

ภาคผนวกที่ 5

เอกสารสอบเทียบความถูกต้องของเครื่องมือ

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ตารางสรุปรายการเอกสารการสอบเทียบเครื่องมือตรวจวัดคุณภาพสิ่งแวดล้อม

รายการตรวจวัด	เครื่องมือเก็บตัวอย่าง	เครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
คุณภาพอากาศ		
- TSP	- High Volume Air Sampler NO. B05, B15, B41	- Electronic Balance
- PM ₁₀	- High Volume PM-10 Air Sampler NO. B25, B28, B32	- Electronic Balance
- CO	- CO Analyzer NO. B20, B72	
- THC	- Personal Pump SKC NO. B70, B72 - Rotameter NO. L-5	
- NO ₂	- NO ₂ Analyzer NO. B02, B04, R09, B11, B19	- NO ₂ Analyzer NO. B02, B04, R09, B11, B19
- SO ₂	- Gas Sampler Box NO. B10, B11, B13, B14, B15	- Spectrophotometer
ระดับเสียง		
- Leq 1 hr, Leq 24 hr, Lmax, Ldn, L ₉₀ , และ เสียงรบกวน	- Acoustic Calibrator	-
	- Sound Level Meter ACO-B05, B14, B24	-
คุณภาพน้ำ		
- pH	-	- pH Meter
- BOD ₅	-	- BOD Analyzer
- TSS	-	- Electronic Balance
- TDS	-	- Electronic Balance
- TKN	-	- Electronic Balance
- Sulfide	-	- Electronic Balance
- Grease & Oil	-	- Electronic Balance
- Total Coliform Bacteria	-	- Electronic Balance

เอกสารที่ 5-1

เอกสารสอบเทียบเครื่องมือการตรวจวัดคุณภาพอากาศ

High Volume Air Sampler Calibration Report			
Calibration Method : Multipoint Orifice Flow Transfer Standard			S/N : 3095
Calibration Data			
High Volume Air Sampler Data			
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)
B01	B01	01/11/2021	y = 1.254x-6.224
B02	B02	03/11/2021	y = 1.080x+0.873
B03	B03	01/11/2021	y = 1.049x+1.608
B04	B04	01/11/2021	y = 1.140x-2.855
B05	B05	01/11/2021	y = 1.148x-2.655
B06	B06	01/11/2021	y = 1.203x-4.180
B07	B07	03/11/2021	y = 1.136x-3.132
B08	B08	03/11/2021	y = 1.211x-6.101
B09	B09	03/11/2021	y = 1.291x-7.760
B10	B10	09/11/2021	y = 1.091x+0.142
B11	B11	03/11/2021	y = 1.090x-0.694
B12	B12	03/11/2021	y = 1.165x-2.613
B13	B13	03/11/2021	y = 1.115x-2.068
B14	B14	03/11/2021	y = 1.174x-2.498
B15	B15	01/11/2021	y = 1.109x-0.219
B16	B16	01/11/2021	y = 1.211x-5.379
B17	B17	01/11/2021	y = 1.160x-2.153
B18	B18	01/11/2021	y = 1.235x-6.315
B19	B19	04/11/2021	y = 1.262x-7.960
B20	B20	04/11/2021	y = 1.263x-8.626
B21	B21	04/11/2021	y = 1.128x-1.642
B22	B22	04/11/2021	y = 1.224x-5.593
B23	B23	03/11/2021	y = 1.145x-2.521
B24	B24	03/11/2021	y = 1.097x-0.331
B25	B25	03/11/2021	y = 1.029x+2.874
B26	B26	03/11/2021	y = 1.121x-1.443
B27	B27	03/11/2021	y = 1.191x-5.420
B28	B28	03/11/2021	y = 1.248x-6.941
B29	B29	03/11/2021	y = 1.223x-5.741
B30	B30	03/11/2021	y = 1.171x-3.691
B31	B31	03/11/2021	y = 1.158x-2.458
B32	B32	03/11/2021	y = 1.197x-3.536
B33	B33	02/11/2021	y = 1.248x-6.869
B34	B34	09/11/2021	y = 1.251x-7.511
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High Volume Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard				Model : TE 5025A	SN : 3095
Calibration Data					
High Volume Air Sampler Data		Calibration Data			
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²	
B01	B01	09/02/2022	y = 1.255x-7.443	0.998	
B02	B02	02/02/2022	y = 1.075x+1.871	0.999	
B03	B03	04/02/2022	y = 1.032x+1.126	0.997	
B04	B04	04/02/2022	y = 1.158x-3.770	0.995	
B05	B05	02/02/2022	y = 1.199x-5.374	1.000	
B06	B06	01/02/2022	y = 1.215x-6.623	0.995	
B07	B07	01/02/2022	y = 1.142x-4.465	0.997	
B08	B08	02/02/2022	y = 1.241x-8.074	0.999	
B09	B09	08/02/2022	y = 1.206x-5.652	0.995	
B10	B10	07/02/2022	y = 1.095x+0.184	0.998	
B11	B11	10/02/2022	y = 1.099x-2.021	0.996	
B12	B12	09/02/2022	y = 1.169x-3.784	1.000	
B13	B13	03/02/2022	y = 1.163x-4.662	0.996	
B14	B14	07/02/2022	y = 1.169x-3.363	0.998	
B15	B15	03/02/2022	y = 1.106x-1.273	0.998	
B16	B16	09/02/2022	y = 1.218x-6.757	0.997	
B17	B17	07/02/2022	y = 1.132x-1.890	0.998	
B18	B18	16/02/2022	y = 1.239x-7.560	0.999	
B19	B19	16/02/2022	y = 1.265x-8.934	0.997	
B20	B20	03/02/2022	y = 1.199x-6.304	0.998	
B21	B21	17/02/2022	y = 1.120x-2.616	0.997	
B22	B22	08/02/2022	y = 1.216x-6.597	0.995	
B23	B23	03/02/2022	y = 1.139x-3.341	0.999	
B24	B24	03/02/2022	y = 1.126x-2.172	1.000	
B25	B25	09/02/2022	y = 1.016x+2.185	0.996	
B26	B26	04/02/2022	y = 1.122x-2.540	0.997	
B27	B27	08/02/2022	y = 1.192x-6.584	0.997	
B28	B28	04/02/2022	y = 1.254x-8.360	0.995	
B29	B29	02/02/2022	y = 1.217x-6.791	0.996	
B30	B30	04/02/2022	y = 1.162x-4.303	0.997	
B31	B31	16/02/2022	y = 1.101x-0.556	0.998	
B32	B32	04/02/2022	y = 1.208x-5.034	0.997	
B33	B33	07/02/2022	y = 1.242x-5.616	0.999	
B34	B34	09/02/2022	y = 1.240x-8.273	0.999	

