.5	19.7	20.4	20.2	5%	19 - 21	Passed	
50	50.1	49.7	51.2	50.3	5%	48 - 53	Passed	
100	101.1	100.3	101.5	101.0	5%	95 - 105	Passed	
200	201.8	204.4	202.3	202.8	5%	190 - 210	Passed	
High Flow								
500	503.8	507.4	510.4	507.2	3%	485 - 515	Passed	
1000	994.7	991.4	996.2	994.1	3%	970 - 1030	Passed	
2000	2000.7	2019.4	2006.3	2008.8	3%	1940 - 2060	Passed	
2500	2516.4	2518.4	2517.5	2517.4	3%	2425 - 2575	Passed	

END OF REPORT

Calibrated By: 

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 06-Apr-25

Approved By: 

(Mr.Supt Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0111

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus
Equipment ID : RYG_FS0111
Serial No. : 20150310160
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.4	20.6	20.3	20.4	5%	19 - 21	Passed
50	49.6	51.1	51.7	50.8	5%	48 - 53	Passed
100	101.9	101.7	101.5	101.7	5%	95 - 105	Passed
200	199.6	200.5	200.4	200.2	5%	190 - 210	Passed
High Flow							
500	507.8	509.8	505.6	507.7	3%	485 - 515	Passed
1000	996.8	992.5	998.6	996.0	3%	970 - 1030	Passed
2000	1996.4	1999.4	1993.4	1996.4	3%	1940 - 2060	Passed
2500	2509.2	2497.3	2495.2	2500.6	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-060425-RYG_FS0124

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus
Equipment ID : RYG_FS0124
Serial No. : 20150310180
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.1	20.6	20.4	20.4	5%	19 - 21	Passed
50	48.2	48.3	48.5	48.3	5%	48 - 53	Passed
100	102.1	102.0	101.8	102.0	5%	95 - 105	Passed
200	201.2	200.5	200.8	200.8	5%	190 - 210	Passed
High Flow							
500	500.4	500.3	500.0	500.2	3%	485 - 515	Passed
1000	997.7	995.3	997.2	996.7	3%	970 - 1030	Passed
2000	2001.9	2000.7	1999.7	2000.8	3%	1940 - 2060	Passed
2500	2498.6	2499.3	2499.9	2499.3	3%	2425 - 2575	Passed
4000	3995.7	3999.7	4000.6	3998.7	3%	3880 - 4120	Passed

END OF REPORT

Calibrated By:

(Mr. Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 06-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0127

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus
Equipment ID : RYG_FS0127
Serial No. : 20150410003
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.3	20.4	20.3	20.3	5%	19 - 21	Passed
50	49.6	49.9	50.0	49.8	5%	48 - 53	Passed
100	98.7	98.1	98.3	98.4	5%	95 - 105	Passed
200	201.8	201.5	200.9	201.4	5%	190 - 210	Passed
High Flow							
500	503.5	501.2	499.2	501.3	3%	485 - 515	Passed
1000	999.5	999.8	999.2	999.5	3%	970 - 1030	Passed
2000	2003.3	2004.0	2003.2	2003.5	3%	1940 - 2060	Passed
2500	2512.2	2517.3	2511.9	2513.8	3%	2425 - 2575	Passed
4000	3994.5	4003.3	3994.3	3997.4	3%	3880 - 4120	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)
RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteh)
RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0130

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus
Equipment ID : RYG_FS0130
Serial No. : 20150410006
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.9	20.6	20.8	20.8	5%	19 - 21	Passed
50	51.2	51.6	50.4	51.1	5%	48 - 53	Passed
100	99.8	101.2	100.4	100.5	5%	95 - 105	Passed
200	199.4	199.6	199.8	199.6	5%	190 - 210	Passed
High Flow							
500	506.0	507.1	501.3	504.8	3%	485 - 515	Passed
1000	1014.7	1005.2	1007.2	1009.0	3%	970 - 1030	Passed
2000	2000.5	1995.5	2002.0	1999.3	3%	1940 - 2060	Passed
2500	2510.4	2509.7	2511.4	2510.5	3%	2425 - 2575	Passed
4000	4002.6	4004.7	4003.9	4003.7	3%	3880 - 4120	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)
RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteh)
RYG Field Services Section Head

ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd.,
Phatthanakan, Suan Luang, Bangkok 10250
T +66 2 760 3000 F +66 2 760 3197



Certificate of Calibration

Certificate No. C-070425-RYG_FS0136

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0136
Serial No. : 20150410012
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.8	20.6	20.3	20.2	5%	19 - 21	Passed
50	49.7	49.9	49.9	49.8	5%	48 - 53	Passed
100	101.4	100.3	100.7	100.8	5%	95 - 105	Passed
200	200.9	201.0	200.4	200.8	5%	190 - 210	Passed
High Flow							
500	501.7	502.4	501.4	501.8	3%	485 - 515	Passed
1000	993.0	1004.8	995.6	997.8	3%	970 - 1030	Passed
2000	1999.4	1999.1	1985.7	1994.7	3%	1940 - 2060	Passed
2500	2514.0	2512.8	2512.3	2513.0	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteh)

RYG Field Services Section Head

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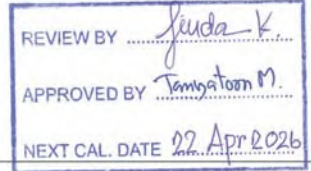
Agilent CrossLab Compliance Services

Certificate of System Qualification

GC-OQ

System ID: GC-6_CN11461066
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Soi 40 Phatthanakan Rd,Khwang Suan Luang, Khet Suan Luang, Bangkok 10250

Date: October 22, 2024 9:27:05 AM
EQP Name: AgilentRecommended
EQP Revision: GC.02.53
Overall Qualification Status: Pass



CDS Logon Verification - GC

Logon: Saenguthai Tarak

Overall CDS Logon Verification - GC Test Status

Pass

System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Decay

Name: 7890

Front SSL

Setpoint Status:

Pass

Pressure:

25.0

psi

Pressure Change:

0.0

psi

/5 minutes

Agilent Recommended:

>=

-2.0

and

<=

0.5

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890
Front SSL

Setpoint Status: Pass

Inlet Pressure: Setpoint 25.0 psi Actual 25.07 psi
Accuracy: 0.1 psi
Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Inlet Pressure Decay

Name: 7890
Back SSL

Setpoint Status: Pass

Pressure: 25.0 psi
Pressure Change: 0.0 psi /5 minutes
Agilent Recommended: ≥ -2.0 and ≤ 0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890
Back SSLDate: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Setpoint Status: Pass

Inlet Pressure: Setpoint 25.0 psi Actual 25.06 psi
Accuracy: 0.1 psi
Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890
Front FID

Setpoint Status: Pass

Flow Type: Fuel
Setpoint: 30.0 mL/min Measured Flow: 28.8 mL/min
Accuracy: 1.2 mL/min
Agilent Recommended: ≤ 10.0 % setpoint (3.0 mL/min)
Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status: Pass

Flow Type: Oxidizer
Setpoint: 400.0 mL/min Measured Flow: 392 mL/min
Accuracy: 8.0 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: 25.4 mL/min
Accuracy: 0.4 mL/min
Agilent Recommended: ≤ 10.0 % setpoint (2.5 mL/min)
Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Overall Detector Flow Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890
Back FID

Setpoint Status: Pass

Flow Type: Fuel
Setpoint: 30.0 mL/min Measured Flow: 30.8 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: 393 mL/min

Accuracy: 7.0 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: 25.2 mL/min

Accuracy: 0.2 mL/min
Agilent Recommended: ≤ 10.0 % setpoint (2.5 mL/min)

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

Overall Detector Flow Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual
Temperature: 230.0 230.3 °C

Accuracy: 0.3 °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: 100.0 100.0 °C

Accuracy: 0.0 °C
Agilent Recommended: ≥ -1.0 % setpoint in K (-3.7 °C)
≤ 1.0 % setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average
Temperature: 100.0 100.0167 °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: 7693A

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Setpoint Status: Completed

Injection Volume on Column: 1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination1 Front SSL / Front FID

Name: 7890

Setpoint Status: Pass

Base Signal: 14.05 pA

ASTM Noise pA	Drift pA/Hr
0.05	0.03
<= 0.10	<= 2.50
Pass	Pass

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1 Front SSL / Front FID

Name: 7693A

Setpoint Status: Pass

Injection Volume on Column: 1.0 uL

Area RSD: 0.30 % Retention Time RSD: 0.63 %

Agilent Recommended: <= 3.00 <= 1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461086

Tested Combination1 Front SSL / Front FID

Injection Tower

Name: 7890

Setpoint Status: Pass

Signal to Noise: 11078525

Agilent Recommended: >= 300000

Overall Signal to Noise Test Status

Pass

Scouting Run

Tested Combination2 Back SSL / Back FID

Injection Tower

Name: 7693A

Setpoint Status: Completed

Injection Volume on Column: 1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination2 Back SSL / Back FID

Name: 7890

Setpoint Status: Pass

Base Signal: 13.79 pA

ASTM Noise pA	Drift pA/Hr
0.05	0.01
<= 0.10	<= 2.50
Pass	Pass

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461086

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination2	Back	SSL	/ Back	FID
Name:	7693A			
Setpoint Status:	Pass			
Injection Volume on Column:	1.0	uL		
Area RSD:	1.06	%	Retention Time RSD:	0.93 %
Agilent Recommended:	<=	3.00	<=	1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination2	Back	SSL	/ Back	FID
	Injection Tower			
Name:	7890			
Setpoint Status:	Pass			
Signal to Noise:	1771221			
Agilent Recommended:	>=	300000		

Overall Signal to Noise Test Status

Pass

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	GC-6_CN11461066
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination1

Injection Technique	Injection Tower
Sampler Identifier	Sampler 1
Inlet	Front
Detector	Front
LTM Included?	No

Tested Combination2

Injection Technique	Injection Tower
Sampler Identifier	Sampler 2
Inlet	Back
Detector	Back
LTM Included?	No

Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CNCN10340103
Firmware Revision	A.11.06
Usage	Sample Injection
Location	Front
Syringe Volume (uL)	10

Sampler 2

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN16280128
Firmware Revision	A.11.06
Usage	Sample Injection
Location	Back
Syringe Volume (µL)	10

Sampler 3

Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN15380030
Firmware Revision	A.11.03
Vial Heater	Not installed

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN11461066
Firmware Revision	A.01.16
Oven Type	Standard

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Inlet 1

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

Inlet 2

Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Back
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1

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

Detector 2

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

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System ID: GC-6_CN11461066

Electronic Signature

Purpose

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Details

Full Name of Signer:Saenguthai Tarak

Logged On User Name:saenguthai.tarak@non.agilent.com

Signature Creation Date:October 22, 2024

Reason for Signature:Executed protocol and published this original version of document

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Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066

Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional information
October 21, 2024 3:16:06 PM	Audit	SessionCreated	Session	None
October 21, 2024 3:16:07 PM	Start	Configuration	Session	None
October 21, 2024 3:16:07 PM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
October 21, 2024 3:22:40 PM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks\Gc\Configuration\02.53\Gc.02.53.eqp], EQP File Name: [Gc.02.53.eqp], EQP Name: [AgilentRecommended], Protocol Revision :[Gc.02.53]
October 21, 2024 3:22:44 PM	End	Configuration	Session	None
October 21, 2024 3:22:47 PM	Start	Qualification	Session	OQ
October 21, 2024 3:22:48 PM	Start	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	None
October 21, 2024 3:23:35 PM	End	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	Run Count : 1
October 21, 2024 3:23:45 PM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
October 21, 2024 3:23:59 PM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1

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2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:24:01 PM	Start	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
October 21, 2024 3:25:26 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
October 21, 2024 3:25:28 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 21, 2024 3:25:32 PM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 21, 2024 3:25:50 PM	Start	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
October 21, 2024 3:26:01 PM	End	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	Run Count : 1
October 21, 2024 3:26:05 PM	Start	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 21, 2024 3:26:10 PM	End	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 21, 2024 3:26:12 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None

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2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:26:50 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:26:53 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:26:54 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:27:10 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:27:13 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:28:11 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:29:27 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:29:29 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:29:30 PM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:29:47 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:29:52 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1

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Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:29:54 PM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:30:07 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:30:09 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:30:11 PM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:30:34 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:30:37 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:30:38 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 21, 2024 3:31:55 PM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
October 21, 2024 3:31:57 PM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1

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2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:31:59 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 21, 2024 3:34:37 PM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
October 21, 2024 3:34:39 PM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
October 21, 2024 3:34:42 PM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
October 21, 2024 3:39:05 PM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
October 21, 2024 3:39:07 PM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
October 21, 2024 3:39:33 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
October 21, 2024 3:40:12 PM	Audit	AceClosed	Session	None
October 22, 2024 8:55:47 AM	Audit	AceRestarted	Session	None
October 22, 2024 8:55:50 AM	Audit	SessionReloaded	Session	None
October 22, 2024 8:56:02 AM	Start	Qualification	Session	OQ

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2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 8:56:02 AM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
October 22, 2024 8:56:46 AM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Data files Path : G:\Data\Front\Front_SC10.D\FID1A.ch
October 22, 2024 8:57:25 AM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Run Count : 1
October 22, 2024 8:57:39 AM	Start	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
October 22, 2024 8:58:03 AM	Audit	Data	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : G:\Data\Front\Front_ND10.D\FID1A.ch
October 22, 2024 8:58:37 AM	End	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
October 22, 2024 8:58:40 AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
October 22, 2024 8:59:06 AM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over

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Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0105.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0106.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0107.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0108.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0109.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0110.D\FID1A.ch
October 22, 2024 9:02:11 AM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
October 22, 2024 9:02:16 AM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	None
October 22, 2024 9:02:34 AM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Data files Path : G:\Data\Front\Front_SN01.D\FID1A.ch

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2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:02:54 AM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Run Count : 1
October 22, 2024 9:03:00 AM	Start	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	None
October 22, 2024 9:03:31 AM	Audit	Data	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	Data files Path : G:\Data\Back\Back_SC01.D\FID2B.ch
October 22, 2024 9:04:03 AM	End	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	Run Count : 1
October 22, 2024 9:04:06 AM	Start	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
October 22, 2024 9:08:56 AM	Audit	Data	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : G:\Data\Back\Back_ND013.D\FID2B.ch
October 22, 2024 9:09:13 AM	End	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
October 22, 2024 9:09:26 AM	Start	Execution	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None

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2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0111.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0112.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0113.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0114.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0115.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0116.D\FID2B.ch
October 22, 2024 9:11:15 AM	End	Execution	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
October 22, 2024 9:11:23 AM	Start	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 300000	None
October 22, 2024 9:11:45 AM	Audit	Data	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 300000	Data files Path : G:\Data\Back\Back_SN01.D\FID2B.ch

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:12:08 AM	End	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID - Detector FID - L: >= 300000	Run Count : 1
October 22, 2024 9:12:15 AM	End	Qualification	Session	OQ
October 22, 2024 9:12:15 AM	Start	Reporting	Session	None
October 22, 2024 9:24:09 AM	Audit	Reporting	Session	Report Generated : Certificate
October 22, 2024 9:25:56 AM	Audit	Reporting	Session	Report Generated : Report

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Phatthanakan, Suan Luang, Bangkok 10250
T +66 2 760 3000 F +66 2 760 3197



Certificate of Calibration

Certificate No. C-070425-RYG_FS0110

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gillian
Model/Type : GilAir Plus
Equipment ID : RYG_FS0110
Serial No. : 20150310159
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.4	20.1	19.7	19.7	5%	19 - 21	Passed
50	49.6	51.8	50.5	50.6	5%	48 - 53	Passed
100	100.4	100.9	100.8	100.7	5%	95 - 105	Passed
200	201.8	202.1	201.7	201.9	5%	190 - 210	Passed
High Flow							
500	496.8	498.8	498.4	498.0	3%	485 - 515	Passed
1000	1019.7	1018.7	1020.1	1019.5	3%	970 - 1030	Passed
2000	2007.1	2016.4	2009.7	2011.1	3%	1940 - 2060	Passed
2500	2518.6	2527.3	2524.9	2523.6	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)
RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteh)
RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-060425-RYG_FS0114

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0114
Serial No. : 20150310163
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.2	20.4	20.6	20.4	5%	19 - 21	Passed
50	51.1	50.6	50.9	50.9	5%	48 - 53	Passed
100	101.6	102.1	102.7	102.1	5%	95 - 105	Passed
200	202.6	201.8	202.4	202.3	5%	190 - 210	Passed
High Flow							
500	506.2	500.2	502.3	502.9	3%	485 - 515	Passed
1000	995.9	997.7	996.9	996.8	3%	970 - 1030	Passed
2000	1994.0	1998.1	1999.4	1997.2	3%	1940 - 2060	Passed
2500	2509.9	2502.4	2505.4	2505.9	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 06-Apr-25

Approved By:

(Mr.Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-060425-RYG_FS0126

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0126
Serial No. : 20150410002
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.5	20.3	20.3	20.4	5%	19 - 21	Passed
50	51.6	50.9	51.1	51.2	5%	48 - 53	Passed
100	99.9	99.8	99.9	99.9	5%	95 - 105	Passed
200	202.8	203.0	202.7	202.8	5%	190 - 210	Passed
High Flow							
500	495.9	494.9	496.8	495.9	3%	485 - 515	Passed
1000	1006.3	1003.9	1004.6	1004.9	3%	970 - 1030	Passed
2000	2009.9	2010.0	2008.6	2009.5	3%	1940 - 2060	Passed
2500	2493.6	2499.8	2494.2	2495.9	3%	2425 - 2575	Passed
4000	4009.1	4003.5	4003.1	4005.2	3%	3880 - 4120	Passed

