

เอกสารแนบที่ 4

เอกสารการสอบเทียบเครื่องมือ

ตารางสรุปรายการเอกสารการสอบเทียบความถูกต้องของเครื่องมือเก็บตัวอย่าง
และเครื่องมือตรวจวิเคราะห์คุณภาพสิ่งแวดล้อม

รายการตรวจวัด	เครื่องมือเก็บตัวอย่าง	เครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
คุณภาพอากาศจากปล่อง Total Suspended Particulate (TSP) Oxides of Nitrogen (NO _x) Sulfur Dioxide (SO ₂) Carbon Monoxide (CO) PM2.5 Mercury	Console No. B03, B04 Pitot Tube No. B21 Vacuum Gauge Personal Pump SKC No. B6, B18, B70, B76 Rotameter No. H-B07, H-B09 Personal Pump SKC No. B04, B10, B17 Rotameter No. H-B07, H-B09 - Console No. B03, B04 Pitot Tube No. B21	Digital Balance Spectrophotometer - CO Analyzer NO. B07, B11 Digital Balance AAS
คุณภาพอากาศในบรรยากาศ PM2.5 Mercury	High Volume PM2.5 Air Sampler Blower No. B09 High Volume Air Sampler Blower No. R07	Digital Balance AAS
ระดับเสียงในบรรยากาศ ระดับเสียงเฉลี่ย 1 ชั่วโมง (L _{eq} 1 hr) ระดับเสียงเฉลี่ย 24 ชั่วโมง (L _{eq} 24 hr) ระดับเสียงสูงสุด (L _{max}) ระดับเสียงเฉลี่ยกลางวัน-กลางคืน (L _{dnt}) ระดับเสียงเปอร์เซ็นต์ไทล์ที่ 90 (L ₉₀)	Sound Level Calibrator Sound Level Meter No. ACO-B43, B44, B45 ACO-B03, B04, B29	-
คุณภาพน้ำ ความเป็นกรดและด่าง ความนำไฟฟ้า อุณหภูมิ ความขุ่น สารที่ละลายได้ทั้งหมด สารแขวนลอย ปริมาณสารทั้งหมด ซีโอดี บีโอดี น้ำมันและไขมัน ฟอสเฟต ฟลูออไรด์ ไนเตรท ไนเตรท-ไนโตรเจน ไสยาไนต์คิดเทียบเป็นไฮโดรเจนไสยาไนต์ ซัลเฟต แคลเซียม แมกนีเซียม	- - - - - - - - - - - - - - - -	pH Meter Conductivity Meter Thermometer Turbidity Meter Digital Balance Digital Balance Digital Balance COD Reactor BOD Analyzer Digital Balance Spectrophotometer Spectrophotometer Spectrophotometer Spectrophotometer Spectrophotometer ICP ICP

**ตารางสรุปรายการเอกสารการสอบเทียบความถูกต้องของเครื่องมือเก็บตัวอย่าง
และเครื่องมือตรวจวิเคราะห์คุณภาพสิ่งแวดล้อม (ต่อ)**

รายการตรวจวัด	เครื่องมือเก็บตัวอย่าง	เครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
คุณภาพน้ำ (ต่อ) แบคทีเรียกลุ่มโคลิฟอร์มทั้งหมด แบคทีเรียกลุ่มฟิคอลโคลิฟอร์ม พรอท แคลเมียม ตะกั่ว สังกะสี ทองแดง นิกเกิล แบริยม เหล็ก อาร์เซนิก เซเลเนียม แมงกานีส โครเมียมชนิดเฮกซะวาเลนต์ เชื้อสิจิโอเนลลา	- - - - - - - - - - - - - - -	Incubator Incubator AAS AAS AAS/ICP AAS/ICP AAS/ICP ICP ICP ICP AAS AAS ICP Spectrophotometer Incubator
ระดับความร้อนในสถานประกอบการ WBGT	Digital Thermometer Heat Stress WBGT Meter NO. B11, B22, B25, B28, B30, B31, B32	-
ระดับเสียงในสถานประกอบการ ระดับเสียงเฉลี่ย 8 ชั่วโมง (L_{eq} 8 hr) ระดับเสียงสูงสุด (L_{max})	Acoustic Calibrator Sound Level Meter No. ACO-B03, B28, B29, B36, B41, B43, R40, R41, R41, R51, R52 Noise Dose Meter No. NMD- B01, B02, B03, B04, B05, B06, B07, B08, B09, B10, B11, B12, B13, B14, B15, B16, B17, B18, B19, B20, R02, R06, R13, R20, R22, R26	-
ปริมาณเสียงสะสมแบบติดตัวบุคคล Noise Dose	Noise Dose Meter No. NMD- B06, B07, B08, B09, B10, B11, B12, B16, B17, B18, B19	-
ระดับความเข้มของแสงสว่างในสถานประกอบการ Light Intensity	Light Meter No. B08, B10, B11	-
คุณภาพอากาศในสถานประกอบการ Total Dust Sulfuric Acid Sodium Hydroxide Hydrogen Chloride Ammonia Chlorine	Personal Pump SKC No. B75, B78, B81, B82, B84, B87 Rotameter No. H-B07 Personal Pump SKC No. B75, B80, B81, B82, B84, B87, B89 Rotameter No. L-B07 Personal Pump SKC No. B58, B78, B81 Rotameter No. H-B07 Personal Pump SKC No. B80, B82, B87 Rotameter No. L-B07 Personal Pump SKC No. B75, B78, B80, B81, B82, B89 Rotameter No. L-B07 Personal Pump SKC No. B33, B58, B78, B80, B81, B 89 Rotameter No. H-B07	Digital Balance IC - IC IC Spectrophotometer



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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Tel : (662) 939-4370-72 Fax : (662) 513-4221 E-mail : sale@spscon.com, www.spscon.com

Console Calibration Report

Calibration Method

Critical Orifices

Calibration Data

Console Data		Calibration Data		
No.	Serial No.	Date	y	DH _g (mmH ₂ O)
B01	1563	01/12/2023	0.998	50.05
B02	8002514	02/12/2023	1.006	49.58
B03	1503016	01/12/2023	1.003	50.16
B04	00006659	04/12/2023	0.998	49.71
B05	00007428	04/12/2023	0.999	49.24
R01	1561	02/12/2023	1.005	49.98
R02	8002513	03/12/2023	1.003	49.90
R03	1570	04/12/2023	0.996	49.68
R04	8002519	01/12/2023	1.002	49.43
R05	1503015	01/12/2023	0.997	50.24

Remark : Accept Value of y (test) is $0.97 < y < 1.03$

Accept Value of DH_g (test) is 46.7 ± 6.4 (mmH₂O)