High Volume Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard				Model : TE 5025A	SN : 3095
Calibration Data					
High Volume Air Sampler Data		Calibration Data			
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²	
B35	B35	16/02/2022	y = 1.274x-9.241	0.999	
B36	B36	15/02/2022	y = 1.132x-3.625	0.996	
B37	B37	04/02/2022	y = 1.157x+2.640	0.999	
B38	B38	15/02/2022	y = 1.1432x-2.720	0.999	
B39	B39	07/02/2022	y = 1.256x-7.614	1.000	
B40	B40	15/02/2022	y = 1.175x-4.385	0.998	
B41	B41	07/02/2022	y = 1.133x-1.951	0.998	
B42	B42	04/02/2022	y = 1.127x-1.985	1.000	
B43	B43	16/02/2022	y = 1.089x+0.223	0.996	
B44	B44	03/02/2022	y = 1.339x-11.636	0.997	
R01	R01	02/02/2022	y = 1.196x-5.960	0.996	
R02	R02	09/02/2022	y = 1.175x-5.572	1.000	
R03	R03	02/02/2022	y = 1.187x-6.283	0.995	
R04	R04	07/02/2022	y = 1.100x-1.352	0.997	
R05	R05	09/02/2022	y = 1.238x-8.500	0.997	
R06	R06	01/02/2022	y = 1.328x-11.118	0.996	
R07	R07	07/02/2022	y = 1.039x+1.507	0.995	
R08	R08	04/02/2022	y = 1.141x-3.942	0.997	
R09	R09	01/02/2022	y = 1.192x-5.710	0.997	
R10	R10	09/02/2022	y = 1.194x-5.807	1.000	
R11	R11	01/02/2022	y = 1.054x+0.098	0.996	
R12	R12	04/02/2022	y = 1.171x-5.349	0.996	
R13	R13	04/02/2022	y = 1.114x-1.755	0.999	
R14	R14	07/02/2022	y = 1.100x-0.965	0.997	
R15	R15	14/02/2022	y = 1.047x+1.073	0.995	
R16	R16	09/02/2022	y = 1.129x-3.642	0.999	
R17	R17	03/02/2022	y = 1.198x-5.739	1.000	
R18	R18	02/02/2022	y = 1.268x-9.241	0.998	
R19	R19	03/02/2022	y = 1.216x-5.626	0.999	
R20	R20	01/02/2022	y = 1.197x-5.676	0.997	

High Volume Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard				Model : TE 5025A	S/N : 3095
Calibration Data					
High Volume Air Sampler Data		Calibration Data			
Recorder No.	Blower No.	Date	Actual Flowrate (l/min)	R ²	
B01	B01	04/05/2022	y = 1.313x-9.642	0.999	
B02	B02	02/05/2022	y = 1.069x+2.593	1.000	
B03	B03	04/05/2022	y = 1.045x+0.757	0.998	
B04	B04	04/05/2022	y = 1.161x-3.677	0.996	
B05	B05	02/05/2022	y = 1.218x-6.416	1.000	
B06	B06	04/05/2022	y = 1.235x-6.768	0.998	
B07	B07	06/05/2022	y = 1.178x-5.564	0.999	
B08	B08	02/05/2022	y = 1.223x-6.991	1.000	
B09	B09	04/05/2022	y = 1.240x-6.649	0.996	
B10	B10	04/05/2022	y = 1.091x+0.142	0.995	
B11	B11	04/05/2022	y = 1.120x-2.107	1.000	
B12	B12	02/05/2022	y = 1.102x-1.916	0.996	
B13	B13	03/05/2022	y = 1.187x-5.240	0.999	
B14	B14	06/05/2022	y = 1.290x-9.276	0.998	
B15	B15	03/05/2022	y = 1.093x-0.919	0.999	
B16	B16	04/05/2022	y = 1.223x-6.745	0.998	
B17	B17	03/05/2022	y = 1.172x-3.414	0.998	
B18	B18	04/05/2022	y = 1.259x-8.700	1.000	
B19	B19	03/05/2022	y = 1.307x-10.268	0.999	
B20	B20	02/05/2022	y = 1.232x-7.260	0.999	
B21	B21	04/05/2022	y = 1.209x-7.461	0.996	
B22	B22	02/05/2022	y = 1.239x-7.827	0.999	
B23	B23	03/05/2022	y = 1.227x-6.159	0.999	
B24	B24	03/05/2022	y = 1.075x-0.925	0.997	
B25	B25	04/05/2022	y = 0.997x+2.795	0.998	
B26	B26	04/05/2022	y = 1.185x-5.015	0.998	
B27	B27	06/05/2022	y = 1.148x-5.099	0.996	
B28	B28	04/05/2022	y = 1.221x-6.454	1.000	
B29	B29	02/05/2022	y = 1.181x-5.705	0.995	
B30	B30	04/05/2022	y = 1.136x-3.406	0.999	
B31	B31	04/05/2022	y = 1.114x-1.568	0.999	
B32	B32	04/05/2022	y = 1.249x-6.749	1.000	
B33	B33	06/05/2022	y = 1.195x-4.397	0.996	
B34	B34	04/05/2022	y = 1.222x-7.759	0.999	