END OF REPORT

Calibrated By:

(Mr.Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 06-Apr-25

Approved By:

(Mr.Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0128

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0128
Serial No. : 20150410004
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

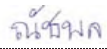
Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.8	20.3	20.6	20.2	5%	19 - 21	Passed
50	49.3	49.3	49.4	49.3	5%	48 - 53	Passed
100	99.3	99.4	99.4	99.4	5%	95 - 105	Passed
200	199.4	197.4	198.5	198.4	5%	190 - 210	Passed
High Flow							
500	506.7	504.1	508.0	506.3	3%	485 - 515	Passed
1000	1015.2	1010.4	1012.4	1012.7	3%	970 - 1030	Passed
2000	1992.6	1998.1	1996.3	1995.7	3%	1940 - 2060	Passed
2500	2492.3	2494.4	2490.5	2492.4	3%	2425 - 2575	Passed
4000	3998.7	4001.2	3999.9	3999.9	3%	3880 - 4120	Passed

END OF REPORT
-----Calibrated By: (Mr.Natchapon Thamklang)
RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By: (Mr.Supot Salamteh)
RYG Field Services Section Head

Certificate of Calibration

Certificate No. C-070425-RYG_FS0135

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0135
Serial No. : 20150410011
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.9	19.8	19.8	19.8	5%	19 - 21	Passed
50	51.6	51.2	51.8	51.5	5%	48 - 53	Passed
100	99.3	99.7	98.9	99.3	5%	95 - 105	Passed
200	202.9	199.9	201.5	201.4	5%	190 - 210	Passed
High Flow							
500	494.4	491.7	493.8	493.3	3%	485 - 515	Passed
1000	1018.2	1014.7	1011.8	1014.9	3%	970 - 1030	Passed
2000	2011.6	2014.0	2020.1	2015.2	3%	1940 - 2060	Passed
2500	2518.1	2493.2	2516.1	2509.1	3%	2425 - 2575	Passed

END OF REPORT
-----Calibrated By: (Mr.Watcharin Pongsamsuan)
RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By: (Mr.Supot Salamteh)
RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-060425-RYG FS0139

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus
Equipment ID : RYG FS0139
Serial No. : 20150510087
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.7	20.5	20.6	20.6	5%	19 - 21	Passed
50	49.5	50.6	49.7	49.9	5%	48 - 53	Passed
100	100.9	100.7	101.0	100.9	5%	95 - 105	Passed
200	200.3	201.1	199.9	200.4	5%	190 - 210	Passed
High Flow							
500	500.5	495.9	505.4	500.6	3%	485 - 515	Passed
1000	1007.4	1002.5	998.8	1002.9	3%	970 - 1030	Passed
2000	2004.3	1992.2	2002.1	1999.5	3%	1940 - 2060	Passed
2500	2502.2	2492.7	2502.6	2499.2	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 06-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head

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Agilent CrossLab Compliance Services

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: GM-3
Organization Name: ALS Laboratory Group
Organization Location: 104 Phatthanakan40, Suan Luang Bangkok 10250

Date: October 25, 2024 12:05:35 PM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.52, GCMS.02.53
Overall Qualification Status: Pass

REVIEW BY
APPROVED BY
NEXT CAL. DATE 25/4/2026

CDS Logon Verification - GC

Logon: asbkk.env03

Overall CDS Logon Verification - GC Test Status

Pass

System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Accuracy

Name: 7890

Front SSL

Setpoint Status: Pass

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

Date: October 25, 2024 12:05:35 PM
System ID: GM-3

Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 230.9 °C

Accuracy: 0.9 °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: 100.0 100.4 °C

Accuracy: 0.4 °C

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

<= 1.0 % setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average

Temperature: 100.0 100.3333 °C

Stability: 0.1 °C

Agilent Recommended: <= 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Date: October 25, 2024 12:05:35 PM

System ID: GM-3

Log Amp

Tested Combination1 Front SSL / External SQ

Name: 5975C inert XL with TAD

Setpoint Status: Pass

Overall Log Amp Test Status

Pass

RFPA

Tested Combination1 Front SSL / External SQ

Name: 5975C inert XL with TAD

Setpoint Status: Pass

Amu: 1050 m/z

Drift After Five Minutes:

11 mV

RFPA Voltage:

524 mV

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

Overall RFPA Test Status

Pass

Tune EI

Tested Combination1 Front SSL / External SQ

Name: 5975C inert XL with TAD

Setpoint Status: Pass

Filament: 1

Setpoint Status: Pass

Filament: 2

Overall Tune EI Test Status

Pass

Scouting Run

Date: October 25, 2024 12:05:35 PM

System ID: GM-3

Tested Combination1	Front	SSL	/ External	SQ
Injection Tower				
Name:	7693A			
Source:	EI - Inert			
Setpoint Status:	Completed			
Injection Volume on Column:	1.0 uL			
Overall Scouting Run Status	Completed			

Signal to Noise EI

Tested Combination1	Front	SSL	/ External	SQ
5975C Inert XL with TAD				
Source:	EI - Inert	Filament:	1	
Setpoint Status:	Pass			
Signal to Noise:	1572			
Agilent Recommended:	>= 320			
Source:	EI - Inert	Filament:	2	
Setpoint Status:	Pass			
Signal to Noise:	1541			
Agilent Recommended:	>= 320			
Overall Signal to Noise EI Test Status	Pass			

Injection Precision

Tested Combination1	Front	SSL	/ External	SQ
7693A				
Name:	7693A			
Source:	EI - Inert			

Date: October 25, 2024 12:05:35 PM
System ID: GM-3

Setpoint Status:	Pass			
Injection Volume on Column:	1.0 uL			
Area RSD:	0.61 %	Retention Time RSD:	0.01 %	
Agilent Recommended:	<= 5.00		<= 1.00	
Overall Injection Precision Test Status	Pass			

Mass Ratio Precision

Tested Combination1	Front	SSL	/ External	SQ
Injection Tower				
Name:	7693A			
Source:	EI - Inert			
Setpoint Status:	Pass			
Injection Volume on Column:	1.0 uL			
RSD:	0.61 %	Area Mass 1	Mass Ratio	
Agilent Recommended:	<= 5.00	Abundance*s	0.33 %	
	Pass		<= 5.00	
			Pass	
Overall Mass Ratio Precision Test Status	Pass			

Date: October 25, 2024 12:05:35 PM
System ID: GM-3

Instrument Details

Purpose
This section describes the as found system configuration.

Details

System

System ID	GM-3
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination1

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

Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN12520102
Firmware Revision	A.10.07
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN12521119
Firmware Revision	A.01.14
Oven Type	Standard

Inlet 1

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

Detector 1

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5975C inert XL with TAD
Model Number	G3172A
Serial Number	US13013A11
Firmware Revision	7.02.29
High Vacuum System	Turbo Pump
Scouting Run Standard	MRP 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.)

Details

Full Name of Signer:

Adirek Rattanawijit

Logged On User Name:

adirek.rattanawijit@non.agilent.com

Signature Creation Date:

October 25, 2024

Reason for Signature:

Executed protocol and published this original version of document

Regulatory Disclaimer

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:33:46 AM	Audit	SessionCreated	Session	None
October 25, 2024 10:33:46 AM	Start	Configuration	Session	None
October 25, 2024 10:33:46 AM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
October 25, 2024 10:41:54 AM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.52/Gc.02.52.eqp], EQP File Name: [Gc.02.52.eqp], EQP Name: [AgilentRecommended].Protocol Revision :[Gc.02.52] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.53/GcMs.02.53.eqp], EQP File Name: [GcMs.02.53.eqp], EQP Name: [AgilentRecommended]
October 25, 2024 10:42:30 AM	End	Configuration	Session	None
October 25, 2024 10:42:32 AM	Start	Qualification	Session	OQ
October 25, 2024 10:42:32 AM	Start	Execution	CDS Logon Verification - GC : - Qualitative test	None
October 25, 2024 10:45:20 AM	End	Execution	CDS Logon Verification - GC : - Qualitative test	Run Count : 1

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:45:22 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
October 25, 2024 10:45:32 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
October 25, 2024 10:45:34 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 25, 2024 10:45:38 AM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 25, 2024 10:45:40 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 25, 2024 10:46:50 AM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
October 25, 2024 10:46:52 AM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
October 25, 2024 10:46:54 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 25, 2024 10:47:21 AM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry

Page 2 / 11

Date: October 25, 2024 12:05:35 PM
System ID: GM-3

Page 10 / 19

User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:47:22 AM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
October 25, 2024 10:47:23 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
October 25, 2024 10:48:14 AM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
October 25, 2024 10:48:15 AM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
October 25, 2024 10:48:20 AM	Start	Execution	Log Amp - 5975C Inert XL with TAD SQ: - Source: EI - Inert	None
October 25, 2024 10:52:15 AM	End	Execution	Log Amp - 5975C Inert XL with TAD SQ: - Source: EI - Inert	Run Count : 1
October 25, 2024 10:52:18 AM	Start	Execution	RFPA - 5975C Inert XL with TAD SQ: - Source: EI - Inert	None
October 25, 2024 10:55:41 AM	Start	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 1 (Qualitative - No setpoints associated)	None
October 25, 2024 10:56:55 AM	End	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 1 (Qualitative - No setpoints associated)	Run Count : 1
October 25, 2024 10:56:58 AM	Start	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 2 (Qualitative - No setpoints associated)	None

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Date: October 25, 2024 12:05:35 PM
System ID: GM-3

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:57:25 AM	End	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 2 (Qualitative - No setpoints associated)	Run Count : 1
October 25, 2024 10:57:32 AM	Start	Execution	Scouting Run - Injection Tower, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	None
October 25, 2024 10:59:48 AM	Audit	Data	Scouting Run - Injection Tower, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\Scout_001.D
October 25, 2024 11:00:27 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 50000; Integration: Off at 0; Integration: On at 5.2;]
October 25, 2024 11:00:31 AM	End	Execution	Scouting Run - Injection Tower, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	Run Count : 1
October 25, 2024 11:00:39 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None
October 25, 2024 11:01:11 AM	Start	Execution	RFPA - 5975C Inert XL with TAD SQ: - Source: EI - Inert	None
October 25, 2024 11:01:37 AM	End	Execution	RFPA - 5975C Inert XL with TAD SQ: - Source: EI - Inert	Run Count : 1

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:01:51 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None
October 25, 2024 11:02:02 AM	Audit	Data	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\SN_F1_001.D
October 25, 2024 11:04:30 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 1000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:04:41 AM	Audit	Reporting	Reintegration	Reintegration Count: 2 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 2000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:04:50 AM	Audit	Reporting	Reintegration	Reintegration Count: 3 – [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 2200; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:05:02 AM	Audit	Reporting	Reintegration	Reintegration Count: 4 – [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 3000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:05:09 AM	Audit	Reporting	Reintegration	Reintegration Count: 5 – [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 4000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:16:07 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:28:50 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None
October 25, 2024 11:29:20 AM	End	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	Run Count : 1
October 25, 2024 11:29:23 AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	None
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_002.D
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_003.D
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_004.D
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_005.D
October 25, 2024 11:29:37 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_006.D

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:29:37 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_007.D
October 25, 2024 11:29:47 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 50000; Integration: Off at 0; Integration: On at 5.2;]
October 25, 2024 11:29:48 AM	End	Execution	Injection Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Run Count : 1
October 25, 2024 11:29:51 AM	Start	Execution	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	None
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_002.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_003.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_004.D

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Date: October 25, 2024 12:05:35 PM
System ID: GM-3

User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_005.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_006.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_007.D
October 25, 2024 11:30:15 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 50000; Integration: Off at 0; Integration: On at 5.2;]
October 25, 2024 11:30:17 AM	End	Execution	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Run Count : 1
October 25, 2024 11:30:23 AM	End	Qualification	Session	OQ
October 25, 2024 11:30:23 AM	Start	Reporting	Session	None
October 25, 2024 11:34:59 AM	End	Reporting	Session	None
October 25, 2024 11:34:59 AM	Start	Qualification	Session	OQ

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Date: October 25, 2024 12:05:35 PM
System ID: GM-3

User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKXWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:44:32 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	None
October 25, 2024 11:44:39 AM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over
October 25, 2024 11:44:42 AM	Audit	Data	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\SN_F2_001.D
October 25, 2024 11:44:53 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 1000; Integration: Off at 0; Integration: On at 4;]
October 25, 2024 11:45:20 AM	Audit	Reporting	Reintegration	Reintegration Count: 2 -- [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 1000; Integration: Off at 0; Integration: On at 5; Integration: Off at 7;]
October 25, 2024 11:45:34 AM	End	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	Run Count : 1

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKXWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:45:59 AM	End	Qualification	Session	OQ
October 25, 2024 11:45:59 AM	Start	Reporting	Session	None
October 25, 2024 12:03:37 PM	Audit	Reporting	Session	Report Generated : Certificate
October 25, 2024 12:04:58 PM	Audit	Reporting	Session	Report Generated : Report

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Certificate of Calibration

Certificate No. C-060425-RYG_FS0362

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0362
Serial No. : 20180610055
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.6	20.4	20.4	20.5	5%	19 - 21	Passed
50	52.2	52.1	52.2	52.2	5%	48 - 53	Passed
100	101.1	100.9	101.2	101.1	5%	95 - 105	Passed
200	199.0	201.6	200.6	200.4	5%	190 - 210	Passed
High Flow							
500	497.4	499.2	496.3	497.6	3%	485 - 515	Passed
1000	999.6	1003.8	1001.5	1001.6	3%	970 - 1030	Passed
2000	2004.8	2003.6	2007.2	2005.2	3%	1940 - 2060	Passed
2500	2510.0	2511.7	2507.7	2509.8	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 06-Apr-25

Approved By:

(Mr.Supot Salamteah)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0365

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0365
Serial No. : 20180610058
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.8	20.2	20.3	20.1	5%	19 - 21	Passed
50	50.5	50.7	50.9	50.7	5%	48 - 53	Passed
100	100.8	101.2	101.7	101.2	5%	95 - 105	Passed
200	201.2	200.8	201.0	201.0	5%	190 - 210	Passed
High Flow							
500	501.7	500.8	500.4	501.0	3%	485 - 515	Passed
1000	998.2	1000.3	1000.4	999.6	3%	970 - 1030	Passed
2000	2002.5	1999.5	1999.7	2000.6	3%	1940 - 2060	Passed
2500	2506.5	2508.4	2503.5	2506.1	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteah)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-060425-RYG_FS0366

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0366
Serial No. : 20180610059
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.8	20.6	20.4	20.3	5%	19 - 21	Passed
50	49.1	49.6	50.2	49.6	5%	48 - 53	Passed
100	100.5	99.8	101.1	100.5	5%	95 - 105	Passed
200	198.6	201.3	200.9	200.3	5%	190 - 210	Passed
High Flow							
500	498.6	509.6	505.3	504.5	3%	485 - 515	Passed
1000	992.5	998.8	1002.4	997.9	3%	970 - 1030	Passed
2000	2002.3	2000.8	2004.6	2002.6	3%	1940 - 2060	Passed
2500	2505.3	2504.5	2508.1	2506.0	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 06-Apr-25

Approved By:

(Mr.Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0367

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0367
Serial No. : 20180610060
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.3	20.7	20.5	20.5	5%	19 - 21	Passed
50	50.5	50.5	50.4	50.5	5%	48 - 53	Passed
100	100.2	100.7	101.1	100.7	5%	95 - 105	Passed
200	202.8	202.4	202.1	202.4	5%	190 - 210	Passed
High Flow							
500	506.7	505.3	507.0	506.3	3%	485 - 515	Passed
1000	1002.6	1003.7	1001.9	1002.7	3%	970 - 1030	Passed
2000	1997.1	1996.7	1998.5	1997.4	3%	1940 - 2060	Passed
2500	2505.8	2502.5	2503.6	2504.0	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteh)

RYG Field Services Section Head



right solutions.
right partner.

รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Workplace	Acrylonitrile	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
		DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	12
		Air Sampling Pump	RYG_FS0140	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0146	6-Apr-25	6-Jul-25	3
		Air Sampling Pump	RYG_FS0156	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0159	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0169	7-Apr-25	7-Jul-25	3
		GC-FID	BKK_EN0126	22-Oct-24	22-Apr-26	18
Workplace	Styrene	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
		DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	12
		Air Sampling Pump	RYG_FS0141	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0147	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0158	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0165	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0361	6-Apr-25	6-Jul-25	3
		GC-MSD	BKK_EN0049	25-Oct-24	25-Apr-26	18

INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
7/139 MOO 13, SOI SUNTINAKORN 11 TAMBON BANG KAE0,
AMPHOE BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL: (66)0-2116-5860-1 FAX: (66)0-2116-7140



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Certificate of Calibration

Customer

Name : ALS Laboratory Group Thailand Co., Ltd.
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang,
Bangkok 10250

Certificate No : 25-AFM-023

Request No : Req-2025-0169

Unit Under Calibration Details

Measurement Item : Air Flow Meter

Manufacturer : Mesa Labs

Accuracy : 1% of Reading

Model : 200-510L

Sensor Model : -

Serial Number : 130027

Sensor Serial Number : -

ID : RYG_FS0208

Instrument Status : Used

Location of Calibration : LAB 4 AIR VELOCITY METER

Calibration Environment and Details

Temperature : 23 °C ± 3 °C

Humidity : 55 %RH ± 20 %RH

Barometric Pressure : 1013 hPa ± 10 hPa

Received Date : 21 January 2025

Calibration Date : 27 January 2025

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceble	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	2 August 2025
Temperature meter	GT 11	08000057	Qreborn	1 March 2025
Pressure meter	CPG2400	41000KDU/651882	TPA	21 October 2025

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

Note :

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

Calibration By :
Mr. Noppadon Luangart
Service Calibration Engineer

Approved By :
Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 27 January 2025

Certificate No : 25-AFM-023
Request No : Req-2025-0169

Result of Calibration : Without Adjustment

Temperature (^o C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
22.50	100.90	20	19.854	-0.1	1.3	0.2	Pass1
22.50	100.90	50	49.732	-0.3	3.3	0.5	Pass1
22.60	100.90	101	100.77	-0.2	2.8	1.0	Pass1
22.70	100.90	151	150.23	-0.8	4.2	1.5	Pass1
22.70	100.90	201	200.39	-0.6	5.6	2.0	Pass1
22.70	100.90	301	300.69	-0.3	8.4	3.0	Pass1
22.80	100.90	400	402.96	3.0	11	4.0	Pass1
23.10	100.90	500	504.62	4.6	7.2	5.0	Pass1

Note STD : Standard UUC : Unit Under Calibration
- UUC Reference Condition : At atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{meas}} \times \frac{T_{meas}}{T_{ref}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature
 Meas = Measurement Condition ref = Standard Condition

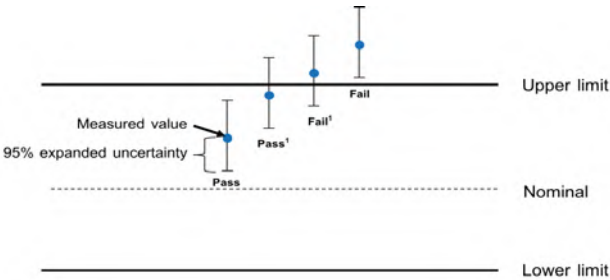
* Indicates non accredited
MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)
N/A = Not Aavailable, Customer does not require a statement of conformity.

Certificate No : 25-AFM-023
Request No : Req-2025-0169

Decision Rule for Statements of Conformity

The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

- Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.
- Pass¹ = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.
- Fail¹ = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.
- Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Certificate



Certificate of Calibration

Customer

Name : ALS Laboratory Group Thailand Co., Ltd.
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang,
Bangkok 10250

Certificate No : 24-AFM-179
Request No : Req-2024-1987

Unit Under Calibration Details

Measurement Item : Air Flow Meter
Manufacturer : MesaLabs
Model : Defender 510-M
Serial Number : I51114
ID : BKK_FS0614
Location of Calibration : LAB 4 AIR VELOCITY METER
Accuracy : 1% of Reading
Sensor Model : -
Sensor Serial Number : -
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 3 °C
Humidity : 55 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 30 August 2024
Calibration Date : 9 September 2024

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator



Reference Standard	Model	Serial Number	Traceble	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	2 August 2025
Temperature meter	GT 11	08000057	Qreborn	1 March 2025
Pressure meter	CPG2400	41000KDU/651882	TPA	9 November 2024

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

Note :

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

Calibration By : Mr. Noppadon Luangart
Service Calibration Engineer

Approved By : Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 9 September 2024



Certificate No : 24-AFM-179
Request No : Req-2024-1987

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
24.70	100.95	100	100.41	0.4	2.8	1.0	N/A
24.90	100.90	502	500.47	-1.5	7.1	5.0	N/A
24.90	100.97	1003	1001.3	-2	14	10.0	N/A
25.00	100.92	2014	2009.9	-4	29	20.1	N/A
25.20	101.03	3043	3058.3	15	44	30.4	N/A
25.30	101.10	4043	4005.1	-38	57	40.4	N/A
25.50	101.15	5052	5003.9	-48	74	50.5	N/A

Note
STD : Standard UUC : Unit Under Calibration
- UUC Reference Condition : At atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{ref}} \times \frac{T_{meas}}{T_{ref}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature
Meas = Measurement Condition ref = Standard Condition

* Indicates non accredited
MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)
N/A = Not Aavailable, Customer does not require a statement of conformity.

Certificate No : 24-AFM-179

Request No : Req-2024-1987

Decision Rule for Statements of Conformity

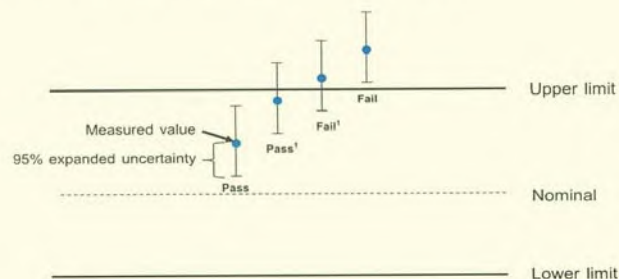
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass¹ = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail¹ = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Certificate

ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd.,
Phatthanakan, Suan Luang, Bangkok 10250
T +66 2 760 3000 F +66 2 760 3197



Certificate of Calibration

Certificate No. C-070425-RYG_FS0140

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gillian
Model/Type : GilAir Plus
Equipment ID : RYG_FS0140
Serial No. : 20150810059
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)			Evaluation (Pass/ Fail)
	1	2	3						
Low Flow									
20	20.2	20.4	20.4	20.3	5%	19	-	21	Passed
50	50.1	51.2	50.9	50.7	5%	48	-	53	Passed
100	99.3	99.6	99.4	99.4	5%	95	-	105	Passed
200	199.8	200.6	200.3	200.2	5%	190	-	210	Passed
High Flow									
500	510.0	511.7	515.7	512.5	3%	485	-	515	Passed
1000	1009.2	1005.8	1012.5	1009.2	3%	970	-	1030	Passed
2000	2015.9	2017.3	1994.6	2009.3	3%	1940	-	2060	Passed
2500	2496.2	2494.2	2504.6	2498.3	3%	2425	-	2575	Passed

END OF REPORT

Calibrated By: _____

(Mr. Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By: _____

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-060425-RYG FS0146

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG FS0146
Serial No. : 20150310176
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.6	20.3	20.4	20.4	5%	19 - 21	Passed
50	51.8	51.3	52.0	51.7	5%	48 - 53	Passed
100	101.8	101.6	101.7	101.7	5%	95 - 105	Passed
200	200.7	200.6	201.0	200.8	5%	190 - 210	Passed
High Flow							
500	511.3	513.5	507.9	510.9	3%	485 - 515	Passed
1000	996.8	1009.1	1000.5	1002.1	3%	970 - 1030	Passed
2000	1996.6	1995.5	2002.4	1998.2	3%	1940 - 2060	Passed
2500	2493.2	2495.7	2492.6	2493.8	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 06-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG FS0156

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG FS0156
Serial No. : 20150910028
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.8	19.6	19.8	19.7	5%	19 - 21	Passed
50	50.2	49.6	50.9	50.2	5%	48 - 53	Passed
100	100.9	100.7	100.1	100.6	5%	95 - 105	Passed
200	198.5	198.3	198.5	198.4	5%	190 - 210	Passed
High Flow							
500	509.8	507.2	510.3	509.1	3%	485 - 515	Passed
1000	1018.3	1012.0	1013.1	1014.5	3%	970 - 1030	Passed
2000	2013.9	2019.3	2010.4	2014.5	3%	1940 - 2060	Passed
2500	2518.5	2541.9	2516.6	2525.7	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0159

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0159
Serial No. : 20150910031
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.4	19.5	19.4	19.4	5%	19 - 21	Passed
50	48.7	51.1	50.4	50.1	5%	48 - 53	Passed
100	104.1	104.1	104.0	104.1	5%	95 - 105	Passed
200	200.4	200.8	201.4	200.9	5%	190 - 210	Passed
High Flow							
500	498.3	498.6	498.5	498.5	3%	485 - 515	Passed
1000	1003.7	1002.1	1003.1	1003.0	3%	970 - 1030	Passed
2000	2009.7	2009.0	2009.2	2009.3	3%	1940 - 2060	Passed
2500	2501.6	2502.6	2495.5	2499.9	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0169

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0169
Serial No. : 20150910041
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.9	20.4	20.3	20.2	5%	19 - 21	Passed
50	49.9	50.8	50.2	50.3	5%	48 - 53	Passed
100	102.6	101.9	102.8	102.4	5%	95 - 105	Passed
200	200.2	201.1	201.6	201.0	5%	190 - 210	Passed
High Flow							
500	496.0	497.1	509.1	500.7	3%	485 - 515	Passed
1000	998.8	1001.1	1005.8	1001.9	3%	970 - 1030	Passed
2000	2025.3	2024.1	2025.1	2024.8	3%	1940 - 2060	Passed
2500	2529.4	2544.2	2533.5	2535.7	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteh)

RYG Field Services Section Head

Certificate of System Qualification

GC-OQ

System ID: GC-6_CN11461066
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Soi 40 Phatthanakan Rd, Khwang Suan Luang, Khet Suan Luang, Bangkok 10250

Date: October 22, 2024 9:27:05 AM
EQP Name: AgilentRecommended
EQP Revision: GC.02.53
Overall Qualification Status: Pass

REVIEW BY *Juda K.*
APPROVED BY *Tamraton M.*
NEXT CAL. DATE *22 Apr 2026*

CDS Logon Verification - GC

Logon: Saenguthai Tarak

Overall CDS Logon Verification - GC Test Status

Pass

System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Decay

Name: 7890

Front SSL

Setpoint Status: Pass

Pressure: 25.0 psi

Pressure Change: 0.0 psi /5 minutes

Agilent Recommended: ≥ -2.0 and ≤ 0.5

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890

Front SSL

Setpoint Status: Pass

Inlet Pressure: Setpoint 25.0 psi Actual 25.07 psi

Accuracy: 0.1 psi

Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Inlet Pressure Decay

Name: 7890

Back SSL

Setpoint Status: Pass

Pressure: 25.0 psi

Pressure Change: 0.0 psi /5 minutes

Agilent Recommended: ≥ -2.0 and ≤ 0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890

Back SSL

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Setpoint Status: Pass

Setpoint Actual
Inlet Pressure: 25.0 psi 25.06 psi

Accuracy: 0.1 psi

Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890
Front FID

Setpoint Status: Pass

Flow Type: Fuel

Setpoint: 30.0 mL/min Measured Flow: 28.8 mL/min

Accuracy: 1.2 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (3.0 mL/min)

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

Setpoint Status: Pass

Flow Type: Oxidizer

Setpoint: 400.0 mL/min Measured Flow: 392 mL/min

Accuracy: 8.0 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: 25.4 mL/min

Accuracy: 0.4 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (2.5 mL/min)

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

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Overall Detector Flow Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890
Back FID

Setpoint Status: Pass

Flow Type: Fuel

Setpoint: 30.0 mL/min Measured Flow: 30.8 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: 393 mL/min

Accuracy: 7.0 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: 25.2 mL/min

Accuracy: 0.2 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (2.5 mL/min)

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

Overall Detector Flow Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 230.3 °C

Accuracy: 0.3 °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: 100.0 100.0 °C

Accuracy: 0.0 °C

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

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average

Temperature: 100.0 100.0167 °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:	7693A			

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461086

Setpoint Status: Completed

Injection Volume on Column: 1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination1	Front	SSL	/ Front	FID
Name:	7890			
Setpoint Status:	Pass			
Base Signal:	14.05 pA			
	ASTM Noise		Drift	
	pA		pA/Hr	
	0.05		0.03	
Agilent Recommended:	<= 0.10		<= 2.50	
Status:	Pass		Pass	

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1	Front	SSL	/ Front	FID
Name:	7693A			
Setpoint Status:	Pass			
Injection Volume on Column:	1.0 uL			
Area RSD:	0.30 %		Retention Time RSD: 0.63 %	
Agilent Recommended:	<= 3.00		<= 1.00	

Overall Injection Precision Test Status

Pass

Signal to Noise

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461086

Tested Combination1

Front SSL / Front FID

Injection Tower

Name: 7890

Setpoint Status:

Pass

Signal to Noise:

11078525

Agilent Recommended:

>= 300000

Overall Signal to Noise Test Status

Pass

Scouting Run

Tested Combination2

Back SSL / Back FID

Injection Tower

Name: 7693A

Setpoint Status:

Completed

Injection Volume on Column:

1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination2

Back SSL / Back FID

Name: 7890

Setpoint Status:

Pass

Base Signal:

13.79 pA

ASTM Noise

pA

0.05

Drift

pA/Hr

0.01

Agilent Recommended:

<= 0.10

<= 2.50

Status:

Pass

Pass

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination2

Back SSL / Back FID

Name: 7693A

Setpoint Status:

Pass

Injection Volume on Column:

1.0 uL

Area RSD:

1.06 %

Retention Time RSD:

0.93 %

Agilent Recommended:

<= 3.00

<= 1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination2

Back SSL / Back FID

Injection Tower

Name: 7890

Setpoint Status:

Pass

Signal to Noise:

1771221

Agilent Recommended:

>= 300000

Overall Signal to Noise Test Status

Pass

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	GC-6_CN11461066
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging



Tested Combination1

Injection Technique	Injection Tower
Sampler Identifier	Sampler 1
Inlet	Front
Detector	Front
LTM Included?	No

Tested Combination2

Injection Technique	Injection Tower
Sampler Identifier	Sampler 2
Inlet	Back
Detector	Back
LTM Included?	No



Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CNCN10340103
Firmware Revision	A.11.06
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

Sampler 2

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN16280128
Firmware Revision	A.11.06
Usage	Sample Injection
Location	Back
Syringe Volume (µL)	10

Sampler 3

Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN15380030
Firmware Revision	A.11.03
Vial Heater	Not installed

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN11461066
Firmware Revision	A.01.16
Oven Type	Standard

Inlet 1	
Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Inlet 2	
Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Back
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1	
Manufacturer	Agilent Technologies
Name	7890
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen

Detector 2	
Manufacturer	Agilent Technologies
Name	7890
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Back
Makeup Gas	Nitrogen

Electronic Signature

Purpose

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Details	
Full Name of Signer:	Saenguthai Tarak
Logged On User Name:	saenguthai.tarak@non.agilent.com
Signature Creation Date:	October 22, 2024
Reason for Signature:	Executed protocol and published this original version of document

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User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:16:06 PM	Audit	SessionCreated	Session	None
October 21, 2024 3:16:07 PM	Start	Configuration	Session	None
October 21, 2024 3:16:07 PM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
October 21, 2024 3:22:40 PM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.53/Gc.02.53.eqp], EQP File Name: [Gc.02.53.eqp], EQP Name: [AgilentRecommended].Protocol Revision [Gc.02.53]
October 21, 2024 3:22:44 PM	End	Configuration	Session	None
October 21, 2024 3:22:47 PM	Start	Qualification	Session	OQ
October 21, 2024 3:22:48 PM	Start	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	None
October 21, 2024 3:23:35 PM	End	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	Run Count : 1
October 21, 2024 3:23:45 PM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
October 21, 2024 3:23:59 PM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1

User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:24:01 PM	Start	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
October 21, 2024 3:25:26 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
October 21, 2024 3:25:28 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 21, 2024 3:25:32 PM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 21, 2024 3:25:50 PM	Start	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
October 21, 2024 3:26:01 PM	End	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	Run Count : 1
October 21, 2024 3:26:05 PM	Start	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 21, 2024 3:26:10 PM	End	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 21, 2024 3:26:12 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None

User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:26:50 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:26:53 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:26:54 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:27:10 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:27:13 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:29:11 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:29:27 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:29:29 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:29:30 PM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:29:47 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:29:52 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:29:54 PM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:30:07 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:30:09 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:30:11 PM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:30:34 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:30:37 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:30:38 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 21, 2024 3:31:55 PM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
October 21, 2024 3:31:57 PM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:31:59 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 21, 2024 3:34:37 PM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
October 21, 2024 3:34:39 PM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
October 21, 2024 3:34:42 PM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
October 21, 2024 3:39:05 PM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
October 21, 2024 3:39:07 PM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
October 21, 2024 3:39:33 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
October 21, 2024 3:40:12 PM	Audit	AccClosed	Session	None
October 22, 2024 8:55:47 AM	Audit	AccRestarted	Session	None
October 22, 2024 8:55:50 AM	Audit	SessionReloaded	Session	None
October 22, 2024 8:56:02 AM	Start	Qualification	Session	OQ

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 8:56:02 AM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
October 22, 2024 8:56:46 AM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Data files Path : G:\Data\Front\Front_SC10.D\ FID1A.ch
October 22, 2024 8:57:25 AM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Run Count : 1
October 22, 2024 8:57:39 AM	Start	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
October 22, 2024 8:58:03 AM	Audit	Data	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : G:\Data\Front\Front_ND10.D\ FID1A.ch
October 22, 2024 8:58:37 AM	End	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
October 22, 2024 8:58:40 AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
October 22, 2024 8:59:06 AM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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User Name: saenguthal.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0105.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0106.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0107.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0108.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0109.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0110.D\FID1A.ch
October 22, 2024 9:02:11 AM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
October 22, 2024 9:02:16 AM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	None
October 22, 2024 9:02:34 AM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Data files Path : G:\Data\Front\Front_SN01.D\FID1A.ch