Calibrated by :

Adul Dangklom

(Mr. Adul Dangklom)

Approved by :

Peera Detudom

(Mr. Peera Detudom)



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Pitot Tube Calibration Report

Calibration Method

Standard Pitot Tube

Calibration Data

Pitot Tube Data			Calibration Data		
No.	Type of Pitot	Coefficient of Standard Pitot	Date	Avg. of Cp (test)	
				Side A	Side B
B03	S	0.99	01/11/2023	0.84	0.85
B04	S	0.99	01/11/2023	0.84	0.84
B05	S	0.99	01/11/2023	0.85	0.84
B07	S	0.99	01/11/2023	0.84	0.83
B08	S	0.99	02/11/2023	0.85	0.84
B09	S	0.99	02/11/2023	0.84	0.84
B11	S	0.99	02/11/2023	0.85	0.84
B16	S	0.99	03/11/2023	0.84	0.84
B18	S	0.99	03/11/2023	0.84	0.85
B19	S	0.99	03/11/2023	0.84	0.85
B21	S	0.99	02/11/2023	0.84	0.84
B24	S	0.99	02/11/2023	0.84	0.83
B27	S	0.99	02/11/2023	0.85	0.84
B30	S	0.99	01/11/2023	0.84	0.85
B31	S	0.99	02/11/2023	0.84	0.84
B33	S	0.99	02/11/2023	0.84	0.85
B35	S	0.99	02/11/2023	0.84	0.84

Remark : Accept value of Cp (test) is 0.84 ± 0.01

Calibrated by :

Adul Dangklom

(Mr. Adul Dangklom)

Approved by :

Peera Detudom

(Mr. Peera Detudom)



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Pitot Tube Calibration Report

Calibration Method

Standard Pitot Tube

Calibration Data

Pitot Tube Data			Calibration Data		
No.	Type of Pitot	Coefficient of Standard Pitot	Date	Avg. of Cp (test)	
				Side A	Side B
B03	S	0.99	01/02/2024	0.84	0.83
B04	S	0.99	02/02/2024	0.85	0.84
B05	S	0.99	02/02/2024	0.84	0.84
B07	S	0.99	01/02/2024	0.84	0.85
B08	S	0.99	01/02/2024	0.83	0.84
B09	S	0.99	03/02/2024	0.84	0.85
B11	S	0.99	03/02/2024	0.84	0.84
B16	S	0.99	01/02/2024	0.83	0.84
B18	S	0.99	02/02/2024	0.84	0.84
B19	S	0.99	02/02/2024	0.84	0.83
B21	S	0.99	01/02/2024	0.84	0.85
B24	S	0.99	02/02/2024	0.85	0.84
B27	S	0.99	01/02/2024	0.84	0.84
B30	S	0.99	02/02/2024	0.84	0.83
B31	S	0.99	02/02/2024	0.84	0.85
B33	S	0.99	01/02/2024	0.84	0.84
B35	S	0.99	01/02/2024	0.85	0.84

Remark : Accept value of Cp (test) is 0.84 ± 0.01

Calibrated by :

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Pitot Tube Calibration Report

Calibration Method

Standard Pitot Tube

Calibration Data

Pitot Tube Data			Calibration Data		
No.	Type of Pitot	Coefficient of Standard Pitot	Date	Avg. of Cp (test)	
				Side A	Side B
B36	S	0.99	02/02/2024	0.84	0.83
B37	S	0.99	02/02/2024	0.84	0.84
B38	S	0.99	01/02/2024	0.84	0.84
B39	S	0.99	02/02/2024	0.85	0.84
B40	S	0.99	02/02/2024	0.84	0.83
B41	S	0.99	01/02/2024	0.84	0.85
B44	S	0.99	01/02/2024	0.85	0.84
B45	S	0.99	02/02/2024	0.83	0.84
B46	S	0.99	01/02/2024	0.84	0.85
B47	S	0.99	03/02/2024	0.84	0.84
B48	S	0.99	03/02/2024	0.84	0.85
B49	S	0.99	01/02/2024	0.83	0.84
B54	S	0.99	01/02/2024	0.84	0.85
B56	S	0.99	02/02/2024	0.84	0.84
B57	S	0.99	01/02/2024	0.83	0.84
B58	S	0.99	02/02/2024	0.84	0.85

Remark : Accept value of Cp (test) is 0.84 ± 0.01

Calibrated by :

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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