High Volume Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard				Model : TE 5025A	S/N : 3095
Calibration Data					
High Volume Air Sampler Data		Calibration Data			
Recorder No.	Blower No.	Date	Actual Flowrate (l/min)	R ²	
B35	B35	02/05/2022	y = 1.345x-12.323	0.999	
B36	B36	03/05/2022	y = 1.154x-4.565	0.999	
B37	B37	04/05/2022	y = 1.139x-2.122	0.996	
B38	B38	06/05/2022	y = 1.126x-2.401	0.999	
B39	B39	02/05/2022	y = 1.188x-5.455	0.998	
B40	B40	06/05/2022	y = 1.156x-3.823	0.995	
B41	B41	06/05/2022	y = 1.187x-6.052	0.997	
B42	B42	04/05/2022	y = 1.063x+0.537	0.998	
B43	B43	04/05/2022	y = 1.258x-9.645	0.998	
B44	B44	03/05/2022	y = 1.252x-9.964	0.999	
R01	R01	02/05/2022	y = 1.220x-6.992	0.999	
R02	R02	10/05/2022	y = 1.121x-3.616	0.997	
R03	R03	02/05/2022	y = 1.161x-5.046	0.999	
R04	R04	06/05/2022	y = 1.115x-1.773	0.999	
R05	R05	06/05/2022	y = 1.217x-7.663	0.998	
R06	R06	04/05/2022	y = 1.245x-8.155	0.998	
R07	R07	06/05/2022	y = 1.042x+1.155	0.995	
R08	R08	04/05/2022	y = 1.220x-6.874	0.998	
R09	R09	04/05/2022	y = 1.192x-5.710	0.997	
R10	R10	10/05/2022	y = 1.209x-6.199	0.999	
R11	R11	02/05/2022	y = 1.101x-2.414	0.999	
R12	R12	10/05/2022	y = 1.209x-6.618	0.995	
R13	R13	10/05/2022	y = 1.158x-3.923	0.999	
R14	R14	06/05/2022	y = 1.128x-2.065	0.999	
R15	R15	04/05/2022	y = 1.014x+2.496	0.998	
R16	R16	04/05/2022	y = 1.159x-5.442	0.997	
R17	R17	10/05/2022	y = 1.203x-5.717	0.999	
R18	R18	02/05/2022	y = 1.395x-12.262	0.997	
R19	R19	03/05/2022	y = 1.246x-7.147	0.998	
R20	R20	04/05/2022	y = 1.230x-7.354	0.999	

High Volume PM-10 Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard				Model : TE 5025A	S/N : 3095
Calibration Data					
High Volume PM-10 Data		Calibration Data			
Recorder No.	Blower No.	Date	Actual Flowrate (l ³ /min)	R ²	
B01	B01	01/11/2021	y = 1.208x-4.065	0.995	
B02	B02	01/11/2021	y = 1.063x+1.371	0.999	
B03	B03	01/11/2021	y = 1.048x+1.850	0.997	
B04	B04	01/11/2021	y = 1.210x-4.614	0.998	
B05	B05	02/11/2021	y = 1.191x-4.399	1.000	
B06	B06	02/11/2021	y = 1.304x-9.578	0.998	
B07	B07	02/11/2021	y = 1.106x-0.463	0.996	
B08	B08	02/11/2021	y = 1.169x-3.444	0.998	
B09	B09	04/11/2021	y = 1.157x-2.570	0.997	
B10	B10	03/11/2021	y = 1.212x-5.982	0.997	
B11	B11	04/11/2021	y = 1.154x-3.419	0.995	
B12	B12	04/11/2021	y = 1.212x-5.982	0.997	
B13	B13	04/11/2021	y = 1.249x-7.657	1.000	
B14	B14	04/11/2021	y = 1.095x+0.679	0.999	
B15	B15	03/11/2021	y = 1.102x-0.132	0.995	
B16	B16	05/11/2021	y = 1.196x-2.682	0.998	
B17	B17	04/11/2021	y = 1.211x-4.732	0.999	
B18	B18	05/11/2021	y = 1.224x-5.520	0.996	
B19	B19	05/11/2021	y = 1.074x+1.056	0.998	
B20	B20	05/11/2021	y = 1.153x-3.408	0.995	
B21	B21	01/11/2021	y = 1.174x-2.651	0.999	
B22	B22	03/11/2021	y = 1.383x-12.324	1.000	
B23	B23	03/11/2021	y = 1.107x-0.811	0.996	
B24	B24	03/11/2021	y = 1.197x-5.593	0.998	
B25	B25	03/11/2021	y = 1.166x-2.717	0.997	
B26	B26	01/11/2021	y = 1.053x+1.597	0.996	
B27	B27	01/11/2021	y = 1.205x-5.691	0.996	
B28	B28	01/11/2021	y = 1.095x-0.442	0.995	
B29	B29	02/11/2021	y = 1.272x-7.969	1.000	
B30	B30	02/11/2021	y = 1.149x-3.091	0.998	
B31	B31	02/11/2021	y = 1.049x+1.595	0.996	
B32	B32	02/11/2021	y = 1.142x-1.981	1.000	
B33	B33	04/11/2021	y = 1.227x-6.487	0.997	
B34	B34	04/11/2021	y = 1.108x+0.446	0.999	

High Volume PM-10 Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard				Model : TE 5025A	S/N : 3095
Calibration Data					
High Volume PM-10 Data		Calibration Data			
Recorder No.	Blower No.	Date	Actual Flowrate (l ³ /min)	R ²	
R01	R01	05/11/2021	y = 1.211x-6.104	0.997	
R02	R02	05/11/2021	y = 1.214x-4.615	0.997	
R03	R03	01/11/2021	y = 1.084x+0.130	0.997	
R04	R04	01/11/2021	y = 1.259x-8.531	0.998	
R05	R05	09/11/2021	y = 1.072x+0.329	0.999	
R06	R06	09/11/2021	y = 1.227x-4.906	1.000	
R07	R07	03/11/2021	y = 1.112x-0.122	0.997	
R08	R08	03/11/2021	y = 1.094x-0.497	0.999	
R09	R09	03/11/2021	y = 1.304x-9.083	0.999	
R10	R10	03/11/2021	y = 1.093x-0.132	0.996	
R11	R11	01/11/2021	y = 1.278x-9.253	1.000	
R12	R12	01/11/2021	y = 1.124x-1.702	0.999	
R13	R13	01/11/2021	y = 1.197x-4.323	0.995	
R14	R14	01/11/2021	y = 1.179x-4.500	0.997	
R15	R15	01/11/2021	y = 1.259x-7.023	1.000	
R16	R16	02/11/2021	y = 1.187x-3.968	0.999	
R17	R17	02/11/2021	y = 1.197x-3.940	0.997	
R18	R18	02/11/2021	y = 1.149x-2.227	0.998	
R19	R19	04/11/2021	y = 1.159x-3.569	1.000	
R20	R20	04/11/2021	y = 1.172x-4.515	0.995	