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

User Name: saenguthal.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:02:54 AM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Run Count : 1
October 22, 2024 9:03:00 AM	Start	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	None
October 22, 2024 9:03:31 AM	Audit	Data	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	Data files Path : G:\Data\Back\Back_SC01.D\FID2B.ch
October 22, 2024 9:04:03 AM	End	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	Run Count : 1
October 22, 2024 9:04:06 AM	Start	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
October 22, 2024 9:08:58 AM	Audit	Data	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : G:\Data\Back\Back_ND013.D\FID2B.ch
October 22, 2024 9:09:13 AM	End	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
October 22, 2024 9:09:26 AM	Start	Execution	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0111.D \FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0112.D \FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0113.D \FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0114.D \FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0115.D \FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0116.D \FID2B.ch
October 22, 2024 9:11:15 AM	End	Execution	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
October 22, 2024 9:11:23 AM	Start	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 300000	None
October 22, 2024 9:11:45 AM	Audit	Data	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 300000	Data files Path : G:\Data\Back\Back_SN01.D \FID2B.ch

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:12:08 AM	End	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 300000	Run Count : 1
October 22, 2024 9:12:15 AM	End	Qualification	Session	OQ
October 22, 2024 9:12:15 AM	Start	Reporting	Session	None
October 22, 2024 9:24:09 AM	Audit	Reporting	Session	Report Generated : Certificate
October 22, 2024 9:25:56 AM	Audit	Reporting	Session	Report Generated : Report

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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Certificate of Calibration

Certificate No. C-070425-RYG_FS0141

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0141
Serial No. : 20150810060
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.3	19.5	19.2	19.3	5%	19 - 21	Passed
50	49.8	51.9	50.4	50.7	5%	48 - 53	Passed
100	99.9	100.4	100.2	100.2	5%	95 - 105	Passed
200	198.8	202.2	201.4	200.8	5%	190 - 210	Passed
High Flow							
500	493.8	495.7	495.4	495.0	3%	485 - 515	Passed
1000	1008.4	1013.5	999.9	1007.3	3%	970 - 1030	Passed
2000	2006.0	2019.3	2012.6	2012.6	3%	1940 - 2060	Passed
2500	2494.4	2492.7	2493.7	2493.6	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0147

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0147
Serial No. : 20150910029
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.9	20.1	20.2	20.4	5%	19 - 21	Passed
50	49.9	50.2	51.2	50.4	5%	48 - 53	Passed
100	100.9	100.7	100.9	100.8	5%	95 - 105	Passed
200	204.1	204.6	204.7	204.5	5%	190 - 210	Passed
High Flow							
500	504.1	505.6	510.1	506.6	3%	485 - 515	Passed
1000	1012.1	1008.2	1012.4	1010.9	3%	970 - 1030	Passed
2000	1990.2	1995.2	1994.8	1993.4	3%	1940 - 2060	Passed
2500	2498.4	2500.2	2494.4	2497.7	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0158

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0158
Serial No. : 20150910030
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.5	20.4	20.6	20.5	5%	19 - 21	Passed
50	50.2	50.4	50.3	50.3	5%	48 - 53	Passed
100	99.6	99.7	99.5	99.6	5%	95 - 105	Passed
200	202.6	202.8	202.9	202.8	5%	190 - 210	Passed
High Flow							
500	505.9	506.8	505.6	506.1	3%	485 - 515	Passed
1000	1016.6	1013.6	1012.8	1014.3	3%	970 - 1030	Passed
2000	2004.1	2005.5	2004.3	2004.6	3%	1940 - 2060	Passed
2500	2492.0	2494.7	2490.4	2492.4	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0165

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0165
Serial No. : 20150910037
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.0	20.2	20.3	20.2	5%	19 - 21	Passed
50	49.5	50.6	50.1	50.1	5%	48 - 53	Passed
100	102.9	103.0	101.4	102.4	5%	95 - 105	Passed
200	201.6	203.1	202.1	202.3	5%	190 - 210	Passed
High Flow							
500	494.8	495.5	495.1	495.1	3%	485 - 515	Passed
1000	1004.4	1001.9	1005.2	1003.8	3%	970 - 1030	Passed
2000	2007.8	2002.0	2005.5	2005.1	3%	1940 - 2060	Passed
2500	2503.0	2501.3	2503.7	2502.7	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-060425-RYG FS0361

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus
Equipment ID : RYG_FS0361
Serial No. : 20180610054
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.5	20.5	20.2	20.1	5%	19 - 21	Passed
50	51.7	51.8	51.7	51.7	5%	48 - 53	Passed
100	100.7	101.1	100.3	100.7	5%	95 - 105	Passed
200	200.5	200.3	200.6	200.5	5%	190 - 210	Passed
High Flow							
500	496.8	499.3	498.2	498.1	3%	485 - 515	Passed
1000	1018.7	1003.8	1010.1	1010.9	3%	970 - 1030	Passed
2000	1994.3	1980.5	1980.6	1985.1	3%	1940 - 2060	Passed
2500	2489.1	2492.1	2506.1	2495.8	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 06-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: GM-3
Organization Name: ALS Laboratory Group
Organization Location: 104 Phatthanakan40, Suan Luang Bangkok 10250

Date: October 25, 2024 12:05:35 PM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.52, GCMS.02.53
Overall Qualification Status: Pass

REVIEW BY
APPROVED BY
NEXT CAL. DATE 25/4/2026

CDS Logon Verification - GC

Logon: asbkk.env03

Overall CDS Logon Verification - GC Test Status

Pass

System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Accuracy

Name: 7890

Front SSL

Setpoint Status: Pass

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

Date: October 25, 2024 12:05:35 PM
System ID: GM-3

Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 230.9 °C

Accuracy: 0.9 °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: 100.0 100.4 °C

Accuracy: 0.4 °C

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

<= 1.0 % setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average

Temperature: 100.0 100.3333 °C

Stability: 0.1 °C

Agilent Recommended: <= 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Date: October 25, 2024 12:05:35 PM

System ID: GM-3

Log Amp

Tested Combination1 Front SSL / External SQ

Name: 5975C inert XL with TAD

Setpoint Status: Pass

Overall Log Amp Test Status

Pass

RFPA

Tested Combination1 Front SSL / External SQ

Name: 5975C inert XL with TAD

Setpoint Status: Pass

Amu: 1050 m/z

Drift After Five Minutes:

11 mV

RFPA Voltage:

524 mV

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

Overall RFPA Test Status

Pass

Tune EI

Tested Combination1 Front SSL / External SQ

Name: 5975C inert XL with TAD

Setpoint Status: Pass

Filament: 1

Setpoint Status: Pass

Filament: 2

Overall Tune EI Test Status

Pass

Scouting Run

Date: October 25, 2024 12:05:35 PM

System ID: GM-3

Tested Combination1	Front	SSL	/ External	SQ
Injection Tower				
Name:	7693A			
Source:	EI - Inert			
Setpoint Status:	Completed			
Injection Volume on Column:	1.0 uL			
Overall Scouting Run Status	Completed			

Tested Combination1	Front	SSL	/ External	SQ
Signal to Noise EI				
5975C Inert XL with TAD				
Source:	EI - Inert	Filament:	1	
Setpoint Status:	Pass			
Signal to Noise:	1572			
Agilent Recommended:	>= 320			
Source:	EI - Inert	Filament:	2	
Setpoint Status:	Pass			
Signal to Noise:	1541			
Agilent Recommended:	>= 320			
Overall Signal to Noise EI Test Status	Pass			

Tested Combination1	Front	SSL	/ External	SQ
Injection Precision				
Name:	7693A			
Source:	EI - Inert			

Setpoint Status:	Pass			
Injection Volume on Column:	1.0 uL			
Area RSD:	0.61 %	Retention Time RSD:	0.01 %	
Agilent Recommended:	<= 5.00		<= 1.00	
Overall Injection Precision Test Status	Pass			

Tested Combination1	Front	SSL	/ External	SQ
Mass Ratio Precision				
7693A				
Source:	EI - Inert			
Setpoint Status:	Pass			
Injection Volume on Column:	1.0 uL			
RSD:	0.61 %	Mass Ratio	0.33 %	
Agilent Recommended:	<= 5.00		<= 5.00	
Overall Mass Ratio Precision Test Status	Pass			

Instrument Details

Purpose
This section describes the as found system configuration.

Details

System

System ID	GM-3
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination1

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

Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN12520102
Firmware Revision	A.10.07
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN12521119
Firmware Revision	A.01.14
Oven Type	Standard

Inlet 1

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

Detector 1

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5975C inert XL with TAD
Model Number	G3172A
Serial Number	US13013A11
Firmware Revision	7.02.29
High Vacuum System	Turbo Pump
Scouting Run Standard	MRP Std

MS EI Source 1

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

Electronic Signature

Purpose

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Full Name of Signer:

Adirek Rattanawijit

Logged On User Name:

adirek.rattanawijit@non.agilent.com

Signature Creation Date:

October 25, 2024

Reason for Signature:

Executed protocol and published this original version of document

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:33:46 AM	Audit	SessionCreated	Session	None
October 25, 2024 10:33:46 AM	Start	Configuration	Session	None
October 25, 2024 10:33:46 AM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
October 25, 2024 10:41:54 AM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.52/Gc.02.52.eqp], EQP File Name: [Gc.02.52.eqp], EQP Name: [AgilentRecommended].Protocol Revision :[Gc.02.52] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.53/GcMs.02.53.eqp], EQP File Name: [GcMs.02.53.eqp], EQP Name: [AgilentRecommended]
October 25, 2024 10:42:30 AM	End	Configuration	Session	None
October 25, 2024 10:42:32 AM	Start	Qualification	Session	OQ
October 25, 2024 10:42:32 AM	Start	Execution	CDS Logon Verification - GC : - Qualitative test	None
October 25, 2024 10:45:20 AM	End	Execution	CDS Logon Verification - GC : - Qualitative test	Run Count : 1

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:45:22 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
October 25, 2024 10:45:32 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
October 25, 2024 10:45:34 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 25, 2024 10:45:38 AM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 25, 2024 10:45:40 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 25, 2024 10:46:50 AM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
October 25, 2024 10:46:52 AM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
October 25, 2024 10:46:54 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 25, 2024 10:47:21 AM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry

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Date: October 25, 2024 12:05:35 PM
System ID: GM-3

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:47:22 AM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
October 25, 2024 10:47:23 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
October 25, 2024 10:48:14 AM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
October 25, 2024 10:48:15 AM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
October 25, 2024 10:48:20 AM	Start	Execution	Log Amp - 5975C Inert XL with TAD SQ: - Source: EI - Inert	None
October 25, 2024 10:52:15 AM	End	Execution	Log Amp - 5975C Inert XL with TAD SQ: - Source: EI - Inert	Run Count : 1
October 25, 2024 10:52:18 AM	Start	Execution	RFPA - 5975C Inert XL with TAD SQ: - Source: EI - Inert	None
October 25, 2024 10:55:41 AM	Start	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 1 (Qualitative - No setpoints associated)	None
October 25, 2024 10:56:55 AM	End	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 1 (Qualitative - No setpoints associated)	Run Count : 1
October 25, 2024 10:56:58 AM	Start	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 2 (Qualitative - No setpoints associated)	None

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Date: October 25, 2024 12:05:35 PM
System ID: GM-3

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:57:25 AM	End	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 2 (Qualitative - No setpoints associated)	Run Count : 1
October 25, 2024 10:57:32 AM	Start	Execution	Scouting Run - Injection Tower, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	None
October 25, 2024 10:59:48 AM	Audit	Data	Scouting Run - Injection Tower, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\Scout_001.D
October 25, 2024 11:00:27 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 50000; Integration: Off at 0; Integration: On at 5.2;]
October 25, 2024 11:00:31 AM	End	Execution	Scouting Run - Injection Tower, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	Run Count : 1
October 25, 2024 11:00:39 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None
October 25, 2024 11:01:11 AM	Start	Execution	RFPA - 5975C Inert XL with TAD SQ: - Source: EI - Inert	None
October 25, 2024 11:01:37 AM	End	Execution	RFPA - 5975C Inert XL with TAD SQ: - Source: EI - Inert	Run Count : 1

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:01:51 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None
October 25, 2024 11:02:02 AM	Audit	Data	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\SN_F1_001.D
October 25, 2024 11:04:30 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 1000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:04:41 AM	Audit	Reporting	Reintegration	Reintegration Count: 2 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 2000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:04:50 AM	Audit	Reporting	Reintegration	Reintegration Count: 3 – [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 2200; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:05:02 AM	Audit	Reporting	Reintegration	Reintegration Count: 4 – [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 3000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:05:09 AM	Audit	Reporting	Reintegration	Reintegration Count: 5 – [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 4000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:16:07 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:28:50 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None
October 25, 2024 11:29:20 AM	End	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	Run Count : 1
October 25, 2024 11:29:23 AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	None
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_002.D
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_003.D
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_004.D
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_005.D
October 25, 2024 11:29:37 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_006.D

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:29:37 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_007.D
October 25, 2024 11:29:47 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 50000; Integration: Off at 0; Integration: On at 5.2;]
October 25, 2024 11:29:48 AM	End	Execution	Injection Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Run Count : 1
October 25, 2024 11:29:51 AM	Start	Execution	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	None
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_002.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_003.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_004.D

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Date: October 25, 2024 12:05:35 PM
System ID: GM-3

User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_005.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_006.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_007.D
October 25, 2024 11:30:15 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 50000; Integration: Off at 0; Integration: On at 5.2;]
October 25, 2024 11:30:17 AM	End	Execution	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Run Count : 1
October 25, 2024 11:30:23 AM	End	Qualification	Session	OQ
October 25, 2024 11:30:23 AM	Start	Reporting	Session	None
October 25, 2024 11:34:59 AM	End	Reporting	Session	None
October 25, 2024 11:34:59 AM	Start	Qualification	Session	OQ

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Date: October 25, 2024 12:05:35 PM
System ID: GM-3

User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:44:32 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	None
October 25, 2024 11:44:39 AM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over
October 25, 2024 11:44:42 AM	Audit	Data	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\SN_F2_001.D
October 25, 2024 11:44:53 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 1000; Integration: Off at 0; Integration: On at 4;]
October 25, 2024 11:45:20 AM	Audit	Reporting	Reintegration	Reintegration Count: 2 -- [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 1000; Integration: Off at 0; Integration: On at 5; Integration: Off at 7;]
October 25, 2024 11:45:34 AM	End	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	Run Count : 1

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:45:59 AM	End	Qualification	Session	OQ
October 25, 2024 11:45:59 AM	Start	Reporting	Session	None
October 25, 2024 12:03:37 PM	Audit	Reporting	Session	Report Generated : Certificate
October 25, 2024 12:04:58 PM	Audit	Reporting	Session	Report Generated : Report

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right solutions.
right partner.

รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Workplace	Acrylonitrile	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
		DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	12
		Air Sampling Pump	RYG_FS0130	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0136	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0140	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0146	6-Apr-25	6-Jul-25	3
		Air Sampling Pump	RYG_FS0156	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0159	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0169	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0127	7-Apr-25	7-Jul-25	3
		GC-FID	BKK_EN0126	22-Oct-24	22-Apr-26	18
Workplace	Styrene	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
		DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	12
		Air Sampling Pump	RYG_FS0135	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0139	6-Apr-25	6-Jul-25	3
		Air Sampling Pump	RYG_FS0141	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0147	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0158	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0165	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0128	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0126	6-Apr-25	6-Jul-25	3
		GC-MSD	BKK_EN0049	25-Oct-24	25-Apr-26	18

INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
7/139 MOO 13, SOI SUNTINAKORN 11 TAMBON BANG KAE0,
AMPHOE BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL: (66)0-2116-5860-1 FAX: (66)0-2116-7140



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Certificate of Calibration

Customer

Name : ALS Laboratory Group Thailand Co., Ltd.
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang,
Bangkok 10250

Certificate No : 25-AFM-023

Request No : Req-2025-0169

Unit Under Calibration Details

Measurement Item : Air Flow Meter
Manufacturer : Mesa Labs
Model : 200-510L
Serial Number : 130027
ID : RYG_FS0208

Accuracy : 1% of Reading

Sensor Model : -

Sensor Serial Number : -

Instrument Status : Used

Location of Calibration : LAB 4 AIR VELOCITY METER

Calibration Environment and Details

Temperature : 23 °C ± 3 °C
Humidity : 55 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 21 January 2025
Calibration Date : 27 January 2025

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceble	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	2 August 2025
Temperature meter	GT 11	08000057	Qreborn	1 March 2025
Pressure meter	CPG2400	41000KDU/651882	TPA	21 October 2025

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

Note :

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

Calibration By :
Mr. Noppadon Luangart
Service Calibration Engineer

Approved By :
Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 27 January 2025

Certificate No : 25-AFM-023
Request No : Req-2025-0169

Result of Calibration : Without Adjustment

Temperature (^o C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
22.50	100.90	20	19.854	-0.1	1.3	0.2	Pass1
22.50	100.90	50	49.732	-0.3	3.3	0.5	Pass1
22.60	100.90	101	100.77	-0.2	2.8	1.0	Pass1
22.70	100.90	151	150.23	-0.8	4.2	1.5	Pass1
22.70	100.90	201	200.39	-0.6	5.6	2.0	Pass1
22.70	100.90	301	300.69	-0.3	8.4	3.0	Pass1
22.80	100.90	400	402.96	3.0	11	4.0	Pass1
23.10	100.90	500	504.62	4.6	7.2	5.0	Pass1

Note STD : Standard UUC : Unit Under Calibration
- UUC Reference Condition : At atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{\text{meas}} = Q_{\text{ref}} \times \frac{P_{\text{ref}}}{P_{\text{meas}}} \times \frac{T_{\text{meas}}}{T_{\text{ref}}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature
 Meas = Measurement Condition ref = Standard Condition

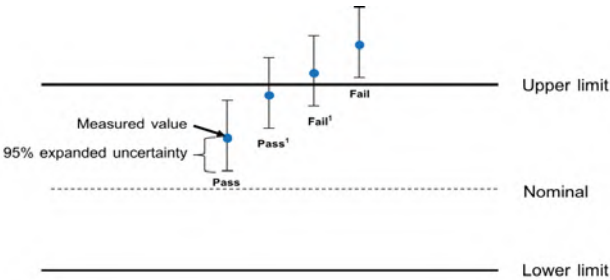
* Indicates non accredited
MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)
N/A = Not Aavailable, Customer does not require a statement of conformity.