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

Personal Pump Data				Calibration Data								
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3	y	R ²
B01	SKC	224-PCXR4	262101	03/01/2024	1,000	1,500	2,000	993	1,497	1,998	1.002x - 4.467	1.000
B02	SKC	224-PCXR4	626166	03/01/2024	1,000	1,500	2,000	1,003	1,505	2,001	1.009x - 19.803	0.999
B03	SKC	224-PCXR4	612968	03/01/2024	1,000	1,500	2,000	996	1,494	2,001	1.006x - 12.799	1.000
B04	SKC	224-PCXR4	602804	04/01/2024	1,000	1,500	2,000	1,000	1,502	1,994	0.999x + 0.239	1.000
B05	SKC	224-PCXR4	612693	04/01/2024	1,000	1,500	2,000	1,003	1,500	2,002	1.011x - 21.266	0.999
B06	SKC	224-PCXR4	262188	05/01/2024	1,000	1,500	2,000	1,002	1,508	2,006	1.007x - 12.077	0.999
B07	SKC	224-PCXR4	626262	05/01/2024	1,000	1,500	2,000	998	1,492	1,997	0.994x + 4.810	1.000
B08	SKC	224-PCXR4	626100	04/01/2024	1,000	1,500	2,000	1,002	1,500	2,003	1.013x - 24.585	0.999
B09	SKC	224-PCXR4	626479	05/01/2024	1,000	1,500	2,000	998	1,490	1,994	0.993x + 3.837	1.000
B10	SKC	224-PCXR4	091950	04/01/2024	1,000	1,500	2,000	993	1,502	2,001	1.017x - 34.867	0.999
B11	SKC	224-PCXR8	564315	05/01/2024	1,000	1,500	2,000	996	1,492	1,999	1.004x - 7.965	1.000
B12	SKC	224-PCXR4	034656	05/01/2024	1,000	1,500	2,000	1,003	1,502	2,003	1.010x - 19.683	0.999
B13	SKC	224-PCXR4	602073	04/01/2024	1,000	1,500	2,000	997	1,500	1,998	1.000x - 0.862	1.000
B14	SKC	224-PCXR4	626313	03/01/2024	1,000	1,500	2,000	999	1,492	1,989	0.991x + 8.479	1.000
B15	SKC	224-PCXR4	626474	03/01/2024	1,000	1,500	2,000	1,002	1,502	2,005	1.012x - 21.697	0.999
B16	SKC	224-PCXR4	626477	04/01/2024	1,000	1,500	2,000	995	1,504	2,001	1.007x - 16.807	1.000
B17	SKC	224-PCXR4	626860	04/01/2024	1,000	1,500	2,000	997	1,494	1,991	0.997x + 0.331	1.000
B18	SKC	224-PCXR4	691484	05/01/2024	1,000	1,500	2,000	1,003	1,500	2,002	1.009x - 17.214	0.999
B19	SKC	224-PCXR4	691599	05/01/2024	1,000	1,500	2,000	993	1,503	1,999	1.005x - 8.906	1.000
B20	SKC	224-PCXR4	691587	05/01/2024	1,000	1,500	2,000	991	1,504	2,000	1.016x - 33.407	0.999
B21	SKC	224-PCXR4	691531	04/01/2024	1,000	1,500	2,000	993	1,499	1,995	1.001x - 5.540	1.000
B22	SKC	224-PCXR4	691654	03/01/2024	1,000	1,500	2,000	1,003	1,501	2,004	1.011x - 19.966	0.999
B23	SKC	224-PCXR4	798393	03/01/2024	1,000	1,500	2,000	993	1,507	2,002	1.017x - 33.276	0.999
B24	SKC	224-PCXR4	626363	03/01/2024	1,000	1,500	2,000	1,000	1,502	2,001	1.012x - 23.859	0.999
B25	SKC	224-PCXR4	798489	03/01/2024	1,000	1,500	2,000	1,001	1,492	2,001	0.998x + 0.694	1.000
B26	SKC	224-PCXR4	798479	04/01/2024	1,000	1,500	2,000	1,000	1,500	1,993	0.996x + 4.204	1.000
B27	SKC	224-PCXR4	691673	04/01/2024	1,000	1,500	2,000	994	1,503	2,002	1.016x - 30.902	0.999
B28	SKC	224-PCXR4	691570	05/01/2024	1,000	1,500	2,000	1,003	1,500	2,001	1.009x - 18.263	0.999
B29	SKC	224-PCXR4	626472	04/01/2024	1,000	1,500	2,000	1,002	1,498	2,000	1.002x - 3.909	1.000
B30	SKC	224-PCXR4	691489	04/01/2024	1,000	1,500	2,000	1,003	1,509	2,006	1.008x - 11.399	1.000
B31	SKC	224-PCXR4	691509	03/01/2024	1,000	1,500	2,000	993	1,496	1,997	1.005x - 11.275	1.000
B32	SKC	224-PCXR4	091567	03/01/2024	1,000	1,500	2,000	991	1,503	2,000	1.015x - 30.886	0.999
B33	SKC	224-PCXR4	091756	05/01/2024	1,000	1,500	2,000	993	1,498	1,992	0.999x - 2.317	1.000
B34	SKC	224-PCXR4	612962	05/01/2024	1,000	1,500	2,000	1,002	1,501	2,002	1.007x - 13.995	1.000
B35	SKC	224-PCXR4	602682	05/01/2024	1,000	1,500	2,000	996	1,498	1,996	1.006x - 5.285	1.000
B36	SKC	224-PCXR4	626164	04/01/2024	1,000	1,500	2,000	999	1,510	1,999	1.004x - 10.131	0.999
B37	SKC	224-PCXR4	626256	05/01/2024	1,000	1,500	2,000	994	1,506	1,999	1.013x - 28.454	0.999
B38	SKC	224-PCXR4	626167	03/01/2024	1,000	1,500	2,000	997	1,498	1,998	1.003x - 5.983	1.000
B39	SKC	224-PCXR4	034637	03/01/2024	1,000	1,500	2,000	1,005	1,501	2,001	1.006x - 15.188	0.999
B40	SKC	224-PCXR4	798349	05/01/2024	1,000	1,500	2,000	994	1,505	2,000	1.014x - 29.004	0.999

Calibrated by :

Abdul Dangklom
(Mr. Abdul Dangklom)

Approved by :

Peera Detudom
(Mr. Peera Detudom)