High Volume PM-10 Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard				Model : TE 5025A	S/N : 3095
Calibration Data					
High Volume PM-10 Data		Calibration Data			
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²	
B01	B01	02/02/2022	y = 1.199x-0.729	0.999	
B02	B02	04/02/2022	y = 1.047x+3.100	0.999	
B03	B03	07/02/2022	y = 1.212x+3.555	0.997	
B04	B04	09/02/2022	y = 1.314x-9.389	1.000	
B05	B05	03/02/2022	y = 1.207x-5.472	0.995	
B06	B06	04/02/2022	y = 1.260x-8.728	0.997	
B07	B07	04/02/2022	y = 1.212x-5.353	0.996	
B08	B08	09/02/2022	y = 1.285x-7.356	0.998	
B09	B09	06/02/2022	y = 1.243x-6.277	1.000	
B10	B10	07/02/2022	y = 1.285x-9.647	0.998	
B11	B11	02/02/2022	y = 1.240x-6.135	0.995	
B12	B12	01/02/2022	y = 1.285x-9.647	0.998	
B13	B13	04/02/2022	y = 1.302x-9.419	0.996	
B14	B14	07/02/2022	y = 1.199x+3.376	0.998	
B15	B15	04/02/2022	y = 1.118x-0.993	0.995	
B16	B16	04/02/2022	y = 1.190x-1.101	0.998	
B17	B17	03/02/2022	y = 1.201x-2.953	0.998	
B18	B18	07/02/2022	y = 1.143x-1.983	0.998	
B19	B19	03/02/2022	y = 1.036x+1.865	0.998	
B20	B20	03/02/2022	y = 1.201x-6.181	0.997	
B21	B21	04/02/2022	y = 1.158x-0.828	0.998	
B22	B22	04/02/2022	y = 1.290x-8.497	0.998	
B23	B23	07/02/2022	y = 1.090x-0.542	1.000	
B24	B24	01/02/2022	y = 1.218x-6.279	0.998	
B25	B25	01/02/2022	y = 1.156x-3.313	0.997	
B26	B26	07/02/2022	y = 1.135x+1.438	0.998	
B27	B27	02/02/2022	y = 1.260x-8.474	0.998	
B28	B28	04/02/2022	y = 1.090x-0.306	0.999	
B29	B29	04/02/2022	y = 1.262x-8.639	1.000	
B30	B30	03/02/2022	y = 1.219x-6.529	0.996	
B31	B31	17/02/2022	y = 1.059x+0.716	0.997	
B32	B32	16/02/2022	y = 1.154x-3.610	0.999	
B33	B33	03/02/2022	y = 1.258x-8.776	0.999	
B34	B34	16/02/2022	y = 1.123x+0.227	0.995	

High Volume PM-10 Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard				Model : TE 5025A	S/N : 3095
Calibration Data					
High Volume PM-10 Data		Calibration Data			
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²	
R01	R01	04/02/2022	y = 1.238x-7.598	0.995	
R02	R02	11/02/2022	y = 1.161x-3.899	0.996	
R03	R03	04/02/2022	y = 1.154x+2.827	0.998	
R04	R04	06/02/2022	y = 1.116x-1.752	0.995	
R05	R05	07/02/2022	y = 1.125x-2.487	0.995	
R06	R06	10/02/2022	y = 1.321x-9.065	0.998	
R07	R07	04/02/2022	y = 1.138x-1.986	0.996	
R08	R08	03/02/2022	y = 1.160x-3.759	0.996	
R09	R09	10/02/2022	y = 1.209x-6.918	0.995	
R10	R10	04/02/2022	y = 1.114x-1.889	0.995	
R11	R11	03/02/2022	y = 1.272x-7.597	1.000	
R12	R12	03/02/2022	y = 1.153x-3.385	0.995	
R13	R13	02/02/2022	y = 1.207x-4.913	0.996	
R14	R14	01/02/2022	y = 1.183x-3.660	0.996	
R15	R15	02/02/2022	y = 1.247x-7.741	0.999	
R16	R16	02/02/2022	y = 1.238x-6.677	0.996	
R17	R17	01/02/2022	y = 1.203x-5.310	0.998	
R18	R18	04/02/2022	y = 1.148x-3.211	0.998	
R19	R19	04/02/2022	y = 1.220x-6.839	0.997	
R20	R20	03/02/2022	y = 1.161x-5.047	0.997	



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High Volume PM-10 Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard				Model : TE 5025A	S/N : 3095
Calibration Data					
High Volume PM-10 Data					
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²	
B01	R01	02/05/2022	y = 1.171x-0.211	0.997	
B02	R02	02/05/2022	y = 0.960x+5.104	0.998	
B03	R03	04/05/2022	y = 1.214x-5.211	0.996	
B04	R04	02/05/2022	y = 1.310x-9.479	0.999	
B05	R05	03/05/2022	y = 1.202x-5.734	0.999	
B06	R06	04/05/2022	y = 1.241x-7.631	0.998	
B07	R07	04/05/2022	y = 1.186x-4.480	0.999	
B08	R08	03/05/2022	y = 1.322x-8.634	0.999	
B09	R09	04/05/2022	y = 1.219x-5.756	0.998	
B10	R10	03/05/2022	y = 1.234x-7.417	1.000	
B11	R11	02/05/2022	y = 1.260x-7.479	0.999	
B12	R12	02/05/2022	y = 1.225x-5.900	0.998	
B13	R13	04/05/2022	y = 1.326x-10.711	0.999	
B14	R14	07/05/2022	y = 1.197x-3.534	0.999	
B15	R15	04/05/2022	y = 1.096x-0.244	0.998	
B16	R16	04/05/2022	y = 1.209x-1.612	1.000	
B17	R17	03/05/2022	y = 1.198x-3.075	0.999	
B18	R18	07/05/2022	y = 1.159x-2.421	0.999	
B19	R19	03/05/2022	y = 1.053x+1.562	0.999	
B20	R20	03/05/2022	y = 1.206x-6.147	1.000	
B21	R21	04/05/2022	y = 1.156x-0.999	0.998	
B22	R22	04/05/2022	y = 1.293x-8.368	0.998	
B23	R23	07/05/2022	y = 1.149x-2.644	1.000	
B24	R24	02/05/2022	y = 1.250x-7.392	1.000	
B25	R25	03/05/2022	y = 1.131x-2.476	0.999	
B26	R26	07/05/2022	y = 1.154x+1.978	1.000	
B27	R27	02/05/2022	y = 1.276x-8.984	0.998	
B28	R28	04/05/2022	y = 1.093x-0.217	0.999	
B29	R29	04/05/2022	y = 1.280x-9.168	0.999	
B30	R30	03/05/2022	y = 1.290x-8.822	0.997	
B31	R31	03/05/2022	y = 1.116x-0.814	0.987	
B32	R32	05/05/2022	y = 1.156x-3.473	0.999	
B33	R33	06/05/2022	y = 1.254x-8.680	0.998	
B34	R34	03/05/2022	y = 1.157x-1.629	0.999	