Certificate No : 25-AFM-023
Request No : Req-2025-0169

Decision Rule for Statements of Conformity

The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.
Pass¹ = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.
Fail¹ = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.
Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Certificate



Certificate of Calibration

Customer

Name : ALS Laboratory Group Thailand Co., Ltd.
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang,
Bangkok 10250

Certificate No : 24-AFM-179
Request No : Req-2024-1987

Unit Under Calibration Details

Measurement Item : Air Flow Meter
Manufacturer : MesaLabs
Model : Defender 510-M
Serial Number : I51114
ID : BKK_FS0614
Location of Calibration : LAB 4 AIR VELOCITY METER
Accuracy : 1% of Reading
Sensor Model : -
Sensor Serial Number : -
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 3 °C
Humidity : 55 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 30 August 2024
Calibration Date : 9 September 2024

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator



Reference Standard	Model	Serial Number	Traceble	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	2 August 2025
Temperature meter	GT 11	08000057	Qreborn	1 March 2025
Pressure meter	CPG2400	41000KDU/651882	TPA	9 November 2024

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

Note :

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

Calibration By : Mr. Noppadon Luangart
Service Calibration Engineer

Approved By : Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 9 September 2024



Certificate No : 24-AFM-179
Request No : Req-2024-1987

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
24.70	100.95	100	100.41	0.4	2.8	1.0	N/A
24.90	100.90	502	500.47	-1.5	7.1	5.0	N/A
24.90	100.97	1003	1001.3	-2	14	10.0	N/A
25.00	100.92	2014	2009.9	-4	29	20.1	N/A
25.20	101.03	3043	3058.3	15	44	30.4	N/A
25.30	101.10	4043	4005.1	-38	57	40.4	N/A
25.50	101.15	5052	5003.9	-48	74	50.5	N/A

Note
STD : Standard UUC : Unit Under Calibration
- UUC Reference Condition : At atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{ref}} \times \frac{T_{meas}}{T_{ref}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature
Meas = Measurement Condition ref = Standard Condition

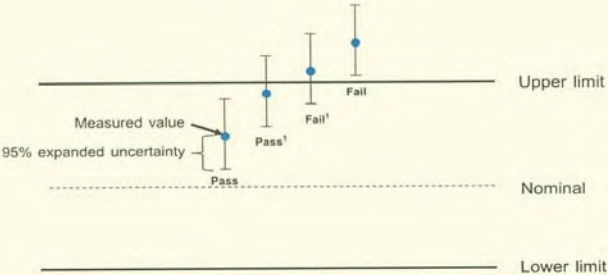
* Indicates non accredited
MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)
N/A = Not Aavailable, Customer does not require a statement of conformity.

Certificate No : 24-AFM-179
Request No : Req-2024-1987

Decision Rule for Statements of Conformity

The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

- Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.
- Pass¹ = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.
- Fail¹ = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.
- Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Certificate

Certificate of Calibration

Certificate No. C-070425-RYG_FS0130

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gillian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0130
Serial No. : 20150410006
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.9	20.6	20.8	20.8	5%	19 - 21	Passed
50	51.2	51.6	50.4	51.1	5%	48 - 53	Passed
100	99.8	101.2	100.4	100.5	5%	95 - 105	Passed
200	199.4	199.6	199.8	199.6	5%	190 - 210	Passed
High Flow							
500	506.0	507.1	501.3	504.8	3%	485 - 515	Passed
1000	1014.7	1005.2	1007.2	1009.0	3%	970 - 1030	Passed
2000	2000.5	1995.5	2002.0	1999.3	3%	1940 - 2060	Passed
2500	2510.4	2509.7	2511.4	2510.5	3%	2425 - 2575	Passed
4000	4002.6	4004.7	4003.9	4003.7	3%	3880 - 4120	Passed

END OF REPORT

Calibrated By: 
(Mr.Natchapon Thamklang)
RYG Field Services Scientist (1)

Approved By: 
(Mr.Supot Salamteh)
RYG Field Services Section Head

Issue date : 07-Apr-25



Certificate of Calibration

Certificate No. C-070425-RYG_FS0136

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0136
Serial No. : 20150410012
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.8	20.6	20.3	20.2	5%	19 - 21	Passed
50	49.7	49.9	49.9	49.8	5%	48 - 53	Passed
100	101.4	100.3	100.7	100.8	5%	95 - 105	Passed
200	200.9	201.0	200.4	200.8	5%	190 - 210	Passed
High Flow							
500	501.7	502.4	501.4	501.8	3%	485 - 515	Passed
1000	993.0	1004.8	995.6	997.8	3%	970 - 1030	Passed
2000	1999.4	1999.1	1985.7	1994.7	3%	1940 - 2060	Passed
2500	2514.0	2512.8	2512.3	2513.0	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By: 

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By: 

(Mr.Supot Salamteah)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0140

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0140
Serial No. : 20150810059
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.2	20.4	20.4	20.3	5%	19 - 21	Passed
50	50.1	51.2	50.9	50.7	5%	48 - 53	Passed
100	99.3	99.6	99.4	99.4	5%	95 - 105	Passed
200	199.8	200.6	200.3	200.2	5%	190 - 210	Passed
High Flow							
500	510.0	511.7	515.7	512.5	3%	485 - 515	Passed
1000	1009.2	1005.8	1012.5	1009.2	3%	970 - 1030	Passed
2000	2015.9	2017.3	1994.6	2009.3	3%	1940 - 2060	Passed
2500	2496.2	2494.2	2504.6	2498.3	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By: 

(Mr.Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By: 

(Mr.Supot Salamteah)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-060425-RYG FS0146

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG FS0146
Serial No. : 20150310176
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.6	20.3	20.4	20.4	5%	19 - 21	Passed
50	51.8	51.3	52.0	51.7	5%	48 - 53	Passed
100	101.8	101.6	101.7	101.7	5%	95 - 105	Passed
200	200.7	200.6	201.0	200.8	5%	190 - 210	Passed
High Flow							
500	511.3	513.5	507.9	510.9	3%	485 - 515	Passed
1000	996.8	1009.1	1000.5	1002.1	3%	970 - 1030	Passed
2000	1996.6	1995.5	2002.4	1998.2	3%	1940 - 2060	Passed
2500	2493.2	2495.7	2492.6	2493.8	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 06-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG FS0156

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG FS0156
Serial No. : 20150910028
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.8	19.6	19.8	19.7	5%	19 - 21	Passed
50	50.2	49.6	50.9	50.2	5%	48 - 53	Passed
100	100.9	100.7	100.1	100.6	5%	95 - 105	Passed
200	198.5	198.3	198.5	198.4	5%	190 - 210	Passed
High Flow							
500	509.8	507.2	510.3	509.1	3%	485 - 515	Passed
1000	1018.3	1012.0	1013.1	1014.5	3%	970 - 1030	Passed
2000	2013.9	2019.3	2010.4	2014.5	3%	1940 - 2060	Passed
2500	2518.5	2541.9	2516.6	2525.7	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0159

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0159
Serial No. : 20150910031
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.4	19.5	19.4	19.4	5%	19 - 21	Passed
50	48.7	51.1	50.4	50.1	5%	48 - 53	Passed
100	104.1	104.1	104.0	104.1	5%	95 - 105	Passed
200	200.4	200.8	201.4	200.9	5%	190 - 210	Passed
High Flow							
500	498.3	498.6	498.5	498.5	3%	485 - 515	Passed
1000	1003.7	1002.1	1003.1	1003.0	3%	970 - 1030	Passed
2000	2009.7	2009.0	2009.2	2009.3	3%	1940 - 2060	Passed
2500	2501.6	2502.6	2495.5	2499.9	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0169

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0169
Serial No. : 20150910041
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.9	20.4	20.3	20.2	5%	19 - 21	Passed
50	49.9	50.8	50.2	50.3	5%	48 - 53	Passed
100	102.6	101.9	102.8	102.4	5%	95 - 105	Passed
200	200.2	201.1	201.6	201.0	5%	190 - 210	Passed
High Flow							
500	496.0	497.1	509.1	500.7	3%	485 - 515	Passed
1000	998.8	1001.1	1005.8	1001.9	3%	970 - 1030	Passed
2000	2025.3	2024.1	2025.1	2024.8	3%	1940 - 2060	Passed
2500	2529.4	2544.2	2533.5	2535.7	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteh)

RYG Field Services Section Head

ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd.,
Phatthanakan, Suan Luang, Bangkok 10250
T +66 2 760 3000 F +66 2 760 3197



Certificate of Calibration

Certificate No. C-070425-RYG_FS0127

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0127
Serial No. : 20150410003
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.3	20.4	20.3	20.3	5%	19 - 21	Passed
50	49.6	49.9	50.0	49.8	5%	48 - 53	Passed
100	98.7	98.1	98.3	98.4	5%	95 - 105	Passed
200	201.8	201.5	200.9	201.4	5%	190 - 210	Passed
High Flow							
500	503.5	501.2	499.2	501.3	3%	485 - 515	Passed
1000	999.5	999.8	999.2	999.5	3%	970 - 1030	Passed
2000	2003.3	2004.0	2003.2	2003.5	3%	1940 - 2060	Passed
2500	2512.2	2517.3	2511.9	2513.8	3%	2425 - 2575	Passed
4000	3994.5	4003.3	3994.3	3997.4	3%	3880 - 4120	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)
RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteh)
RYG Field Services Section Head

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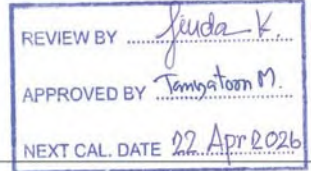
Agilent CrossLab Compliance Services

Certificate of System Qualification

GC-OQ

System ID: GC-6_CN11461066
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Soi 40 Phatthanakan Rd,Khwang Suan Luang, Khet Suan Luang, Bangkok 10250

Date: October 22, 2024 9:27:05 AM
EQP Name: AgilentRecommended
EQP Revision: GC.02.53
Overall Qualification Status: Pass



CDS Logon Verification - GC

Logon: Saenguthai Tarak

Overall CDS Logon Verification - GC Test Status

Pass

System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Decay

Name: 7890

Front SSL

Setpoint Status:

Pass

Pressure:

25.0

psi

Pressure Change:

0.0

psi

/5 minutes

Agilent Recommended:

>=

-2.0

and

<=

0.5

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890
Front SSL

Setpoint Status: Pass

Inlet Pressure: Setpoint 25.0 psi Actual 25.07 psi
Accuracy: 0.1 psi
Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Inlet Pressure Decay

Name: 7890
Back SSLSetpoint Status: Pass
Pressure: 25.0 psi
Pressure Change: 0.0 psi /5 minutes
Agilent Recommended: ≥ -2.0 and ≤ 0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890
Back SSLDate: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Setpoint Status: Pass

Inlet Pressure: Setpoint 25.0 psi Actual 25.06 psi
Accuracy: 0.1 psi
Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890
Front FID

Setpoint Status: Pass

Flow Type: Fuel
Setpoint: 30.0 mL/min Measured Flow: 28.8 mL/min
Accuracy: 1.2 mL/min
Agilent Recommended: ≤ 10.0 % setpoint (3.0 mL/min)
Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status: Pass

Flow Type: Oxidizer
Setpoint: 400.0 mL/min Measured Flow: 392 mL/min
Accuracy: 8.0 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: 25.4 mL/min
Accuracy: 0.4 mL/min
Agilent Recommended: ≤ 10.0 % setpoint (2.5 mL/min)
Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Overall Detector Flow Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890
Back FID

Setpoint Status: Pass

Flow Type: Fuel
Setpoint: 30.0 mL/min Measured Flow: 30.8 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: 393 mL/min

Accuracy: 7.0 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: 25.2 mL/min

Accuracy: 0.2 mL/min
Agilent Recommended: ≤ 10.0 % setpoint (2.5 mL/min)

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

Overall Detector Flow Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual
Temperature: 230.0 230.3 °C

Accuracy: 0.3 °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: 100.0 100.0 °C

Accuracy: 0.0 °C
Agilent Recommended: ≥ -1.0 % setpoint in K (-3.7 °C)
≤ 1.0 % setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average
Temperature: 100.0 100.0167 °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: 7693A

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Setpoint Status: Completed

Injection Volume on Column: 1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination1 Front SSL / Front FID

Name: 7890

Setpoint Status: Pass

Base Signal: 14.05 pA

ASTM Noise pA	Drift pA/Hr
0.05	0.03
<= 0.10	<= 2.50
Pass	Pass

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1 Front SSL / Front FID

Name: 7693A

Setpoint Status: Pass

Injection Volume on Column: 1.0 uL

Area RSD: 0.30 % Retention Time RSD: 0.63 %

Agilent Recommended: <= 3.00 <= 1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461086

Tested Combination1 Front SSL / Front FID

Injection Tower

Name: 7890

Setpoint Status: Pass

Signal to Noise: 11078525

Agilent Recommended: >= 300000

Overall Signal to Noise Test Status

Pass

Scouting Run

Tested Combination2 Back SSL / Back FID

Injection Tower

Name: 7693A

Setpoint Status: Completed

Injection Volume on Column: 1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination2 Back SSL / Back FID

Name: 7890

Setpoint Status: Pass

Base Signal: 13.79 pA

ASTM Noise pA	Drift pA/Hr
0.05	0.01
<= 0.10	<= 2.50
Pass	Pass

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461086

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination2	Back	SSL	/ Back	FID
Name:	7693A			
Setpoint Status:	Pass			
Injection Volume on Column:	1.0	uL		
Area RSD:	1.06	%	Retention Time RSD:	0.93 %
Agilent Recommended:	<=	3.00	<=	1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination2	Back	SSL	/ Back	FID
	Injection Tower			
Name:	7890			
Setpoint Status:	Pass			
Signal to Noise:	1771221			
Agilent Recommended:	>=	300000		

Overall Signal to Noise Test Status

Pass

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	GC-6_CN11461066
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination1

Injection Technique	Injection Tower
Sampler Identifier	Sampler 1
Inlet	Front
Detector	Front
LTM Included?	No

Tested Combination2

Injection Technique	Injection Tower
Sampler Identifier	Sampler 2
Inlet	Back
Detector	Back
LTM Included?	No

Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CNCN10340103
Firmware Revision	A.11.06
Usage	Sample Injection
Location	Front
Syringe Volume (uL)	10

Sampler 2

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN16280128
Firmware Revision	A.11.06
Usage	Sample Injection
Location	Back
Syringe Volume (µL)	10

Sampler 3

Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN15380030
Firmware Revision	A.11.03
Vial Heater	Not installed

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN11461066
Firmware Revision	A.01.16
Oven Type	Standard

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Inlet 1

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

Inlet 2

Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Back
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1

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

Detector 2

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

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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:Saenguthai Tarak

Logged On User Name:saenguthai.tarak@non.agilent.com

Signature Creation Date:October 22, 2024

Reason for Signature:Executed protocol and published this original version of document

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User Name: saenguthai.tarakSystem Id: GC-6_CN11461066

Report Generated by Hostname: LAPTOP-CQ3SKOMVPrint Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:16:06 PM	Audit	SessionCreated	Session	None
October 21, 2024 3:16:07 PM	Start	Configuration	Session	None
October 21, 2024 3:16:07 PM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
October 21, 2024 3:22:40 PM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks\Gc\Configuration\02.53\Gc.02.53.eqp], EQP File Name: [Gc.02.53.eqp], EQP Name: [AgilentRecommended], Protocol Revision :[Gc.02.53]
October 21, 2024 3:22:44 PM	End	Configuration	Session	None
October 21, 2024 3:22:47 PM	Start	Qualification	Session	OQ
October 21, 2024 3:22:48 PM	Start	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	None
October 21, 2024 3:23:35 PM	End	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	Run Count : 1
October 21, 2024 3:23:45 PM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
October 21, 2024 3:23:59 PM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1

User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:24:01 PM	Start	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
October 21, 2024 3:25:26 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
October 21, 2024 3:25:28 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 21, 2024 3:25:32 PM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 21, 2024 3:25:50 PM	Start	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
October 21, 2024 3:26:01 PM	End	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	Run Count : 1
October 21, 2024 3:26:05 PM	Start	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 21, 2024 3:26:10 PM	End	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 21, 2024 3:26:12 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None

Page 2 / 10

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:26:50 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:26:53 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:26:54 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:27:10 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:27:13 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:28:11 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:29:27 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:29:29 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:29:30 PM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:29:47 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:29:52 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

User Name: saenguthai.larak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:29:54 PM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:30:07 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:30:09 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:30:11 PM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:30:34 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:30:37 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:30:38 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 21, 2024 3:31:55 PM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
October 21, 2024 3:31:57 PM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