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

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	05/01/2024	1,000	1,500	2,000	999	1,496	1,991	0.996x + 1.914	1.000
B42	SKC	224-PCXR4	626041	03/01/2024	1,000	1,500	2,000	1,004	1,498	1,991	0.986x + 19.248	1.000
B43	SKC	224-PCXR4	034636	03/01/2024	1,000	1,500	2,000	1,000	1,501	1,992	0.991x + 11.682	1.000
B44	SKC	224-PCXR8	529341	03/01/2024	1,000	1,500	2,000	1,002	1,502	2,002	1.004x - 6.860	1.000
B45	SKC	224-PCXR8	529594	03/01/2024	1,000	1,500	2,000	1,001	1,501	1,987	0.987x + 16.026	1.000
B46	SKC	224-PCXR8	566743	04/01/2024	1,000	1,500	2,000	995	1,506	2,002	1.013x - 27.915	0.999
B47	SKC	224-PCXR8	566747	04/01/2024	1,000	1,500	2,000	1,002	1,502	2,004	1.010x - 21.769	0.999
B48	SKC	224-PCXR8	566753	04/01/2024	1,000	1,500	2,000	1,000	1,493	1,998	0.997x + 0.239	1.000
B49	SKC	224-PCXR8	566780	04/01/2024	1,000	1,500	2,000	1,003	1,502	2,006	1.011x - 21.550	0.999
B50	SKC	224-PCXR8	500400	03/01/2024	1,000	1,500	2,000	1,001	1,496	2,002	1.001x - 2.900	1.000
B51	SKC	224-PCXR8	500363	03/01/2024	1,000	1,500	2,000	996	1,502	2,000	1.011x - 25.709	0.999
B52	SKC	224-PCXR8	093186	03/01/2024	1,000	1,500	2,000	994	1,496	1,992	0.995x + 1.751	1.000
B53	SKC	224-PCXR8	707670	05/01/2024	1,000	1,500	2,000	1,002	1,501	2,002	1.008x - 16.042	0.999
B54	SKC	224-PCXR3	509821	05/01/2024	1,000	1,500	2,000	995	1,501	2,002	1.016x - 32.282	0.999
B55	SKC	224-PCXR3	510710	05/01/2024	1,000	1,500	2,000	1,004	1,495	1,992	0.991x + 7.666	1.000
B56	SKC	224-PCXR3	511450	05/01/2024	1,000	1,500	2,000	1,002	1,500	2,001	1.005x - 8.559	1.000
B57	SKC	224-PCXR3	510798	03/01/2024	1,000	1,500	2,000	997	1,492	1,999	0.999x - 2.122	1.000
B58	SKC	224-PCXR3	509852	03/01/2024	1,000	1,500	2,000	1,000	1,500	1,999	1.007x - 19.073	0.999
B59	SKC	224-PCXR3	509862	04/01/2024	1,000	1,500	2,000	995	1,503	1,995	0.998x + 2.118	1.000
B60	SKC	224-PCXR3	512655	04/01/2024	1,000	1,500	2,000	1,004	1,510	2,004	1.005x - 6.421	0.999
B61	SKC	224-PCXR3	503915	04/01/2024	1,000	1,500	2,000	993	1,492	1,999	1.003x - 11.706	1.000
B62	SKC	224-PCXR3	505975	03/01/2024	1,000	1,500	2,000	999	1,494	1,996	0.996x + 0.822	1.000
B63	SKC	224-PCXR3	511432	03/01/2024	1,000	1,500	2,000	990	1,501	2,000	1.017x - 36.259	0.999
B64	SKC	224-PCXR3	508302	03/01/2024	1,000	1,500	2,000	998	1,492	1,989	0.990x + 10.175	1.000
B65	SKC	224-PCXR3	508310	03/01/2024	1,000	1,500	2,000	1,002	1,501	2,002	1.007x - 13.537	1.000
B66	SKC	224-PCXR3	509861	04/01/2024	1,000	1,500	2,000	1,002	1,491	1,992	0.988x + 13.744	1.000
B67	SKC	224-PCXR3	506295	04/01/2024	1,000	1,500	2,000	995	1,508	2,004	1.007x - 12.843	1.000
B68	SKC	224-PCXR3	505872	04/01/2024	1,000	1,500	2,000	1,002	1,491	1,998	0.995x + 4.040	1.000
B69	SKC	224-PCXR3	508375	04/01/2024	1,000	1,500	2,000	1,003	1,499	2,000	1.009x - 18.977	0.999
B70	SKC	224-PCXR3	510623	05/01/2024	1,000	1,500	2,000	992	1,493	1,996	1.002x - 7.730	1.000
B71	SKC	224-PCXR3	508367	05/01/2024	1,000	1,500	2,000	994	1,506	2,002	1.015x - 31.561	0.999
B72	SKC	224-PCXR3	505977	03/01/2024	1,000	1,500	2,000	1,003	1,499	1,994	0.991x + 9.042	1.000
B73	SKC	224-PCXR3	512666	04/01/2024	1,000	1,500	2,000	1,001	1,501	2,004	1.008x - 14.346	1.000
B74	SKC	224-PCXR3	505993	04/01/2024	1,000	1,500	2,000	996	1,497	1,995	1.001x - 7.036	1.000
B75	SKC	224-PCXR3	509820	05/01/2024	1,000	1,500	2,000	996	1,496	1,991	0.996x + 1.432	1.000
B76	SKC	224-PCXR3	509811	05/01/2024	1,000	1,500	2,000	993	1,499	1,999	1.006x - 14.283	1.000
B77	SKC	224-PCXR3	508301	05/01/2024	1,000	1,500	2,000	1,001	1,501	2,003	1.013x - 25.406	0.999
B78	SKC	224-PCXR3	510677	05/01/2024	1,000	1,500	2,000	995	1,503	1,999	1.012x - 27.520	0.999
B79	SKC	224-PCXR3	510920	05/01/2024	1,000	1,500	2,000	994	1,494	1,994	1.001x - 6.178	1.000



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

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

Personal Pump Data				Calibration Data									
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve		
					Setting			Actual (Q std.)					
					1	2	3	1	2	3	y	R ²	
880	SKC	224-PCXR3	504569	05/01/2024	1,000	1,500	2,000	1,002	1,498	2,002	1.012x - 24.186	0.999	
881	SKC	224-PCXR3	503480	05/01/2024	1,000	1,500	2,000	996	1,499	2,000	1.014x - 30.165	0.999	
882	SKC	224-PCXR3	505673	04/01/2024	1,000	1,500	2,000	994	1,498	1,996	1.000x - 4.746	1.000	
883	SKC	224-PCXR3	510785	04/01/2024	1,000	1,500	2,000	1,010	1,500	1,999	1.003x - 7.793	0.999	
884	SKC	224-PCXR3	508333	04/01/2024	1,000	1,500	2,000	997	1,498	1,991	0.993x + 4.810	1.000	
885	SKC	224-PCXR3	505757	05/01/2024	1,000	1,500	2,000	994	1,502	1,998	1.006x - 14.562	1.000	
886	SKC	224-PCXR3	512625	03/01/2024	1,000	1,500	2,000	1,015	1,503	2,004	0.999x + 3.063	0.999	
887	SKC	224-PCXR3	504324	03/01/2024	1,000	1,500	2,000	1,000	1,496	2,000	1.000x - 0.710	1.000	
888	SKC	224-PCXR3	508307	03/01/2024	1,000	1,500	2,000	995	1,498	1,993	0.997x + 0.574	1.000	
889	SKC	224-PCXR3	509860	03/01/2024	1,000	1,500	2,000	1,000	1,499	2,004	1.010x - 17.509	1.000	
890	SKC	224-PCXR3	508366	04/01/2024	1,000	1,500	2,000	995	1,508	2,000	1.005x - 10.091	1.000	
891	SKC	224-PCXR3	510919	04/01/2024	1,000	1,500	2,000	1,000	1,500	1,997	0.992x + 7.522	1.000	
892	SKC	224-PCXR3	510987	04/01/2024	1,000	1,500	2,000	1,002	1,501	1,999	0.999x + 1.097	1.000	
893	SKC	224-PCXR3	509845	04/01/2024	1,000	1,500	2,000	996	1,496	2,004	1.009x - 15.822	1.000	
894	SKC	224-PCXR8	A127871	05/01/2024	1,000	1,500	2,000	1,000	1,499	2,002	1.007x - 19.184	0.999	
895	SKC	224-PCXR8	A127921	05/01/2024	1,000	1,500	2,000	994	1,502	2,002	1.015x - 30.559	0.999	
896	SKC	224-PCXR8	A127942	04/01/2024	1,000	1,500	2,000	998	1,499	1,996	1.001x - 3.486	1.000	
897	SKC	224-PCXR8	A127955	05/01/2024	1,000	1,500	2,000	1,003	1,501	2,003	1.010x - 20.082	0.999	
898	SKC	224-PCXR8	A127956	05/01/2024	1,000	1,500	2,000	996	1,497	1,998	1.003x - 6.330	1.000	