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High Volume PM-10 Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard				Model : TE 5025A	S/N : 3095
Calibration Data					
High Volume PM-10 Data					
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²	
R01	R01	06/05/2022	y = 1.220x-6.822	0.999	
R02	R02	16/05/2022	y = 1.196x-6.112	0.998	
R03	R03	04/05/2022	y = 1.172x-3.836	1.000	
R04	R04	06/05/2022	y = 1.094x-1.025	0.998	
R05	R05	06/05/2022	y = 1.118x-2.214	0.999	
R06	R06	03/05/2022	y = 1.327x-9.050	0.999	
R07	R07	10/05/2022	y = 1.123x-1.146	0.998	
R08	R08	06/05/2022	y = 1.178x-4.322	0.998	
R09	R09	06/05/2022	y = 1.182x-5.965	0.998	
R10	R10	10/05/2022	y = 1.131x-2.385	0.997	
R11	R11	03/05/2022	y = 1.275x-7.441	0.999	
R12	R12	10/05/2022	y = 1.173x-4.483	0.997	
R13	R13	10/05/2022	y = 1.230x-5.394	1.000	
R14	R14	03/05/2022	y = 1.157x-2.812	0.998	
R15	R15	03/05/2022	y = 1.242x-7.800	0.997	
R16	R16	02/05/2022	y = 1.240x-6.268	0.999	
R17	R17	10/05/2022	y = 1.183x-4.691	0.985	
R18	R18	04/05/2022	y = 1.166x-3.714	0.999	
R19	R19	04/05/2022	y = 1.239x-7.405	0.998	
R20	R20	03/05/2022	y = 1.145x-4.137	0.999	

Gas Sampler Box Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Dry Cal DCL-ML

S/N : 136164

Calibration Data									
Gas Sampler Data		Calibration Data							
No.	Rotameter	Date	Setting (Constant Flow) (ml/min)	Actual Flow Rate (ml/min)					
				Sampling Line A		Sampling Line B		Standard Condition	Normal Condition
				Normal Condition	Standard Condition	Normal Condition	Standard Condition		
B01	2 (A&B)	01/12/2021	200	200.6	199.1	200.7	199.2	199.2	
B02	2 (A&B)	01/12/2021	200	200.5	199.1	200.4	199.0	199.0	
B03	2 (A&B)	01/12/2021	200	200.6	199.2	200.5	199.1	199.1	
B04	2 (A&B)	01/12/2021	200	200.5	199.0	200.5	199.1	199.1	
B05	2 (A&B)	01/12/2021	200	200.7	199.2	200.6	199.2	199.2	
B06	2 (A&B)	02/12/2021	200	200.6	199.2	200.6	199.1	199.1	
B07	2 (A&B)	02/12/2021	200	200.5	199.1	200.4	199.0	199.0	
B08	2 (A&B)	02/12/2021	200	200.6	199.2	200.7	199.2	199.2	
B09	2 (A&B)	02/12/2021	200	200.5	199.1	200.5	199.0	199.0	
B10	2 (A&B)	02/12/2021	200	200.5	199.1	200.6	199.1	199.1	
B11	2 (A&B)	02/12/2021	200	200.5	199.1	200.6	199.2	199.2	
B12	2 (A&B)	03/12/2021	200	200.5	199.0	200.5	199.1	199.1	
B13	2 (A&B)	03/12/2021	200	200.4	199.0	200.5	199.0	199.0	
B14	2 (A&B)	03/12/2021	200	200.5	199.0	200.6	199.1	199.1	
B15	2 (A&B)	03/12/2021	200	200.6	199.2	200.5	199.1	199.1	
B16	2 (A&B)	03/12/2021	200	200.5	199.1	200.6	199.2	199.2	
B17	2 (A&B)	03/12/2021	200	200.5	199.1	200.4	199.0	199.0	

Gas Sampler Box Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Dry Cal DCL-ML

S/N : 136164

Calibration Data									
Gas Sampler Data		Calibration Data							
No.	Rotameter	Date	Setting (Constant Flow) (ml/min)	Actual Flow Rate (ml/min)					
				Sampling Line A		Sampling Line B		Standard Condition	Normal Condition
				Normal Condition	Standard Condition	Normal Condition	Standard Condition		
B01	2 (A&B)	03/03/2022	200	200.5	199.0	200.4	199.0	199.0	
B02	2 (A&B)	03/03/2022	200	200.3	198.9	200.5	199.1	199.1	
B03	2 (A&B)	03/03/2022	200	200.5	199.1	200.5	199.0	199.0	
B04	2 (A&B)	03/03/2022	200	200.4	198.9	200.6	199.2	199.2	
B05	2 (A&B)	03/03/2022	200	200.5	199.1	200.5	199.1	199.1	
B06	2 (A&B)	03/03/2022	200	200.6	199.2	200.4	199.0	199.0	
B07	2 (A&B)	03/03/2022	200	200.5	199.0	200.5	199.1	199.1	
B08	2 (A&B)	03/03/2022	200	200.5	199.1	200.5	199.0	199.0	
B09	2 (A&B)	04/03/2022	200	200.6	199.2	200.5	199.1	199.1	
B10	2 (A&B)	04/03/2022	200	200.4	198.9	200.5	199.0	199.0	
B11	2 (A&B)	04/03/2022	200	200.6	199.2	200.6	199.1	199.1	
B12	2 (A&B)	04/03/2022	200	200.5	199.1	200.6	199.2	199.2	
B13	2 (A&B)	04/03/2022	200	200.5	199.1	200.5	199.1	199.1	
B14	2 (A&B)	04/03/2022	200	200.6	199.1	200.6	199.2	199.2	
B15	2 (A&B)	04/03/2022	200	200.6	199.1	200.5	199.0	199.0	
B16	2 (A&B)	04/03/2022	200	200.4	199.0	200.5	199.1	199.1	
B17	2 (A&B)	04/03/2022	200	200.5	199.0	200.5	199.1	199.1	