User Name: saenguthai.larak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:31:59 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 21, 2024 3:34:37 PM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
October 21, 2024 3:34:39 PM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
October 21, 2024 3:34:42 PM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
October 21, 2024 3:39:05 PM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
October 21, 2024 3:39:07 PM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
October 21, 2024 3:39:33 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
October 21, 2024 3:40:12 PM	Audit	AceClosed	Session	None
October 22, 2024 8:55:47 AM	Audit	AceRestarted	Session	None
October 22, 2024 8:55:50 AM	Audit	SessionReloaded	Session	None
October 22, 2024 8:56:02 AM	Start	Qualification	Session	OQ

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 8:56:02 AM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
October 22, 2024 8:56:46 AM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Data files Path : G:\Data\Front\Front_SC10.D\FID1A.ch
October 22, 2024 8:57:25 AM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Run Count : 1
October 22, 2024 8:57:39 AM	Start	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
October 22, 2024 8:58:03 AM	Audit	Data	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : G:\Data\Front\Front_ND10.D\FID1A.ch
October 22, 2024 8:58:37 AM	End	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
October 22, 2024 8:58:40 AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
October 22, 2024 8:59:06 AM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0105.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0106.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0107.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0108.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0109.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0110.D\FID1A.ch
October 22, 2024 9:02:11 AM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
October 22, 2024 9:02:16 AM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	None
October 22, 2024 9:02:34 AM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Data files Path : G:\Data\Front\Front_SN01.D\FID1A.ch

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:02:54 AM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Run Count : 1
October 22, 2024 9:03:00 AM	Start	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	None
October 22, 2024 9:03:31 AM	Audit	Data	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	Data files Path : G:\Data\Back\Back_SC01.D\FID2B.ch
October 22, 2024 9:04:03 AM	End	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	Run Count : 1
October 22, 2024 9:04:06 AM	Start	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
October 22, 2024 9:08:56 AM	Audit	Data	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : G:\Data\Back\Back_ND013.D\FID2B.ch
October 22, 2024 9:09:13 AM	End	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
October 22, 2024 9:09:26 AM	Start	Execution	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0111.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0112.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0113.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0114.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0115.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0116.D\FID2B.ch
October 22, 2024 9:11:15 AM	End	Execution	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
October 22, 2024 9:11:23 AM	Start	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 300000	None
October 22, 2024 9:11:45 AM	Audit	Data	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 300000	Data files Path : G:\Data\Back\Back_SN01.D\FID2B.ch

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:12:08 AM	End	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID - Detector FID - L: >= 300000	Run Count : 1
October 22, 2024 9:12:15 AM	End	Qualification	Session	OQ
October 22, 2024 9:12:15 AM	Start	Reporting	Session	None
October 22, 2024 9:24:09 AM	Audit	Reporting	Session	Report Generated : Certificate
October 22, 2024 9:25:56 AM	Audit	Reporting	Session	Report Generated : Report

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd.,
Phatthanakan, Suan Luang, Bangkok 10250
T +66 2 760 3000 F +66 2 760 3197



Certificate of Calibration

Certificate No. C-070425-RYG_FS0135

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gillian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0135
Serial No. : 20150410011
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.9	19.8	19.8	19.8	5%	19 - 21	Passed
50	51.6	51.2	51.8	51.5	5%	48 - 53	Passed
100	99.3	99.7	98.9	99.3	5%	95 - 105	Passed
200	202.9	199.9	201.5	201.4	5%	190 - 210	Passed
High Flow							
500	494.4	491.7	493.8	493.3	3%	485 - 515	Passed
1000	1018.2	1014.7	1011.8	1014.9	3%	970 - 1030	Passed
2000	2011.6	2014.0	2020.1	2015.2	3%	1940 - 2060	Passed
2500	2518.1	2493.2	2516.1	2509.1	3%	2425 - 2575	Passed

----- END OF REPORT -----

Calibrated By:

(Mr. Watcharin Pongsamsuan)
RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr. Supot Salamteah)
RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-060425-RYG_FS0139

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0139
Serial No. : 20150510087
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.7	20.5	20.6	20.6	5%	19 - 21	Passed
50	49.5	50.6	49.7	49.9	5%	48 - 53	Passed
100	100.9	100.7	101.0	100.9	5%	95 - 105	Passed
200	200.3	201.1	199.9	200.4	5%	190 - 210	Passed
High Flow							
500	500.5	495.9	505.4	500.6	3%	485 - 515	Passed
1000	1007.4	1002.5	998.8	1002.9	3%	970 - 1030	Passed
2000	2004.3	1992.2	2002.1	1999.5	3%	1940 - 2060	Passed
2500	2502.2	2492.7	2502.6	2499.2	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 06-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0141

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0141
Serial No. : 20150810060
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.3	19.5	19.2	19.3	5%	19 - 21	Passed
50	49.8	51.9	50.4	50.7	5%	48 - 53	Passed
100	99.9	100.4	100.2	100.2	5%	95 - 105	Passed
200	198.8	202.2	201.4	200.8	5%	190 - 210	Passed
High Flow							
500	493.8	495.7	495.4	495.0	3%	485 - 515	Passed
1000	1008.4	1013.5	999.9	1007.3	3%	970 - 1030	Passed
2000	2006.0	2019.3	2012.6	2012.6	3%	1940 - 2060	Passed
2500	2494.4	2492.7	2493.7	2493.6	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0147

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0147
Serial No. : 20150910029
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

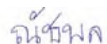
Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.9	20.1	20.2	20.4	5%	19 - 21	Passed
50	49.9	50.2	51.2	50.4	5%	48 - 53	Passed
100	100.9	100.7	100.9	100.8	5%	95 - 105	Passed
200	204.1	204.6	204.7	204.5	5%	190 - 210	Passed
High Flow							
500	504.1	505.6	510.1	506.6	3%	485 - 515	Passed
1000	1012.1	1008.2	1012.4	1010.9	3%	970 - 1030	Passed
2000	1990.2	1995.2	1994.8	1993.4	3%	1940 - 2060	Passed
2500	2498.4	2500.2	2494.4	2497.7	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By: 

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By: 

(Mr.Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0158

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG_FS0158
Serial No. : 20150910030
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.5	20.4	20.6	20.5	5%	19 - 21	Passed
50	50.2	50.4	50.3	50.3	5%	48 - 53	Passed
100	99.6	99.7	99.5	99.6	5%	95 - 105	Passed
200	202.6	202.8	202.9	202.8	5%	190 - 210	Passed
High Flow							
500	505.9	506.8	505.6	506.1	3%	485 - 515	Passed
1000	1016.6	1013.6	1012.8	1014.3	3%	970 - 1030	Passed
2000	2004.1	2005.5	2004.3	2004.6	3%	1940 - 2060	Passed
2500	2492.0	2494.7	2490.4	2492.4	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By: 

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By: 

(Mr.Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0165

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus
Equipment ID : RYG_FS0165
Serial No. : 20150910037
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.0	20.2	20.3	20.2	5%	19 - 21	Passed
50	49.5	50.6	50.1	50.1	5%	48 - 53	Passed
100	102.9	103.0	101.4	102.4	5%	95 - 105	Passed
200	201.6	203.1	202.1	202.3	5%	190 - 210	Passed
High Flow							
500	494.8	495.5	495.1	495.1	3%	485 - 515	Passed
1000	1004.4	1001.9	1005.2	1003.8	3%	970 - 1030	Passed
2000	2007.8	2002.0	2005.5	2005.1	3%	1940 - 2060	Passed
2500	2503.0	2501.3	2503.7	2502.7	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteah)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0128

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus
Equipment ID : RYG_FS0128
Serial No. : 20150410004
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.8	20.3	20.6	20.2	5%	19 - 21	Passed
50	49.3	49.3	49.4	49.3	5%	48 - 53	Passed
100	99.3	99.4	99.4	99.4	5%	95 - 105	Passed
200	199.4	197.4	198.5	198.4	5%	190 - 210	Passed
High Flow							
500	506.7	504.1	508.0	506.3	3%	485 - 515	Passed
1000	1015.2	1010.4	1012.4	1012.7	3%	970 - 1030	Passed
2000	1992.6	1998.1	1996.3	1995.7	3%	1940 - 2060	Passed
2500	2492.3	2494.4	2490.5	2492.4	3%	2425 - 2575	Passed
4000	3998.7	4001.2	3999.9	3999.9	3%	3880 - 4120	Passed

END OF REPORT

Calibrated By:

(Mr.Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr.Supot Salamteah)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-060425-RYG FS0126

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus
Equipment ID : RYG_FS0126
Serial No. : 20150410002
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.5	20.3	20.3	20.4	5%	19 - 21	Passed
50	51.6	50.9	51.1	51.2	5%	48 - 53	Passed
100	99.9	99.8	99.9	99.9	5%	95 - 105	Passed
200	202.8	203.0	202.7	202.8	5%	190 - 210	Passed
High Flow							
500	495.9	494.9	496.8	495.9	3%	485 - 515	Passed
1000	1006.3	1003.9	1004.6	1004.9	3%	970 - 1030	Passed
2000	2009.9	2010.0	2008.6	2009.5	3%	1940 - 2060	Passed
2500	2493.6	2499.8	2494.2	2495.9	3%	2425 - 2575	Passed
4000	4009.1	4003.5	4003.1	4005.2	3%	3880 - 4120	Passed

END OF REPORT

Calibrated By:

(Mr. Watcharin Pongsamsuan)
RYG Field Services Scientist (1)

Issue date : 06-Apr-25

Approved By:

(Mr. Supot Salamteh)
RYG Field Services Section Head

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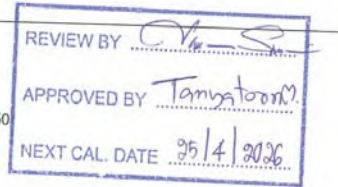
Agilent CrossLab Compliance Services

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: GM-3
Organization Name: ALS Laboratory Group
Organization Location: 104 Phattanakan40, Suan Luang Bangkok 10250

Date: October 25, 2024 12:05:35 PM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.52, GCMS.02.53
Overall Qualification Status: Pass



CDS Logon Verification - GC

Logon: asbkk.env03

Overall CDS Logon Verification - GC Test Status

Pass

System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Accuracy

Name: 7890

Front SSL

Setpoint Status: Pass

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

Date: October 25, 2024 12:05:35 PM
System ID: GM-3

Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 230.9 °C

Accuracy: 0.9 °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: 100.0 100.4 °C

Accuracy: 0.4 °C

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

<= 1.0 % setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average

Temperature: 100.0 100.3333 °C

Stability: 0.1 °C

Agilent Recommended: <= 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Date: October 25, 2024 12:05:35 PM

System ID: GM-3

Log Amp

Tested Combination1 Front SSL / External SQ

Name: 5975C inert XL with TAD

Setpoint Status: Pass

Overall Log Amp Test Status

Pass

RFPA

Tested Combination1 Front SSL / External SQ

Name: 5975C inert XL with TAD

Setpoint Status: Pass

Amu: 1050 m/z

Drift After Five Minutes:

11 mV

RFPA Voltage:

524 mV

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

Overall RFPA Test Status

Pass

Tune EI

Tested Combination1 Front SSL / External SQ

Name: 5975C inert XL with TAD

Setpoint Status: Pass

Filament: 1

Setpoint Status: Pass

Filament: 2

Overall Tune EI Test Status

Pass

Scouting Run

Date: October 25, 2024 12:05:35 PM

System ID: GM-3

Tested Combination1	Front	SSL	/ External	SQ
Injection Tower				
Name:	7693A			
Source:	EI - Inert			
Setpoint Status:	Completed			
Injection Volume on Column:	1.0 uL			
Overall Scouting Run Status	Completed			

Signal to Noise EI

Tested Combination1	Front	SSL	/ External	SQ
5975C Inert XL with TAD				
Source:	EI - Inert	Filament:	1	
Setpoint Status:	Pass			
Signal to Noise:	1572			
Agilent Recommended:	>= 320			
Source:	EI - Inert	Filament:	2	
Setpoint Status:	Pass			
Signal to Noise:	1541			
Agilent Recommended:	>= 320			
Overall Signal to Noise EI Test Status	Pass			

Injection Precision

Tested Combination1	Front	SSL	/ External	SQ
7693A				
Name:	7693A			
Source:	EI - Inert			

Date: October 25, 2024 12:05:35 PM
System ID: GM-3

Setpoint Status:	Pass			
Injection Volume on Column:	1.0 uL			
Area RSD:	0.61 %	Retention Time RSD:	0.01 %	
Agilent Recommended:	<= 5.00		<= 1.00	
Overall Injection Precision Test Status	Pass			

Mass Ratio Precision

Tested Combination1	Front	SSL	/ External	SQ
Injection Tower				
Name:	7693A			
Source:	EI - Inert			
Setpoint Status:	Pass			
Injection Volume on Column:	1.0 uL			
RSD:	0.61 %	Area Mass 1	Mass Ratio	
Agilent Recommended:	<= 5.00	Abundance*s	0.33 %	
	Pass		<= 5.00	
			Pass	
Overall Mass Ratio Precision Test Status	Pass			

Date: October 25, 2024 12:05:35 PM
System ID: GM-3

Instrument Details

Purpose
This section describes the as found system configuration.

Details

System

System ID	GM-3
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination1

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

Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN12520102
Firmware Revision	A.10.07
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN12521119
Firmware Revision	A.01.14
Oven Type	Standard

Inlet 1

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

Detector 1

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5975C inert XL with TAD
Model Number	G3172A
Serial Number	US13013A11
Firmware Revision	7.02.29
High Vacuum System	Turbo Pump
Scouting Run Standard	MRP 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:

October 25, 2024

Reason for Signature:

Executed protocol and published this original version of document

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:33:46 AM	Audit	SessionCreated	Session	None
October 25, 2024 10:33:46 AM	Start	Configuration	Session	None
October 25, 2024 10:33:46 AM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
October 25, 2024 10:41:54 AM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.52/Gc.02.52.eqp], EQP File Name: [Gc.02.52.eqp], EQP Name: [AgilentRecommended].Protocol Revision :[Gc.02.52] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.53/GcMs.02.53.eqp], EQP File Name: [GcMs.02.53.eqp], EQP Name: [AgilentRecommended]
October 25, 2024 10:42:30 AM	End	Configuration	Session	None
October 25, 2024 10:42:32 AM	Start	Qualification	Session	OQ
October 25, 2024 10:42:32 AM	Start	Execution	CDS Logon Verification - GC : - Qualitative test	None
October 25, 2024 10:45:20 AM	End	Execution	CDS Logon Verification - GC : - Qualitative test	Run Count : 1

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:45:22 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
October 25, 2024 10:45:32 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
October 25, 2024 10:45:34 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 25, 2024 10:45:38 AM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 25, 2024 10:45:40 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 25, 2024 10:46:50 AM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
October 25, 2024 10:46:52 AM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
October 25, 2024 10:46:54 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 25, 2024 10:47:21 AM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry

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Date: October 25, 2024 12:05:35 PM
System ID: GM-3

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:47:22 AM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
October 25, 2024 10:47:23 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
October 25, 2024 10:48:14 AM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
October 25, 2024 10:48:15 AM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
October 25, 2024 10:48:20 AM	Start	Execution	Log Amp - 5975C Inert XL with TAD SQ: - Source: EI - Inert	None
October 25, 2024 10:52:15 AM	End	Execution	Log Amp - 5975C Inert XL with TAD SQ: - Source: EI - Inert	Run Count : 1
October 25, 2024 10:52:18 AM	Start	Execution	RFPA - 5975C Inert XL with TAD SQ: - Source: EI - Inert	None
October 25, 2024 10:55:41 AM	Start	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 1 (Qualitative - No setpoints associated)	None
October 25, 2024 10:56:55 AM	End	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 1 (Qualitative - No setpoints associated)	Run Count : 1
October 25, 2024 10:56:58 AM	Start	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 2 (Qualitative - No setpoints associated)	None

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Date: October 25, 2024 12:05:35 PM
System ID: GM-3

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:57:25 AM	End	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 2 (Qualitative - No setpoints associated)	Run Count : 1
October 25, 2024 10:57:32 AM	Start	Execution	Scouting Run - Injection Tower, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	None
October 25, 2024 10:59:48 AM	Audit	Data	Scouting Run - Injection Tower, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\Scout_001.D
October 25, 2024 11:00:27 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 50000; Integration: Off at 0; Integration: On at 5.2;]
October 25, 2024 11:00:31 AM	End	Execution	Scouting Run - Injection Tower, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	Run Count : 1
October 25, 2024 11:00:39 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None
October 25, 2024 11:01:11 AM	Start	Execution	RFPA - 5975C Inert XL with TAD SQ: - Source: EI - Inert	None
October 25, 2024 11:01:37 AM	End	Execution	RFPA - 5975C Inert XL with TAD SQ: - Source: EI - Inert	Run Count : 1

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:01:51 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None
October 25, 2024 11:02:02 AM	Audit	Data	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\SN_F1_001.D
October 25, 2024 11:04:30 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 1000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:04:41 AM	Audit	Reporting	Reintegration	Reintegration Count: 2 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 2000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:04:50 AM	Audit	Reporting	Reintegration	Reintegration Count: 3 – [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 2200; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:05:02 AM	Audit	Reporting	Reintegration	Reintegration Count: 4 – [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 3000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:05:09 AM	Audit	Reporting	Reintegration	Reintegration Count: 5 – [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 4000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:16:07 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:28:50 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None
October 25, 2024 11:29:20 AM	End	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	Run Count : 1
October 25, 2024 11:29:23 AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	None
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_002.D
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_003.D
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_004.D
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_005.D
October 25, 2024 11:29:37 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_006.D

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:29:37 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_007.D
October 25, 2024 11:29:47 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 50000; Integration: Off at 0; Integration: On at 5.2;]
October 25, 2024 11:29:48 AM	End	Execution	Injection Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Run Count : 1
October 25, 2024 11:29:51 AM	Start	Execution	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	None
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_002.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_003.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_004.D

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Date: October 25, 2024 12:05:35 PM
System ID: GM-3

User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_005.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_006.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_007.D
October 25, 2024 11:30:15 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 50000; Integration: Off at 0; Integration: On at 5.2;]
October 25, 2024 11:30:17 AM	End	Execution	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Run Count : 1
October 25, 2024 11:30:23 AM	End	Qualification	Session	OQ
October 25, 2024 11:30:23 AM	Start	Reporting	Session	None
October 25, 2024 11:34:59 AM	End	Reporting	Session	None
October 25, 2024 11:34:59 AM	Start	Qualification	Session	OQ

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Date: October 25, 2024 12:05:35 PM
System ID: GM-3

User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:44:32 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	None
October 25, 2024 11:44:39 AM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over
October 25, 2024 11:44:42 AM	Audit	Data	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\SN_F2_001.D
October 25, 2024 11:44:53 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 1000; Integration: Off at 0; Integration: On at 4;]
October 25, 2024 11:45:20 AM	Audit	Reporting	Reintegration	Reintegration Count: 2 -- [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 1000; Integration: Off at 0; Integration: On at 5; Integration: Off at 7;]
October 25, 2024 11:45:34 AM	End	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	Run Count : 1

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:45:59 AM	End	Qualification	Session	OQ
October 25, 2024 11:45:59 AM	Start	Reporting	Session	None
October 25, 2024 12:03:37 PM	Audit	Reporting	Session	Report Generated : Certificate
October 25, 2024 12:04:58 PM	Audit	Reporting	Session	Report Generated : Report

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right solutions.
right partner.

รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Workplace	Acrylonitrile	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
		DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	12
		Air Sampling Pump	RYG_FS0140	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0146	6-Apr-25	6-Jul-25	3
		Air Sampling Pump	RYG_FS0156	7-Apr-25	7-Jul-25	3
		GC-FID	BKK_EN0126	22-Oct-24	22-Apr-26	18
Workplace	Styrene	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
		DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	12
		Air Sampling Pump	RYG_FS0141	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0147	7-Apr-25	7-Jul-25	3
		Air Sampling Pump	RYG_FS0158	7-Apr-25	7-Jul-25	3
		GC-MSD	BKK_EN0049	25-Oct-24	25-Apr-26	18

INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
7/139 MOO 13, SOI SUNTINAKORN 11 TAMBON BANG KAE0,
AMPHOE BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL: (66)0-2116-5860-1 FAX: (66)0-2116-7140



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Certificate of Calibration

Customer

Name : ALS Laboratory Group Thailand Co., Ltd.
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang,
Bangkok 10250

Certificate No : 25-AFM-023

Request No : Req-2025-0169

Unit Under Calibration Details

Measurement Item : Air Flow Meter
Manufacturer : Mesa Labs
Model : 200-510L
Serial Number : 130027
ID : RYG_FS0208

Accuracy : 1% of Reading

Sensor Model : -

Sensor Serial Number : -

Instrument Status : Used

Location of Calibration : LAB 4 AIR VELOCITY METER

Calibration Environment and Details

Temperature : 23 °C ± 3 °C
Humidity : 55 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 21 January 2025
Calibration Date : 27 January 2025

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceble	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	2 August 2025
Temperature meter	GT 11	08000057	Qreborn	1 March 2025
Pressure meter	CPG2400	41000KDU/651882	TPA	21 October 2025

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

Note :

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

Calibration By :
Mr. Noppadon Luangart
Service Calibration Engineer

Approved By :
Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 27 January 2025

Certificate No : 25-AFM-023
Request No : Req-2025-0169

Result of Calibration : Without Adjustment

Temperature (^o C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
22.50	100.90	20	19.854	-0.1	1.3	0.2	Pass1
22.50	100.90	50	49.732	-0.3	3.3	0.5	Pass1
22.60	100.90	101	100.77	-0.2	2.8	1.0	Pass1
22.70	100.90	151	150.23	-0.8	4.2	1.5	Pass1
22.70	100.90	201	200.39	-0.6	5.6	2.0	Pass1
22.70	100.90	301	300.69	-0.3	8.4	3.0	Pass1
22.80	100.90	400	402.96	3.0	11	4.0	Pass1
23.10	100.90	500	504.62	4.6	7.2	5.0	Pass1

Note STD : Standard UUC : Unit Under Calibration
- UUC Reference Condition : At atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{meas}} \times \frac{T_{meas}}{T_{ref}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature
 Meas = Measurement Condition ref = Standard Condition

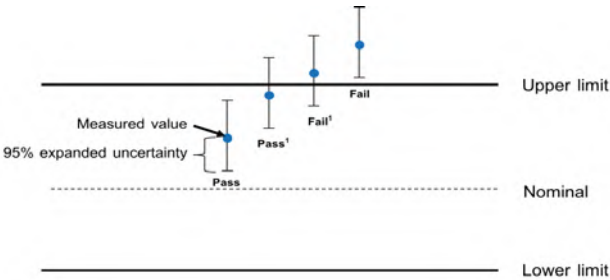
* Indicates non accredited
MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)
N/A = Not Aavailable, Customer does not require a statement of conformity.

Certificate No : 25-AFM-023
Request No : Req-2025-0169

Decision Rule for Statements of Conformity

The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

- Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.
- Pass¹ = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.
- Fail¹ = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.
- Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Certificate

Certificate of Calibration

Customer

Name : ALS Laboratory Group Thailand Co., Ltd.
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang,
Bangkok 10250

Certificate No : 24-AFM-179
Request No : Req-2024-1987

Unit Under Calibration Details

Measurement Item : Air Flow Meter
Manufacturer : MesaLabs
Model : Defender 510-M
Serial Number : I51114
ID : BKK_FS0614
Location of Calibration : LAB 4 AIR VELOCITY METER

Calibration Environment and Details

Temperature : 23 °C ± 3 °C
Humidity : 55 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 30 August 2024
Calibration Date : 9 September 2024
Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Accuracy : 1% of Reading
Sensor Model : -
Sensor Serial Number : -
Instrument Status : Used

REVIEW BY *Marakorn P.*
APPROVED BY *[Signature]*
NEXT CAL. DATE *9/9/25*

Reference Standard	Model	Serial Number	Traceble	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	2 August 2025
Temperature meter	GT 11	08000057	Qreborn	1 March 2025
Pressure meter	CPG2400	41000KDU/651882	TPA	9 November 2024

Traceability :
This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

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

Calibration By : *MPV*
Mr. Noppadon Luangart
Service Calibration Engineer

Approved By : *[Signature]*
Mr. Pacit Mathavorn
Calibration Engineer Supervisor
Issue Date : 9 September 2024

Certificate No : 24-AFM-179
Request No : Req-2024-1987

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
24.70	100.95	100	100.41	0.4	2.8	1.0	N/A
24.90	100.90	502	500.47	-1.5	7.1	5.0	N/A
24.90	100.97	1003	1001.3	-2	14	10.0	N/A
25.00	100.92	2014	2009.9	-4	29	20.1	N/A
25.20	101.03	3043	3058.3	15	44	30.4	N/A
25.30	101.10	4043	4005.1	-38	57	40.4	N/A
25.50	101.15	5052	5003.9	-48	74	50.5	N/A

Note STD : Standard UUC : Unit Under Calibration
- UUC Reference Condition : At atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{meas}} \times \frac{T_{meas}}{T_{ref}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature
Meas = Measurement Condition ref = Standard Condition

* Indicates non accredited
MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)
N/A = Not Aavailable, Customer does not require a statement of conformity.

Certificate No : 24-AFM-179

Request No : Req-2024-1987

Decision Rule for Statements of Conformity

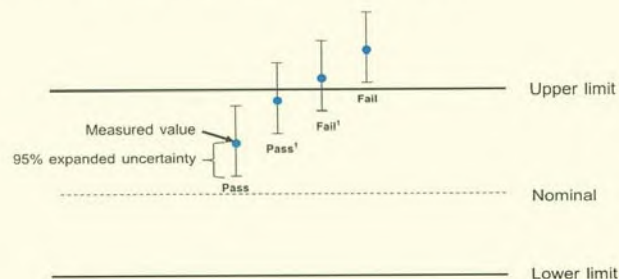
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass¹ = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail¹ = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Certificate

ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd.,
Phatthanakan, Suan Luang, Bangkok 10250
T +66 2 760 3000 F +66 2 760 3197



Certificate of Calibration

Certificate No. C-070425-RYG_FS0140

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gillian
Model/Type : GilAir Plus
Equipment ID : RYG_FS0140
Serial No. : 20150810059
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)			Evaluation (Pass/ Fail)
	1	2	3						
Low Flow									
20	20.2	20.4	20.4	20.3	5%	19	-	21	Passed
50	50.1	51.2	50.9	50.7	5%	48	-	53	Passed
100	99.3	99.6	99.4	99.4	5%	95	-	105	Passed
200	199.8	200.6	200.3	200.2	5%	190	-	210	Passed
High Flow									
500	510.0	511.7	515.7	512.5	3%	485	-	515	Passed
1000	1009.2	1005.8	1012.5	1009.2	3%	970	-	1030	Passed
2000	2015.9	2017.3	1994.6	2009.3	3%	1940	-	2060	Passed
2500	2496.2	2494.2	2504.6	2498.3	3%	2425	-	2575	Passed

END OF REPORT

Calibrated By: _____

(Mr. Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By: _____

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-060425-RYG FS0146

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG FS0146
Serial No. : 20150310176
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.6	20.3	20.4	20.4	5%	19 - 21	Passed
50	51.8	51.3	52.0	51.7	5%	48 - 53	Passed
100	101.8	101.6	101.7	101.7	5%	95 - 105	Passed
200	200.7	200.6	201.0	200.8	5%	190 - 210	Passed
High Flow							
500	511.3	513.5	507.9	510.9	3%	485 - 515	Passed
1000	996.8	1009.1	1000.5	1002.1	3%	970 - 1030	Passed
2000	1996.6	1995.5	2002.4	1998.2	3%	1940 - 2060	Passed
2500	2493.2	2495.7	2492.6	2493.8	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 06-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG FS0156

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : RYG FS0156
Serial No. : 20150910028
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : RYG FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.8	19.6	19.8	19.7	5%	19 - 21	Passed
50	50.2	49.6	50.9	50.2	5%	48 - 53	Passed
100	100.9	100.7	100.1	100.6	5%	95 - 105	Passed
200	198.5	198.3	198.5	198.4	5%	190 - 210	Passed
High Flow							
500	509.8	507.2	510.3	509.1	3%	485 - 515	Passed
1000	1018.3	1012.0	1013.1	1014.5	3%	970 - 1030	Passed
2000	2013.9	2019.3	2010.4	2014.5	3%	1940 - 2060	Passed
2500	2518.5	2541.9	2516.6	2525.7	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head

Certificate of System Qualification

GC-OQ

System ID: GC-6_CN11461066
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Soi 40 Phatthanakan Rd, Khwang Suan Luang, Khet Suan Luang, Bangkok 10250

Date: October 22, 2024 9:27:05 AM
EQP Name: AgilentRecommended
EQP Revision: GC.02.53
Overall Qualification Status: Pass

REVIEW BY *Juda K.*
APPROVED BY *Tamraton M.*
NEXT CAL. DATE *22 Apr 2026*

CDS Logon Verification - GC

Logon: Saenguthai Tarak

Overall CDS Logon Verification - GC Test Status

Pass

System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Decay

Name: 7890

Front SSL

Setpoint Status: Pass

Pressure: 25.0 psi

Pressure Change: 0.0 psi /5 minutes

Agilent Recommended: ≥ -2.0 and ≤ 0.5

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890

Front SSL

Setpoint Status: Pass

Inlet Pressure: Setpoint 25.0 psi Actual 25.07 psi

Accuracy: 0.1 psi

Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Inlet Pressure Decay

Name: 7890

Back SSL

Setpoint Status: Pass

Pressure: 25.0 psi

Pressure Change: 0.0 psi /5 minutes

Agilent Recommended: ≥ -2.0 and ≤ 0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890

Back SSL

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Setpoint Status: Pass

Setpoint Actual
Inlet Pressure: 25.0 psi 25.06 psi

Accuracy: 0.1 psi

Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890
Front FID

Setpoint Status: Pass

Flow Type: Fuel

Setpoint: 30.0 mL/min Measured Flow: 28.8 mL/min

Accuracy: 1.2 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (3.0 mL/min)

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

Setpoint Status: Pass

Flow Type: Oxidizer

Setpoint: 400.0 mL/min Measured Flow: 392 mL/min

Accuracy: 8.0 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: 25.4 mL/min

Accuracy: 0.4 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (2.5 mL/min)

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

Overall Detector Flow Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890
Back FID

Setpoint Status: Pass

Flow Type: Fuel

Setpoint: 30.0 mL/min Measured Flow: 30.8 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: 393 mL/min

Accuracy: 7.0 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: 25.2 mL/min

Accuracy: 0.2 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (2.5 mL/min)

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

Overall Detector Flow Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 230.3 °C

Accuracy: 0.3 °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: 100.0 100.0 °C

Accuracy: 0.0 °C

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

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average

Temperature: 100.0 100.0167 °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:	7693A			

Setpoint Status: Completed

Injection Volume on Column: 1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination1	Front	SSL	/ Front	FID
Name:	7890			
Setpoint Status:	Pass			
Base Signal:	14.05 pA			
	ASTM Noise		Drift	
	pA		pA/Hr	
	0.05		0.03	
Agilent Recommended:	<= 0.10		<= 2.50	
Status:	Pass		Pass	

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1	Front	SSL	/ Front	FID
Name:	7693A			
Setpoint Status:	Pass			
Injection Volume on Column:	1.0 uL			
Area RSD:	0.30 %		Retention Time RSD: 0.63 %	
Agilent Recommended:	<= 3.00		<= 1.00	

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination1

Front SSL / Front FID

Injection Tower

Name: 7890

Setpoint Status:

Pass

Signal to Noise:

11078525

Agilent Recommended:

>= 300000

Overall Signal to Noise Test Status

Pass

Scouting Run

Tested Combination2

Back SSL / Back FID

Injection Tower

Name: 7693A

Setpoint Status:

Completed

Injection Volume on Column:

1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination2

Back SSL / Back FID

Name: 7890

Setpoint Status:

Pass

Base Signal:

13.79 pA

ASTM Noise

pA

0.05

Drift

pA/Hr

0.01

Agilent Recommended:

<= 0.10

<= 2.50

Status:

Pass

Pass

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination2

Back SSL / Back FID

Name: 7693A

Setpoint Status:

Pass

Injection Volume on Column:

1.0 uL

Area RSD:

1.06 %

Retention Time RSD:

0.93 %

Agilent Recommended:

<= 3.00

<= 1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination2

Back SSL / Back FID

Injection Tower

Name: 7890

Setpoint Status:

Pass

Signal to Noise:

1771221

Agilent Recommended:

>= 300000

Overall Signal to Noise Test Status

Pass

Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

Instrument Details

Purpose
This section describes the as found system configuration.