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 ± 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	03/01/2024	1,000	1,500	2,000	992	1,508	2,005	1.008x - 15.012	1.000	
R02	SKC	224-PCXR4	626450	04/01/2024	1,000	2,000	3,000	998	1,499	1,990	0.989x + 12.189	1.000	
R03	SKC	224-PCXR4	691592	03/01/2024	1,000	1,500	2,000	1,004	1,500	2,004	1.012x - 22.718	0.999	
R04	SKC	224-PCXR4	691672	04/01/2024	1,000	1,500	2,000	996	1,493	1,996	0.998x - 2.002	1.000	
R05	SKC	224-PCXR4	798470	03/01/2024	1,000	1,500	2,000	993	1,507	1,999	1.013x - 29.199	0.999	
R06	SKC	224-PCXR4	798456	04/01/2024	1,000	1,500	2,000	997	1,498	1,996	1.002x - 6.760	1.000	
R07	SKC	224-PCXR4	798480	05/01/2024	1,000	1,500	2,000	994	1,492	1,999	1.008x - 16.153	1.000	
R08	SKC	224-PCXR4	883215	05/01/2024	1,000	1,500	2,000	1,012	1,500	2,005	0.999x + 3.725	1.000	
R09	SKC	224-PCXR4	034650	05/01/2024	1,000	1,500	2,000	991	1,504	2,001	1.018x - 36.179	0.999	
R10	SKC	224-PCXR4	091765	03/01/2024	1,000	1,500	2,000	997	1,511	1,994	1.000x + 0.499	1.000	
R11	SKC	224-PCXR4	091763	04/01/2024	1,000	1,500	2,000	1,000	1,499	2,002	1.012x - 24.042	0.999	
R12	SKC	224-PCXR4	091568	03/01/2024	1,000	1,500	2,000	996	1,500	2,000	1.003x - 7.698	1.000	
R13	SKC	224-PCXR4	091638	04/01/2024	1,000	1,500	2,000	1,002	1,501	1,991	0.989x + 14.781	1.000	
R14	SKC	224-PCXR4	091764	03/01/2024	1,000	1,500	2,000	994	1,503	1,999	1.014x - 30.292	0.999	
R15	SKC	224-PCXR8	529457	03/01/2024	1,000	1,500	2,000	1,001	1,500	2,004	1.006x - 11.543	1.000	
R16	SKC	224-PCXR8	529643	05/01/2024	1,000	1,500	2,000	998	1,495	1,994	0.999x + 3.450	1.000	
R17	SKC	224-PCXR8	529645	04/01/2024	1,000	1,500	2,000	995	1,509	2,001	1.015x - 30.890	0.999	
R18	SKC	224-PCXR8	566756	04/01/2024	1,000	1,500	2,000	991	1,498	1,998	1.001x - 6.800	1.000	
R19	SKC	224-PCXR8	566802	04/01/2024	1,000	1,500	2,000	1,002	1,499	2,000	1.010x - 20.772	0.999	
R20	SKC	224-PCXR8	529089	05/01/2024	1,000	1,500	2,000	991	1,500	2,003	1.020x - 39.390	0.999	
R21	SKC	224-PCXR8	665728	03/01/2024	1,000	1,500	2,000	998	1,495	1,999	1.000x - 3.937	1.000	
R22	SKC	224-PCXR8	707444	03/01/2024	1,000	1,500	2,000	1,003	1,500	2,003	1.005x - 8.595	1.000	
R23	SKC	224-PCXR8	761067	03/01/2024	1,000	1,500	2,000	998	1,491	1,991	0.993x + 3.358	1.000	
R24	SKC	224-PCXR8	707893	04/01/2024	1,000	1,500	2,000	996	1,508	2,000	1.008x - 16.660	0.999	
R25	SKC	224-PCXR8	761052	04/01/2024	1,000	1,500	2,000	1,010	1,496	1,995	0.985x + 21.199	1.000	
R26	SKC	224-PCXR8	707956	04/01/2024	1,000	1,500	2,000	1,002	1,500	2,005	1.010x - 16.732	1.000	
R27	SKC	224-PCXR8	707398	03/01/2024	1,000	1,500	2,000	996	1,500	2,002	1.007x - 16.201	1.000	
R28	SKC	224-PCXR8	707481	05/01/2024	1,000	1,500	2,000	1,004	1,501	2,002	1.010x - 19.878	0.999	
R29	SKC	224-PCXR8	707402	05/01/2024	1,000	1,500	2,000	1,003	1,494	1,989	0.986x + 16.137	1.000	
R30	SKC	224-PCXR8	093811	05/01/2024	1,000	1,500	2,000	1,000	1,493	1,993	0.995x + 4.371	1.000	
R31	SKC	224-PCXR8	093183	05/01/2024	1,000	1,500	2,000	1,001	1,501	2,000	1.002x - 2.800	1.000	
R32	SKC	224-PCXR8	671950	05/01/2024	1,000	1,500	2,000	998	1,501	1,993	0.996x + 4.136	1.000	
R33	SKC	224-PCXR4	626254	03/01/2024	1,000	1,500	2,000	994	1,502	2,000	1.015x - 32.298	0.999	
R34	SKC	224-PCXR4	626131	03/01/2024	1,000	1,500	2,000	1,002	1,499	2,004	1.007x - 12.157	1.000	
R35	SKC	224-PCXR8	707460	04/01/2024	1,000	1,500	2,000	999	1,498	1,995	0.994x + 6.098	1.000	
R36	SKC	224-PCXR8	707446	04/01/2024	1,000	1,500	2,000	1,004	1,498	2,001	1.009x - 18.630	0.999	
R37	SKC	224-PCXR8	707432	04/01/2024	1,000	1,500	2,000	996	1,499	2,000	1.000x - 1.827	1.000	
R38	SKC	224-PCXR8	707349	03/01/2024	1,000	1,500	2,000	997	1,500	2,002	1.003x - 7.889	1.000	
R39	SKC	224-PCXR8	761095	03/01/2024	1,000	1,500	2,000	1,001	1,497	1,994	0.998x + 1.193	1.000	

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 ± 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
R40	SKC	224-PCXR4	612753	05/01/2024	1,000	1,500	2,000	1,001	1,502	2,003	1.013x - 23.923	0.999
R41	SKC	224-PCXR4	626140	05/01/2024	1,000	1,500	2,000	992	1,509	2,001	1.016x - 31.995	0.999
R42	SKC	224-PCXR4	626463	03/01/2024	1,000	1,500	2,000	998	1,494	1,999	1.000x - 2.397	1.000
R43	SKC	224-PCXR4	626129	03/01/2024	1,000	1,500	2,000	1,003	1,501	2,005	1.012x - 20.899	0.999
R44	SKC	224-PCXR4	602753	05/01/2024	1,000	1,500	2,000	1,002	1,496	1,993	0.995x + 3.007	1.000
R45	SKC	224-PCXR4	626137	03/01/2024	1,000	1,500	2,000	992	1,505	2,002	1.019x - 37.144	0.999