Gas Sampler Box Calibration Report

Calibration Method : Dry Cal Primary Flowmeter	Model : Dry Cal DCL-ML	S/N : 136164
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Gas Sampler Data		Calibration Data				
		Setting		Actual Flow Rate (ml/min)		
		Date	(Constant Flow) (ml/min)	Sampling Line A		Sampling Line B
No.	Rotameter			Normal Condition	Standard Condition	Standard Condition
B01	2 (A&B)	01/06/2022	200	200.4	199.0	200.6
B02	2 (A&B)	01/06/2022	200	200.6	199.1	200.5
B03	2 (A&B)	03/06/2022	200	200.5	199.0	200.5
B04	2 (A&B)	02/06/2022	200	200.5	199.1	200.6
B05	2 (A&B)	01/06/2022	200	200.4	199.0	200.5
B06	2 (A&B)	01/06/2022	200	200.5	199.1	200.4
B07	2 (A&B)	03/06/2022	200	200.3	198.9	200.5
B08	2 (A&B)	01/06/2022	200	200.5	199.1	200.4
B09	2 (A&B)	01/06/2022	200	200.4	199.0	200.3
B10	2 (A&B)	02/06/2022	200	200.5	199.0	200.5
B11	2 (A&B)	01/06/2022	200	200.4	199.0	200.7
B12	2 (A&B)	01/06/2022	200	200.5	199.1	200.5
B13	2 (A&B)	02/06/2022	200	200.4	199.0	200.5
B14	2 (A&B)	02/06/2022	200	200.5	199.0	200.4
B15	2 (A&B)	03/06/2022	200	200.6	199.2	200.6
B16	2 (A&B)	01/06/2022	200	200.5	199.0	200.5
B17	2 (A&B)	01/06/2022	200	200.5	199.0	200.4



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ration Report

Model

25	\pm
1010	\pm

Personal Pump Data				Calibration Data												
No.	Brand	Model	Serial No.	Date	Flow Rate (m/min)						Value From Calibration Curve					
					Setting			Actual (Q std.)			y			R ²		
					1	2	3	1	2	3	1	2	3	1	2	3
B41	SKC	224-PCXN84	612669	05/10/2021	1,000	1,50	2,000	995	1,498	1,993	0.986x + 2.061	1,000				
B42	SKC	224-PCXN84	624041	05/10/2021	1,000	1,50	2,000	1,000	1,499	1,499	1.013x - 34.407	0.999				
B43	SKC	224-PCXN88	034636	05/10/2021	1,000	1,50	2,000	995	1,491	1,996	- 0.988x - 1.527	1,000				
B44	SKC	224-PCXN88	529341	05/10/2021	1,000	1,50	2,000	995	1,503	2,000	1.014x - 29.666	0.999				
B45	SKC	224-PCXN88	5293694	05/10/2021	1,000	1,50	2,000	1,003	1,501	2,002	1.011x - 32.903	0.999				
B46	SKC	224-PCXN88	566747	01/10/2021	1,000	1,50	2,000	998	1,489	1,996	1.011x - 5.963	1,000				
B47	SKC	224-PCXN88	566747	01/10/2021	1,000	1,50	2,000	1,001	1,498	2,004	1.014x - 35.764	0.999				
B48	SKC	224-PCXN88	566763	01/10/2021	1,000	1,50	2,000	993	1,505	1,999	1.014x - 31.221	0.999				
B49	SKC	224-PCXN88	566780	01/10/2021	1,000	1,50	2,000	995	1,495	1,993	0.987 + 0.715	1,000				
B50	SKC	224-PCXN88	560400	01/10/2021	1,000	1,50	2,000	1,002	1,494	1,993	0.991 + 8.494	1,000				
B51	SKC	224-PCXN88	500363	01/10/2021	1,000	1,50	2,000	1,000	1,402	2,002	1.012x - 23.105	0.999				
B52	SKC	224-PCXN88	709186	01/10/2021	1,000	1,50	2,000	995	1,488	1,991	- 0.986x - 0.909	1,000				
B53	SKC	224-PCXN88	076370	01/10/2021	1,000	1,50	2,000	996	1,503	2,000	1.013x - 27.432	0.999				
B54	SKC	224-PCXN83	509821	05/10/2021	1,000	1,50	2,000	1,001	1,491	1,989	0.989x + 8.406	1,000				
B55	SKC	224-PCXN83	510710	05/10/2021	1,000	1,50	2,000	1,002	1,501	2,002	1.012x - 22.811	0.999				
B56	SKC	224-PCXN83	511460	05/10/2021	1,000	1,50	2,000	1,002	1,489	2,004	1.012x - 22.867	0.999				
B57	SKC	224-PCXN83	510788	07/10/2021	1,000	1,50	2,000	996	1,495	1,990	0.994x + 8.423	1,000				
B58	SKC	224-PCXN83	509862	06/10/2021	1,000	1,50	2,000	995	1,494	1,992	0.985x + 2.324	1,000				
B59	SKC	224-PCXN83	509862	05/10/2021	1,000	1,50	2,000	994	1,501	1,997	1.013x - 30.065	0.999				
B60	SKC	224-PCXN83	512655	05/10/2021	1,000	1,50	2,000	996	1,497	1,997	0.988x - 0.745	1,000				
B61	SKC	224-PCXN83	503915	05/10/2021	1,000	1,50	2,000	1,003	1,499	2,003	1.011x - 21.718	0.999				
B62	SKC	224-PCXN83	505975	05/10/2021	1,000	1,50	2,000	991	1,502	1,999	1.015x - 34.066	0.999				
B63	SKC	224-PCXN83	511432	05/10/2021	1,000	1,50	2,000	996	1,496	1,992	0.986x + 1.837	1,000				
B64	SKC	224-PCXN83	508302	05/10/2021	1,000	1,50	2,000	1,001	1,500	2,003	1.013x - 25.433	0.999				
B65	SKC	224-PCXN83	508310	05/10/2021	1,000	1,50	2,000	993	1,495	1,990	0.997x - 3.424	1,000				
B66	SKC	224-PCXN83	509861	05/10/2021	1,000	1,50	2,000	997	1,503	1,998	1.011x - 25.489	0.999				
B67	SKC	224-PCXN83	508285	07/10/2021	1,000	1,50	2,000	996	1,496	1,994	1.000x - 3.715	1,000				
B68	SKC	224-PCXN83	508372	07/10/2021	1,000	1,50	2,000	1,001	1,489	2,003	1.013x - 25.290	0.999				
B69	SKC	224-PCXN83	508375	07/10/2021	1,000	1,50	2,000	994	1,500	2,000	1.014x - 30.240	0.999				
B70	SKC	224-PCXN83	510623	07/10/2021	1,000	1,50	2,000	996	1,496	1,994	0.999x - 3.013	1,000				
B71	SKC	224-PCXN83	508367	07/10/2021	1,000	1,50	2,000	995	1,502	1,999	1.013x - 29.438	0.999				
B72	SKC	224-PCXN83	505977	07/10/2021	1,000	1,50	2,000	1,004	1,500	2,001	1.009x - 19.461	0.999				
B73	SKC	224-PCXN83	512606	07/10/2021	1,000	1,50	2,000	997	1,498	1,993	0.994x + 3.767	1,000				
B74	SKC	224-PCXN83	505993	07/10/2021	1,000	1,50	2,000	990	1,494	1,991	0.999x - 4.105	1,000				
B75	SKC	224-PCXN83	509820	07/10/2021	1,000	1,50	2,000	1,003	1,500	2,000	1.009x - 18.426	0.999				
B76	SKC	224-PCXN83	509811	07/10/2021	1,000	1,50	2,000	990	1,503	1,999	1.016x - 34.425	0.999				
B77	SKC	224-PCXN83	508301	07/10/2021	1,000	1,50	2,000	999	1,495	1,992	0.992x + 6.676	1,000				
B78	SKC	224-PCXN83	510677	07/10/2021	1,000	1,50	2,000	1,002	1,502	2,001	1.012x - 23.301	0.999				
B79	SKC	224-PCXN83	510920	07/10/2021	1,000	1,50	2,000	998	1,506	1,999	1.010x - 23.771	0.999				