Details

System	
System ID	GC-6_CN11461066
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging
Tested Combination1	
Injection Technique	Injection Tower
Sampler Identifier	Sampler 1
Inlet	Front
Detector	Front
LTM Included?	No
Tested Combination2	
Injection Technique	Injection Tower
Sampler Identifier	Sampler 2
Inlet	Back
Detector	Back
LTM Included?	No
Sampler 1	
Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CNCN10340103
Firmware Revision	A.11.06
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

Sampler 2	
Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN16280128
Firmware Revision	A.11.06
Usage	Sample Injection
Location	Back
Syringe Volume (µL)	10
Sampler 3	
Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN15380030
Firmware Revision	A.11.03
Vial Heater	Not installed
Mainframe 1	
Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN11461066
Firmware Revision	A.01.16
Oven Type	Standard

Inlet 1	
Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Inlet 2	
Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Back
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1	
Manufacturer	Agilent Technologies
Name	7890
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen

Detector 2	
Manufacturer	Agilent Technologies
Name	7890
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Back
Makeup Gas	Nitrogen

Electronic Signature

Purpose

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Details	
Full Name of Signer:	Saenguthai Tarak
Logged On User Name:	saenguthai.tarak@non.agilent.com
Signature Creation Date:	October 22, 2024
Reason for Signature:	Executed protocol and published this original version of document

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User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:16:06 PM	Audit	SessionCreated	Session	None
October 21, 2024 3:16:07 PM	Start	Configuration	Session	None
October 21, 2024 3:16:07 PM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
October 21, 2024 3:22:40 PM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.53/Gc.02.53.eqp], EQP File Name: [Gc.02.53.eqp], EQP Name: [AgilentRecommended].Protocol Revision [Gc.02.53]
October 21, 2024 3:22:44 PM	End	Configuration	Session	None
October 21, 2024 3:22:47 PM	Start	Qualification	Session	OQ
October 21, 2024 3:22:48 PM	Start	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	None
October 21, 2024 3:23:35 PM	End	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	Run Count : 1
October 21, 2024 3:23:45 PM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
October 21, 2024 3:23:59 PM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1

User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
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2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:24:01 PM	Start	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
October 21, 2024 3:25:26 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
October 21, 2024 3:25:28 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 21, 2024 3:25:32 PM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 21, 2024 3:25:50 PM	Start	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
October 21, 2024 3:26:01 PM	End	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	Run Count : 1
October 21, 2024 3:26:05 PM	Start	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 21, 2024 3:26:10 PM	End	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 21, 2024 3:26:12 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None

User Name: saenguthai.tarak
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System Id: GC-6_CN11461066
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2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:26:50 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:26:53 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:26:54 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:27:10 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:27:13 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:29:11 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:29:27 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:29:29 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:29:30 PM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:29:47 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:29:52 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1

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User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

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Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:29:54 PM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:30:07 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:30:09 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:30:11 PM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
October 21, 2024 3:30:34 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:30:37 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:30:38 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 21, 2024 3:31:55 PM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
October 21, 2024 3:31:57 PM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1

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User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

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Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:31:59 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 21, 2024 3:34:37 PM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
October 21, 2024 3:34:39 PM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
October 21, 2024 3:34:42 PM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
October 21, 2024 3:39:05 PM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
October 21, 2024 3:39:07 PM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
October 21, 2024 3:39:33 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
October 21, 2024 3:40:12 PM	Audit	AccClosed	Session	None
October 22, 2024 8:55:47 AM	Audit	AccRestarted	Session	None
October 22, 2024 8:55:50 AM	Audit	SessionReloaded	Session	None
October 22, 2024 8:56:02 AM	Start	Qualification	Session	OQ

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User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

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Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 8:56:02 AM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
October 22, 2024 8:56:46 AM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Data files Path : G:\Data\Front\Front_SC10.D\ FID1A.ch
October 22, 2024 8:57:25 AM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Run Count : 1
October 22, 2024 8:57:39 AM	Start	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
October 22, 2024 8:58:03 AM	Audit	Data	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : G:\Data\Front\Front_ND10.D\ FID1A.ch
October 22, 2024 8:58:37 AM	End	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
October 22, 2024 8:58:40 AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
October 22, 2024 8:59:06 AM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over

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System ID: GC-6_CN11461066

User Name: saenguthal.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0105.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0106.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0107.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0108.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0109.D\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Front\Front_IP0110.D\FID1A.ch
October 22, 2024 9:02:11 AM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
October 22, 2024 9:02:16 AM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	None
October 22, 2024 9:02:34 AM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Data files Path : G:\Data\Front\Front_SN01.D\FID1A.ch

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System ID: GC-6_CN11461066

User Name: saenguthal.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:02:54 AM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Run Count : 1
October 22, 2024 9:03:00 AM	Start	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	None
October 22, 2024 9:03:31 AM	Audit	Data	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	Data files Path : G:\Data\Back\Back_SC01.D\FID2B.ch
October 22, 2024 9:04:03 AM	End	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	Run Count : 1
October 22, 2024 9:04:06 AM	Start	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
October 22, 2024 9:08:58 AM	Audit	Data	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : G:\Data\Back\Back_ND013.D\FID2B.ch
October 22, 2024 9:09:13 AM	End	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
October 22, 2024 9:09:26 AM	Start	Execution	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0111.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0112.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0113.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0114.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0115.D\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : G:\Data\Back\Back_IP0116.D\FID2B.ch
October 22, 2024 9:11:15 AM	End	Execution	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
October 22, 2024 9:11:23 AM	Start	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 300000	None
October 22, 2024 9:11:45 AM	Audit	Data	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 300000	Data files Path : G:\Data\Back\Back_SN01.D\FID2B.ch

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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User Name: saenguthai.tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:12:08 AM	End	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 300000	Run Count : 1
October 22, 2024 9:12:15 AM	End	Qualification	Session	OQ
October 22, 2024 9:12:15 AM	Start	Reporting	Session	None
October 22, 2024 9:24:09 AM	Audit	Reporting	Session	Report Generated : Certificate
October 22, 2024 9:25:56 AM	Audit	Reporting	Session	Report Generated : Report

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Date: October 22, 2024 9:27:05 AM
System ID: GC-6_CN11461066

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Certificate of Calibration

Certificate No. C-070425-RYG_FS0141

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus
Equipment ID : RYG_FS0141
Serial No. : 20150810060
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.3	19.5	19.2	19.3	5%	19 - 21	Passed
50	49.8	51.9	50.4	50.7	5%	48 - 53	Passed
100	99.9	100.4	100.2	100.2	5%	95 - 105	Passed
200	198.8	202.2	201.4	200.8	5%	190 - 210	Passed
High Flow							
500	493.8	495.7	495.4	495.0	3%	485 - 515	Passed
1000	1008.4	1013.5	999.9	1007.3	3%	970 - 1030	Passed
2000	2006.0	2019.3	2012.6	2012.6	3%	1940 - 2060	Passed
2500	2494.4	2492.7	2493.7	2493.6	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Watcharin Pongsamsuan)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG_FS0147

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus
Equipment ID : RYG_FS0147
Serial No. : 20150910029
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.9	20.1	20.2	20.4	5%	19 - 21	Passed
50	49.9	50.2	51.2	50.4	5%	48 - 53	Passed
100	100.9	100.7	100.9	100.8	5%	95 - 105	Passed
200	204.1	204.6	204.7	204.5	5%	190 - 210	Passed
High Flow							
500	504.1	505.6	510.1	506.6	3%	485 - 515	Passed
1000	1012.1	1008.2	1012.4	1010.9	3%	970 - 1030	Passed
2000	1990.2	1995.2	1994.8	1993.4	3%	1940 - 2060	Passed
2500	2498.4	2500.2	2494.4	2497.7	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:

(Mr. Natchapon Thamklang)

RYG Field Services Scientist (1)

Issue date : 07-Apr-25

Approved By:

(Mr. Supot Salamteh)

RYG Field Services Section Head



Certificate of Calibration

Certificate No. C-070425-RYG FS0158

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus
Equipment ID : RYG FS0158
Serial No. : 20150910030
Calibration Date : 07-Apr-25
Next calibration date : 07-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.5	20.4	20.6	20.5	5%	19 - 21	Passed
50	50.2	50.4	50.3	50.3	5%	48 - 53	Passed
100	99.6	99.7	99.5	99.6	5%	95 - 105	Passed
200	202.6	202.8	202.9	202.8	5%	190 - 210	Passed
High Flow							
500	505.9	506.8	505.6	506.1	3%	485 - 515	Passed
1000	1016.6	1013.6	1012.8	1014.3	3%	970 - 1030	Passed
2000	2004.1	2005.5	2004.3	2004.6	3%	1940 - 2060	Passed
2500	2492.0	2494.7	2490.4	2492.4	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:
(Mr.Natchapon Thamklang)
RYG Field Services Scientist (1)
Issue date : 07-Apr-25

Approved By:
(Mr.Supot Salamteh)
RYG Field Services Section Head

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Agilent CrossLab Compliance Services

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: GM-3
Organization Name: ALS Laboratory Group
Organization Location: 104 Phattanakan40, Suan Luang Bangkok 10250
Date: October 25, 2024 12:05:35 PM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.52, GCMS.02.53
Overall Qualification Status: Pass

REVIEW BY
APPROVED BY
NEXT CAL. DATE 25/4/2026

CDS Logon Verification - GC

Logon: asbkk.env03

Overall CDS Logon Verification - GC Test Status

Pass

System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Accuracy

Name: 7890

Front SSL

Setpoint Status: Pass

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

Date: October 25, 2024 12:05:35 PM
System ID: GM-3

Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 230.9 °C

Accuracy: 0.9 °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: 100.0 100.4 °C

Accuracy: 0.4 °C

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

<= 1.0 % setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average

Temperature: 100.0 100.3333 °C

Stability: 0.1 °C

Agilent Recommended: <= 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Date: October 25, 2024 12:05:35 PM

System ID: GM-3

Log Amp

Tested Combination1 Front SSL / External SQ

Name: 5975C inert XL with TAD

Setpoint Status: Pass

Overall Log Amp Test Status

Pass

RFPA

Tested Combination1 Front SSL / External SQ

Name: 5975C inert XL with TAD

Setpoint Status: Pass

Amu: 1050 m/z

Drift After Five Minutes:

11 mV

RFPA Voltage:

524 mV

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

Overall RFPA Test Status

Pass

Tune EI

Tested Combination1 Front SSL / External SQ

Name: 5975C inert XL with TAD

Setpoint Status: Pass

Filament: 1

Setpoint Status: Pass

Filament: 2

Overall Tune EI Test Status

Pass

Scouting Run

Date: October 25, 2024 12:05:35 PM

System ID: GM-3

Tested Combination1	Front	SSL	/ External	SQ
Injection Tower				
Name:	7693A			
Source:	EI - Inert			
Setpoint Status:	Completed			
Injection Volume on Column:	1.0 uL			
Overall Scouting Run Status	Completed			

Signal to Noise EI

Tested Combination1	Front	SSL	/ External	SQ
5975C Inert XL with TAD				
Source:	EI - Inert	Filament:	1	
Setpoint Status:	Pass			
Signal to Noise:	1572			
Agilent Recommended:	>= 320			
Source:	EI - Inert	Filament:	2	
Setpoint Status:	Pass			
Signal to Noise:	1541			
Agilent Recommended:	>= 320			
Overall Signal to Noise EI Test Status	Pass			

Injection Precision

Tested Combination1	Front	SSL	/ External	SQ
7693A				
Name:	7693A			
Source:	EI - Inert			

Date: October 25, 2024 12:05:35 PM
System ID: GM-3

Setpoint Status:	Pass			
Injection Volume on Column:	1.0 uL			
Area RSD:	0.61 %	Retention Time RSD:	0.01 %	
Agilent Recommended:	<= 5.00		<= 1.00	
Overall Injection Precision Test Status	Pass			

Mass Ratio Precision

Tested Combination1	Front	SSL	/ External	SQ
Injection Tower				
Name:	7693A			
Source:	EI - Inert			
Setpoint Status:	Pass			
Injection Volume on Column:	1.0 uL			
RSD:	0.61 %	Area Mass 1	Mass Ratio	
Agilent Recommended:	<= 5.00	Abundance*s	0.33 %	
	Pass		<= 5.00	
			Pass	
Overall Mass Ratio Precision Test Status	Pass			

Date: October 25, 2024 12:05:35 PM
System ID: GM-3

Instrument Details

Purpose
This section describes the as found system configuration.

Details

System

System ID	GM-3
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination1

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

Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN12520102
Firmware Revision	A.10.07
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN12521119
Firmware Revision	A.01.14
Oven Type	Standard

Inlet 1

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

Detector 1

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5975C inert XL with TAD
Model Number	G3172A
Serial Number	US13013A11
Firmware Revision	7.02.29
High Vacuum System	Turbo Pump
Scouting Run Standard	MRP 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.)

Details

Full Name of Signer:

Adirek Rattanawijit

Logged On User Name:

adirek.rattanawijit@non.agilent.com

Signature Creation Date:

October 25, 2024

Reason for Signature:

Executed protocol and published this original version of document

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ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:33:46 AM	Audit	SessionCreated	Session	None
October 25, 2024 10:33:46 AM	Start	Configuration	Session	None
October 25, 2024 10:33:46 AM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
October 25, 2024 10:41:54 AM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.52/Gc.02.52.eqp], EQP File Name: [Gc.02.52.eqp], EQP Name: [AgilentRecommended].Protocol Revision :[Gc.02.52] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.53/GcMs.02.53.eqp], EQP File Name: [GcMs.02.53.eqp], EQP Name: [AgilentRecommended]
October 25, 2024 10:42:30 AM	End	Configuration	Session	None
October 25, 2024 10:42:32 AM	Start	Qualification	Session	OQ
October 25, 2024 10:42:32 AM	Start	Execution	CDS Logon Verification - GC : - Qualitative test	None
October 25, 2024 10:45:20 AM	End	Execution	CDS Logon Verification - GC : - Qualitative test	Run Count : 1

User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:45:22 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
October 25, 2024 10:45:32 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
October 25, 2024 10:45:34 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 25, 2024 10:45:38 AM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 25, 2024 10:45:40 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 25, 2024 10:46:50 AM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
October 25, 2024 10:46:52 AM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
October 25, 2024 10:46:54 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
October 25, 2024 10:47:21 AM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:47:22 AM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
October 25, 2024 10:47:23 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
October 25, 2024 10:48:14 AM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
October 25, 2024 10:48:15 AM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
October 25, 2024 10:48:20 AM	Start	Execution	Log Amp - 5975C Inert XL with TAD SQ: - Source: EI - Inert	None
October 25, 2024 10:52:15 AM	End	Execution	Log Amp - 5975C Inert XL with TAD SQ: - Source: EI - Inert	Run Count : 1
October 25, 2024 10:52:18 AM	Start	Execution	RFPA - 5975C Inert XL with TAD SQ: - Source: EI - Inert	None
October 25, 2024 10:55:41 AM	Start	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 1 (Qualitative - No setpoints associated)	None
October 25, 2024 10:56:55 AM	End	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 1 (Qualitative - No setpoints associated)	Run Count : 1
October 25, 2024 10:56:58 AM	Start	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 2 (Qualitative - No setpoints associated)	None

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 10:57:25 AM	End	Execution	Tune EI - 5975C Inert XL with TAD SQ: - Source: - EI - Inert Filament 2 (Qualitative - No setpoints associated)	Run Count : 1
October 25, 2024 10:57:32 AM	Start	Execution	Scouting Run - Injection Tower, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	None
October 25, 2024 10:59:48 AM	Audit	Data	Scouting Run - Injection Tower, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\Scout_001.D
October 25, 2024 11:00:27 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 50000; Integration: Off at 0; Integration: On at 5.2;]
October 25, 2024 11:00:31 AM	End	Execution	Scouting Run - Injection Tower, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	Run Count : 1
October 25, 2024 11:00:39 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None
October 25, 2024 11:01:11 AM	Start	Execution	RFPA - 5975C Inert XL with TAD SQ: - Source: EI - Inert	None
October 25, 2024 11:01:37 AM	End	Execution	RFPA - 5975C Inert XL with TAD SQ: - Source: EI - Inert	Run Count : 1

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:01:51 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None
October 25, 2024 11:02:02 AM	Audit	Data	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\SN_F1_001.D
October 25, 2024 11:04:30 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 1000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:04:41 AM	Audit	Reporting	Reintegration	Reintegration Count: 2 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 2000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:04:50 AM	Audit	Reporting	Reintegration	Reintegration Count: 3 – [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 2200; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:05:02 AM	Audit	Reporting	Reintegration	Reintegration Count: 4 – [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 3000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:05:09 AM	Audit	Reporting	Reintegration	Reintegration Count: 5 – [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 4000; Integration: Off at 0; Integration: On at 4; Integration: Off at 5.6;]
October 25, 2024 11:16:07 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None

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User Name: adirek.rattanawijit

Report Generated by Hostname: ASBKWX314

System Id: GM-3

Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:28:50 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None
October 25, 2024 11:29:20 AM	End	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	Run Count : 1
October 25, 2024 11:29:23 AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	None
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_002.D
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_003.D
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_004.D
October 25, 2024 11:29:36 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_005.D
October 25, 2024 11:29:37 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\OQPV2024\MRP_006.D

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:29:37 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_007.D
October 25, 2024 11:29:47 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 50000; Integration: Off at 0; Integration: On at 5.2;]
October 25, 2024 11:29:48 AM	End	Execution	Injection Precision - Injection Tower, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Run Count : 1
October 25, 2024 11:29:51 AM	Start	Execution	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	None
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_002.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_003.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_004.D

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Date: October 25, 2024 12:05:35 PM
System ID: GM-3

User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKKWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_005.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_006.D
October 25, 2024 11:30:04 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data\VOQPV2024\MRP_007.D
October 25, 2024 11:30:15 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 50000; Integration: Off at 0; Integration: On at 5.2;]
October 25, 2024 11:30:17 AM	End	Execution	Mass Ratio Precision - Injection Tower, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Run Count : 1
October 25, 2024 11:30:23 AM	End	Qualification	Session	OQ
October 25, 2024 11:30:23 AM	Start	Reporting	Session	None
October 25, 2024 11:34:59 AM	End	Reporting	Session	None
October 25, 2024 11:34:59 AM	Start	Qualification	Session	OQ

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Date: October 25, 2024 12:05:35 PM
System ID: GM-3

User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKXWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:44:32 AM	Start	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	None
October 25, 2024 11:44:39 AM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over
October 25, 2024 11:44:42 AM	Audit	Data	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	Data files Path : D:\MassHunterGCMS\1\data\OQPV2024\SN_F2_001.D
October 25, 2024 11:44:53 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 1000; Integration: Off at 0; Integration: On at 4;]
October 25, 2024 11:45:20 AM	Audit	Reporting	Reintegration	Reintegration Count: 2 -- [Integration Type: Injections; BaselineCorrectionMode: Advanced; InitialSlopeSensitivity: 10; InitialPeakWidth: 0.01; InitialAreaReject: 0; InitialHeightReject: 1000; Integration: Off at 0; Integration: On at 5; Integration: Off at 7;]
October 25, 2024 11:45:34 AM	End	Execution	Signal to Noise EI - Injection Tower, Front SSL, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	Run Count : 1

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User Name: adirek.rattanawijit
Report Generated by Hostname: ASBKXWX314

System Id: GM-3
Print Date: October 25, 2024 12:05:37 PM

ALS_OQGCMS_GM-3_2024 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 25, 2024 11:45:59 AM	End	Qualification	Session	OQ
October 25, 2024 11:45:59 AM	Start	Reporting	Session	None
October 25, 2024 12:03:37 PM	Audit	Reporting	Session	Report Generated : Certificate
October 25, 2024 12:04:58 PM	Audit	Reporting	Session	Report Generated : Report

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