Calibrated by :

Adul Dangklorn
(Mr. Adul Dangklorn)

Approved by :

Peera Detudom
(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

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-801	Dwyer	VFB-65	04/01/2024	500	1,000	2,000	506.5	991.1	1974.3	0.989x + 9.286	1.000
H-802	Dwyer	VFB-65	04/01/2024	500	1,000	2,000	496.7	997.6	1996.1	0.994x + 4.509	1.000
H-803	Dwyer	VFB-65	04/01/2024	500	1,000	2,000	497.6	988.8	2009.6	1.004x - 14.177	0.999
H-804	Dwyer	VFB-65	03/01/2024	500	1,000	2,000	501.6	998.7	2006.5	0.997x - 0.777	1.000
H-805	Dwyer	VFB-65	05/01/2024	500	1,000	2,000	500.4	997.3	1974.3	0.980x + 21.602	0.999
H-806	Dwyer	VFB-65	05/01/2024	500	1,000	2,000	504.9	994.8	1984.0	1.003x - 5.213	1.000
H-807	Dwyer	VFB-65	03/01/2024	500	1,000	2,000	502.6	990.6	2016.7	1.001x - 0.998	1.000
H-808	Dwyer	VFB-65	04/01/2024	500	1,000	2,000	499.7	998.7	1979.8	0.996x + 3.580	0.999
H-809	Dwyer	VFB-65	04/01/2024	500	1,000	2,000	504.1	1004.3	2010.7	0.993x + 13.998	1.000
H-810	Dwyer	VFB-65	03/01/2024	500	1,000	2,000	496.2	999.3	2009.2	0.996x + 3.860	1.000

Calibrated by :

Adul Dangklorn
(Mr. Adul Dangklorn)

Approved by :

Peera Detudom
(Mr. Peera Detudom)



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

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	03/01/2024	500	1,000	2,000	501.7	994.0	1980.7	1.000x - 3.859	0.999
H-R02	Dwyer	VFB-65	04/01/2024	500	1,000	2,000	500.8	999.1	1988.7	1.001x - 2.909	1.000
H-R03	Dwyer	VFB-65	03/01/2024	500	1,000	2,000	501.7	990.3	1997.7	0.993x + 3.830	1.000
H-R04	Dwyer	VFB-65	03/01/2024	500	1,000	2,000	496.8	992.2	2016.5	1.007x - 11.486	1.000
H-R05	Dwyer	VFB-65	04/01/2024	500	1,000	2,000	499.6	992.9	1990.7	1.002x - 4.797	1.000
H-R06	Dwyer	VFB-65	05/01/2024	500	1,000	2,000	505.2	995.4	1982.6	0.999x - 1.343	0.999

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

Peerat Detudom
(Mr. Peera Detudom)



CALIBRATION LABORATORY Co., LTD.

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



CERTIFICATE OF CALIBRATION

FOR

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

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

DATE OF RECEIVED : 25 July 2023

DATE OF ISSUED : 31 July 2023

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

Calibrated By :

Sittipong Pimdee

Calibration Engineer

Sittipong Pimdee

Approved By :

Mongkol Yotsoontorn

Authorized Signatory

31 July 2023



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

Certificate No. Q23081570

F3-011-04/01-12

page 1 of 3



@clccalibration



CALIBRATION LABORATORY Co., LTD.

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



REPORT OF CALIBRATION

FOR

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

ENVIRONMENT CONDITIONS :

Temperature : (23 ± 2) °C

Relative Humidity : (55 ± 10) %RH

PROCEDURE USED :

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

The calibration was performed by direct measurement with Document Process Calibrator and Pressure Module

which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

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

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).

Certificate No. MP-0035-23, Due Date 02 February 2024.

UNCERTAINTY :

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

Certificate No. Q23081570

F3-011-04/01-12

page 2 of 3



@clccalibration



CALIBRATION LABORATORY Co., LTD.

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



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

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

CALIBRATION DATA

CORRECTION OF PRESSURE

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

Uncertainty of measurement ± 0.2 inHg

Transmitting fluid : Air.

Technical Note. Conversion factor 1 kPa ; 0.2953003 inHg

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

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

End of Certificate

Certificate No. Q23081570

F3-011-04/01-12

page 3 of 3



@clccalibration



CERTIFICATE No : 23M2441
REFERENCE No : 68471-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : METTLER TOLEDO
MODEL : XS105DU
SERIAL No : 1126422905
ID No : BA 05/50
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 : 10-Mar-23
APPROVED BY : PONGSAK J.
ISSUED DATE : 16-Mar-23
RECEIVED DATE : 10-Mar-23

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



CERTIFICATE No : 23M2441

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : XS105DU
MANUFACTURER : METTLER TOLEDO S/N : 1126422905
ID No : BA 05/50 RECEIVED DATE : 10-Mar-23
AIR PRESSURE : 1010mbar \pm 1mbar CALIBRATION DATE : 10-Mar-23
AMBIENT TEMPERATURE : 23°C \pm 1°C RELATIVE HUMIDITY : 49%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 :-

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

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 CENTRAL BUREAU OF WEIGHTS&MEASURES

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

- ZERO SETTING FUNCTION : NORMAL
- TARE FUNCTION : NORMAL
- REPEATABILITY OF READING AT 200 g WAS 0 g
- DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.00	0.00000	0.00000	0.000039
0.02	0.02000	0.00000	0.000039
0.10	0.10000	0.00000	0.000039
0.20	0.20001	-0.00001	0.000040
0.50	0.50001	-0.00001	0.000040
1.00	1.00000	0.00000	0.000041
2.00	2.00003	-0.00003	0.000042
5.00	5.00001	-0.00001	0.000046
10.00	10.00003	-0.00003	0.000053
20.00	20.00005	-0.00005	0.000067
50.00	50.0001	-0.0001	0.00011
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	50.0000
2	50.0001
3	50.0000
4	50.0000
5	49.9999
OFF-CENTER LOADING	0.0001