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Corporation Report

Model

25	± 0
1010	± 1

Personal Pump Data				Calibration Data													
No.	Brand	Model	Serial No.	Date	Flow Rate (m/min)					Actual (Q_act)					Value From Calibration Curve		
					1	2	3	Setting	1	2	3	1	2	3	y	R ²	
B41	SKC	224-PCX84	612689	10/01/2022	1,000	1,500	2,000	998	1,496	1,989	0.990x + 2.680	1,000					
B42	SKC	224-PCX84	612641	07/01/2022	1,000	1,500	2,000	1,003	1,498	1,992	0.990x + 11.710	1,000					
B43	SKC	224-PCX84	034636	05/01/2022	1,000	1,500	2,000	998	1,500	1,992	0.992x + 8.392	1,000					
B44	SKC	224-PCX88	529341	07/01/2022	1,000	1,500	2,000	1,004	1,500	2,003	1.011x - 21.139	0.999					
B45	SKC	224-PCX88	5293694	07/01/2022	1,000	1,500	2,000	997	1,498	1,992	0.985x + 2.728	1,000					
B46	SKC	224-PCX88	566743	07/01/2022	1,000	1,500	2,000	994	1,504	2,002	1.015x - 32.087	0.999					
B47	SKC	224-PCX88	566747	07/01/2022	1,000	1,500	2,000	1,002	1,501	2,003	1.013x - 33.560	0.999					
B48	SKC	224-PCX88	566763	07/01/2022	1,000	1,500	2,000	1,000	1,494	1,996	0.996x + 1.567	1,000					
B49	SKC	224-PCX88	566780	07/01/2022	1,000	1,500	2,000	1,002	1,501	2,004	1.012x - 22.236	0.999					
B50	SKC	224-PCX88	500400	07/01/2022	1,000	1,500	2,000	1,000	1,493	1,996	0.996x + 3.641	1,000					
B51	SKC	224-PCX88	500363	07/01/2022	1,000	1,500	2,000	995	1,504	2,000	1.013x - 27.704	0.999					
B52	SKC	224-PCX88	903186	07/01/2022	1,000	1,500	2,000	995	1,498	1,994	0.997x - 0.283	1,000					
B53	SKC	224-PCX88	707670	10/01/2022	1,000	1,500	2,000	1,002	1,499	2,004	1.012x - 23.650	0.999					
B54	SKC	224-PCX83	509821	05/01/2022	1,000	1,500	2,000	994	1,501	2,001	1.015x - 32.043	0.999					
B55	SKC	224-PCX83	510710	06/01/2022	1,000	1,500	2,000	1,000	1,494	1,994	0.994x + 4.830	1,000					
B56	SKC	224-PCX83	511460	06/01/2022	1,000	1,500	2,000	1,004	1,502	2,002	1.010x - 19.246	0.999					
B57	SKC	224-PCX83	510798	06/01/2022	1,000	1,500	2,000	997	1,492	1,996	0.996x + 1.747	1,000					
B58	SKC	224-PCX83	509862	06/01/2022	1,000	1,500	2,000	997	1,499	2,000	1.011x - 27.010	0.999					
B59	SKC	224-PCX83	509862	06/01/2022	1,000	1,500	2,000	997	1,495	1,991	0.995x + 3.833	1,000					
B60	SKC	224-PCX83	512655	06/01/2022	1,000	1,500	2,000	1,002	1,500	2,004	1.013x - 24.686	0.999					
B61	SKC	224-PCX83	503915	06/01/2022	1,000	1,500	2,000	994	1,488	1,999	1.005x - 12.631	1,000					
B62	SKC	224-PCX83	505975	10/01/2022	1,000	1,500	2,000	994	1,491	1,995	1.002x - 8.069	1,000					
B63	SKC	224-PCX83	511432	10/01/2022	1,000	1,500	2,000	992	1,501	2,000	1.016x - 33.906	0.999					
B64	SKC	224-PCX83	508302	10/01/2022	1,000	1,500	2,000	998	1,493	1,990	0.994x + 4.272	1,000					
B65	SKC	224-PCX83	508310	10/01/2022	1,000	1,500	2,000	1,002	1,500	2,004	1.012x - 23.077	0.999					
B66	SKC	224-PCX83	509861	10/01/2022	1,000	1,500	2,000	997	1,494	1,994	0.995x + 3.953	1,000					
B67	SKC	224-PCX83	502895	10/01/2022	1,000	1,500	2,000	993	1,507	2,002	1.017x - 34.003	0.998					
B68	SKC	224-PCX83	503872	13/01/2022	1,000	1,500	2,000	1,000	1,495	1,994	0.995x + 4.188	1,000					
B69	SKC	224-PCX83	508375	13/01/2022	1,000	1,500	2,000	1,002	1,501	2,002	1.011x - 21.984	0.999					
B70	SKC	224-PCX83	510623	13/01/2022	1,000	1,500	2,000	995	1,490	1,997	1.001x - 7.267	1,000					
B71	SKC	224-PCX83	509837	13/01/2022	1,000	1,500	2,000	991	1,506	2,001	1.017x - 35.429	0.999					
B72	SKC	224-PCX83	509397	13/01/2022	1,000	1,500	2,000	1,001	1,498	1,991	0.991x + 8.882	1,000					
B73	SKC	224-PCX83	512606	13/01/2022	1,000	1,500	2,000	1,001	1,501	2,004	1.013x - 23.520	0.999					
B74	SKC	224-PCX83	505993	13/01/2022	1,000	1,500	2,000	996	1,495	1,995	1.006x - 5.161	1,000					
B75	SKC	224-PCX83	509820	13/01/2022	1,000	1,500	2,000	996	1,499	1,992	0.996x + 1.831	1,000					
B76	SKC	224-PCX83	509811	13/01/2022	1,000	1,500	2,000	995	1,496	1,998	1.003x - 9.050	1,000					
B77	SKC	224-PCX83	508301	13/01/2022	1,000	1,500	2,000	1,001	1,500	2,000	1.014x - 26.959	0.999					
B78	SKC	224-PCX83	510677	13/01/2022	1,000	1,500	2,000	994	1,504	1,999	1.013x - 38.236	0.999					
B79	SKC	224-PCX83	510920	12/01/2022	1,000	1,500	2,000	994	1,493	1,994	0.99x - 4.304	1,000					