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

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

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



NSC-TISI-TIS 17025
CALIBRATION 0394

Cert. No. : SP23016

Pages 1 of 3

Calibration Certificate

Equipment : UV-VIS SPECTROPHOTOMETER
Manufacturer : PERKINELMER
Model : LAMBDA 25
Serial No.: 501S14123010
ID No.: SP03/58
Calibration Mode : WAVELENGTH ACCURACY
PHOTOMETRIC ACCURACY
Condition As Found : GOOD
Customer : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN ROAD,
CHOMPHON, CHATUCHAK,
BANGKOK 10900, THAILAND.
Location : ORGANIC LABORATORY IV
Ambient Temperature : (25.0 ± 5) °C
Relative Humidity : (48.4 ± 25) %
Received Date : 30 AUGUST 2023
Calibration Date : 30 AUGUST 2023
Date of Issue : 31 AUGUST 2023

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur
(Thanakul Petchurai)

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

SITHIPORN
associates

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : SP23016

Job No. : VC66SP0014

Pages : 2 of 3

Calibration Method :

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

Condition of this result of calibration :

1. Certified reference materials

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

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

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

3.1 The UK National Physical Laboratory (NPL)

3.2 The National Institute of Standards and Technology,NIST.

Result of calibration : Wavelength Accuracy

(Without adjustment)

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

UUC* = Unit Under Calibration

T. Petchur

Continuation of Calibration Certificate

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

Result of calibration : Photometric Accuracy

(Without adjustment)

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

UUC* = Unit Under Calibration

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

Resolution of Wavelength Mode 0.1 nm

Resolution of Photometric Mode 0.0001 A

Parameter Setting

Measurement Mode Wavelength, Absorbance

Wavelength Scan 1100 nm-190 nm

Scanning Speed 7.5 nm/min

Data Pitch 0.1 nm

Band width(Wavelength) 1.0 nm

Band width(Vis) 1.0 nm

Band width(Uv) 1.0 nm

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

**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

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

Calibration Report			
Non-Dispersive Infrared CO Analyzer			
Date :	05 January 2024	Brand :	API
No.	CO-815	Model :	300E
		Serial No.	226
Calibrator (Dilution System)			
Brand :	API	Model :	700
Last Cal. Date :	08 August 2023	Serial No. :	911
Reference Standard Gas			
Standard Gas :	Carbon Monoxide (CO)	Cylinder No. :	D196045
Certified Date :	16 April 2022	Expired Date :	15 April 2024
		Cylinder Conc. :	4,570 ppm
Calibrating Condition			
Pressure :	1011 mmbar	Temp. :	24.4 °C
		% RH :	49
Calibration Setting			
Span	Initial Reading (Before Adj.), PPM		Final Reading (After Adj.), PPM
Set Point	Expected Concentration	Analyzer Response	%Diff
Zero	0	0.10	-
CO Span	40.00	39.97	-0.075
API Model 300E CO Analyzer Check List			
Parameter	Observed Value	Units	Nominal Range
Range	50	PPM	0-1000 ppm
Stability	0.10	PPM	< 1 ppm With Zero Air
CO Measure	4017.4	mV	2500-4800 mV
CO Reference	3949.1	mV	2500-4800 mV
Measure/Reference Ratio	1.180	-	1.1-1.3 W/Zero Air
Sample Pressure	28.7	in-Hg-A	-2" < Ambient Absolute Pressure
Sample Flow	808	CC/Min	800 ± 10%
Sample Temperature	48.2	°C	48 ± 4
Bench Temperature	48.0	°C	48 ± 2
Wheel Temperature	68.4	°C	68 ± 2
Box Temperature	30.8	°C	Ambient Temp + 7 ± 10
Photo-Drive	3030.1	mV	250 mV to 4750 mV
Slope	1.017	-	1.0 ± 0.3
Offset	0.2	-	0 ± 0.3

Calibrated by :

Adul Dangklom
(Mr. Adul Dangklom)

Approved by :

Mr. Peera Detudom



CALIBRATION LABORATORY Co.,LTD.

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



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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : CONDUCTIVITY METER
MANUFACTURER : METTLER TOLEDO
MODEL / TYPE : SEVEN COMPACT S230
SERIAL NO. : C141708983/5821320179
CLID. NO. : 272300452
JOB CONTROL NO. : 240213016389
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 : 13 February 2024

DATE OF ISSUED : 16 February 2024

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

Calibrated By : Sukgasem Sechanart
Calibration Engineer



Approved By : Mongkol Yotsoontorn
Authorized Signatory
16 February 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. Q24016389

F3-011-05/12-23

page 1 of 4



@clccalibration

REPORT OF CALIBRATION

FOR

NOMENCLATURE : CONDUCTIVITY METER
MANUFACTURER : METTLER TOLEDO
MODEL / TYPE : SEVEN COMPACT S230
SERIAL NO. : C141708983/5821320179
DATE OF CALIBRATION : 13 February 2024

ENVIRONMENT CONDITIONS :

Temperature : $(25 \pm 2.5) ^\circ\text{C}$

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

PROCEDURE USED :

This instrument [Conductivity Meter] was calibrated under procedure No. **WI-305-130**. The calibration was performed by direct measurement with Certified Reference Material (CRM) and Reference Material (RM) .

This instrument [Temperature] was calibrated under procedure No. **WI-305-244**. The calibration was performed by Comparison with Calibration Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Conductivity Solution , Hanna Product Code HI 7033L Lot Number 7830.
2. Potassium Chloride Solution (nominal 1.41 mS/cm)
3. Potassium Chloride Solution (nominal 12.8 mS/cm)
4. Calibration Bath, Kambic Model OB-22/2 ULT S/N. 17115653.
5. Precision Thermometer, ASL Model F200-A-8 S/N. 014433/03.
6. IPRT, ASL Model T100-250-1D S/N. L0193A-1-1.

Certificate No. Q24016389

F3-011-05/12-23

page 2 of 4



@clccalibration

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

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.

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

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)



MAINTENANCE AND TEST CERTIFICATE MODEL OPTIMA 5300DV

Customer : S.P.S.Consulting Service Co.,Ltd Date Tested: July 4, 2024
Recommendation Recertification
Address : 7 Soi Phaholyothin 24 Period 6 Months
Paholyothin Road Recertification Due: January 4, 2025
Jompoi Chatuchak, Bangkok 1090 Date Last Certified: January 4, 2024
User Name: K.Phenpha Vipasthawat Visit Number: 1 of 2
Phone: 083-9269252 PerkinElmer Phone: 02-719-6420 ext 206
Fax: 02-513-4221 PerkinElmer Fax: 02-318-5597

CONFIGURATION TESTED

MODEL SERIAL NUMBER
OPTIMA 5300DV 077C7042401

TESTED EQUIPMENT CALIBRATION NUMBER EXPIRATION
IPV Methods

TEST STANDARD USED PART NUMBER EXPIRATION DATE
Multielement Standard N069-1579 December 30, 2024
Wavecal Solution N058-2152 September 30, 2024
VIS Wavecal solution N930-2946 January 30, 2025
Instrument Cal. STD4 N930-0221 November 30, 2024

CUSTOMER SUPPLIED COMMENTS CUSTOMER INITIALS
2 % HNO3
10 % HNO3

ACCESSORIES/COMPONENT NOT INCLUDED



MAINTENANCE AND TEST CERTIFICATE MODEL

OPTIMA 5300DV

SERIAL NUMBER 077C7042401

DATE TESTED July 4, 2024

1. MECHANICAL CHECKS

A. Inspect and clean all fans and filters. ☐

B. Inspect and replace as necessary, all torch components including the RF coil. ☐

C. Inspect all tubing for sign of clacking or leaking. ☐

D. Adjust water and gas pressure regulator settings. ☐

E. Inspect and leak check pneumatics drawers. ☐

F. Clean the exterior of the instrument. ☐

2. OPTICAL CHECKS

A. Inspect and clean all optical components. ☐

B. As required, check and replace all purgefilters. ☐

C. Recheck optical alignment. ☐

3. COOLING SYSTEM CHECKS

A. Perform preventive maintenance on chiller. ☐

B. Flush out the chiller every year. ☐

4. PERFORMANCE CHECKS

A. Torch View Alignment. ☐

B. Wavelength Calibration. ☐



MAINTENANCE AND TEST CERTIFICATE MODEL

OPTIMA 5300DV

SERIAL NUMBER : 077C7042401

DATE TESTED : July 4, 2024

PARAMETER	SPECIFICATION		FINAL VALUE	
Spectral Resolution : UV	As	193.696 nm ≤ 0.007	0.00550	
	Ni	231.604 nm ≤ 0.008	0.00714	
	Ni	341.476 nm ≤ 0.012	0.00790	
Spectral Resolution : VIS	La	408.672 nm ≤ 0.020	0.01655	
	Ba	455.403 nm ≤ 0.025	0.02391	
Precision	As	193.656 nm % RSD < 1.0	0.72 %	
	Zn	213.856 nm % RSD < 1.0	0.66 %	
	Mn	257.610 nm % RSD < 1.0	0.30 %	
	La	379.478 nm % RSD < 1.0	0.98 %	
	Ba	455.403 nm % RSD < 1.0	0.95 %	
	Ba	493.408 nm % RSD < 1.0	0.78 %	
Detection Limits : Axial	Tl	190.080 nm 3(sd)	6.22	ppb
	As	193.696 nm 3(sd)	6.44	ppb
	Pb	220.353 nm 3(sd)	2.06	ppb
Detection Limits : Radial	As	193.696 nm 3(sd)	78.26	ppb
	Zn	213.856 nm 3(sd)	2.07	ppb
	Mn	257.610 nm 3(sd)	0.52	ppb
	La	379.478 nm 3(sd)	2.63	ppb
	Ba	455.403 nm 3(sd)	0.08	ppb
	Ba	493.408 nm 3(sd)	0.75	ppb
BEC : Axial (IB X 500)/(IS-IB)	Cd	226.502 nm ≤ 150 ppb	64.72	
BEC : Radial (IB X 1000)/(IS-IB)	Mn	257.610 nm ≤ 45 ppb	15.04	

WO-02612424/2024



**MAINTENANCE AND TEST CERTIFICATE MODEL
OPTIMA 5300DV**

SERIAL NUMBER 077C7042401 DATE TESTED July 4, 2024

Remarks :

Commissioning follow as commissioning performance sheets.

This is to certify that the above tests have been performed and the configuration tested



meets



does not meet

the PerkinElmer Specifications listed on this certificate.

This certificate does not modify PerkinElmer's standard terms and condition of sale,
including warranty terms.

Service Department PerkinElmer Ltd.

Authorized Representative:

Wiphan Promlumda

(Wiphan Promlumda)
Service Engineer

Page 4 of 4



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD
214 Bangwaek Rd. Bangpai Bangkac Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 http://www.mit.in.th



CALIBRATION CERTIFICATE

Certificate No. : S2023090437-0003

Date Issued : 28-Sep-23

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 : 22-Sep-23

Date Calibrated : 22-Sep-23

Calibrated by : Mr. Jame Khaothong

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:

Sarayuth T.

(Mr. Sarayuth Tochua)



Page 1 of 2

Certificate No. : S2023090437-0003
Environment : Ambient Temperature : Start record 24.3 °C, Stop record 24.5 °C
Relative Humidity : Start record 54.8 %RH, Stop record 54.6 %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	0.08	0.17	0.31
41.5	41.5	41.5	0.04	0.18	0.25

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	34.83	34.85	34.97	34.82	34.84	34.95	34.90	34.80	34.93	0.23
41.5	41.36	41.38	41.46	41.32	41.28	41.48	41.40	41.33	41.44	0.23

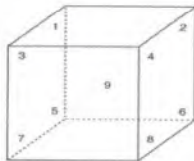
Calibration Temperature (°C)	MPE (±°C)	Pass / Fail with Guard Band								
		No. 1 (°C)	No. 2 (°C)	No. 3 (°C)	No. 4 (°C)	No. 5 (°C)	No. 6 (°C)	No. 7 (°C)	No. 8 (°C)	No. 9 (°C)
35.00	0.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
41.50	0.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

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

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. L202306247-001 for Data Acquisition STD-286 Module 1 Serial No. MY44023139, Due 24-Dec-23

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



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 แขวงพญาไท เขตพญาไท กรุงเทพมหานคร 10990
Tel : (662) 939-4370-72 Fax : (662) 513-4221 E-mail : sales@spscon.com, www.spscon.com

Noise B_127/24

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-B03	ACO	6236	00222297	22 April 2024	94.0	93.9	
ACO-B28	ACO	6236	00182009	22 April 2024	93.9	93.9	
ACO-B29	ACO	6236	00182011	22 April 2024	93.9	93.9	
ACO-B36	ACO	6236	00192027	22 April 2024	93.9	93.9	
ACO-B41	ACO	6236	00192032	22 April 2024	94.0	93.9	
ACO-B43	ACO	6236	00192034	22 April 2024	94.0	93.9	
ACO-R40	ACO	6236	00192052	22 April 2024	93.9	93.9	
ACO-R41	ACO	6236	00192053	22 April 2024	94.1	93.9	
ACO-R50	ACO	6236	00192062	22 April 2024	93.9	93.9	
ACO-R51	ACO	6236	00192063	22 April 2024	93.9	93.9	
ACO-R52	ACO	6236	00192064	22 April 2024	94.1	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)