Model : Defender 510-H	S/N : 136164
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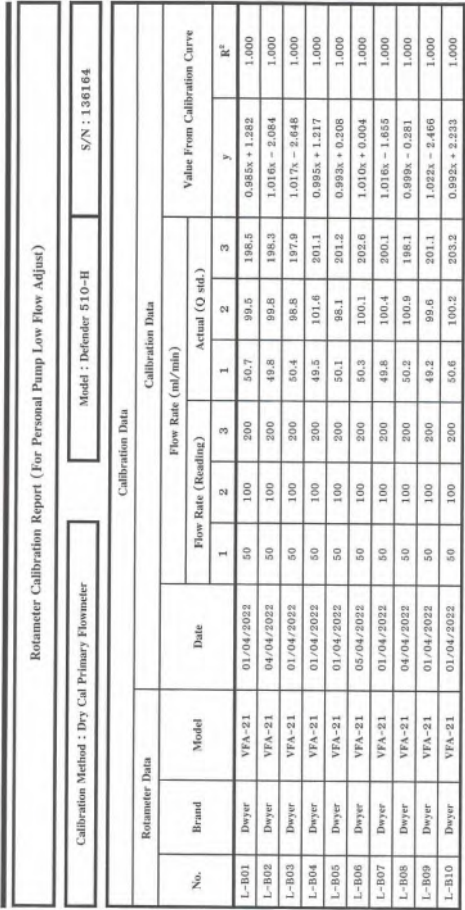
Environmental Conditions		η_c
Temperature	25	3
Pressure	1.0 ± 0.1	13

Personal Pump Data			Calibration Data									
No.	Brand	Model	Serial No.	Date	Flow Rate (cm/min)				Value From Calibration Curve			
					Setting				Actual (Q cal.)			
					1	2	3		1	2	3	
B41	SKC	224-PCXR4	612669	04/04/2022	1,000	1,500	2,000	998	1,496	1,989	\bar{y}	R^2
B42	SKC	224-PCXR4	616041	01/04/2022	1,000	1,500	2,000	1,003	1,498	1,993	$0.990x + 12.348$	1.000
B43	SKC	224-PCXR4	034636	11/04/2022	1,000	1,500	2,000	1,001	1,501	1,992	$0.990x + 12.839$	1.000
B44	SKC	224-PCXR8	529341	01/04/2022	1,000	1,500	2,000	1,002	1,501	2,002	$1.011x - 21.577$	0.999
B45	SKC	224-PCXR8	528594	12/04/2022	1,000	1,500	2,000	997	1,498	1,992	$0.995x + 3.928$	1.000
B46	SKC	224-PCXR8	666743	04/04/2022	1,000	1,500	2,000	994	1,504	2,002	$1.016x - 33.204$	0.999
B47	SKC	224-PCXR8	566747	01/04/2022	1,000	1,500	2,000	1,002	1,500	2,004	$1.013x - 24.902$	0.999
B48	SKC	224-PCXR8	666753	01/04/2022	1,000	1,500	2,000	999	1,494	1,997	$0.999x + 1.795$	1.000
B49	SKC	224-PCXR8	566760	19/04/2022	1,000	1,500	2,000	1,002	1,502	2,003	$1.011x - 21.031$	0.999
B50	SKC	224-PCXR8	500400	01/04/2022	1,000	1,500	2,000	1,003	1,495	2,002	$1.001x + 3.240$	1.000
B51	SKC	224-PCXR8	600963	01/04/2022	1,000	1,500	2,000	995	1,504	2,000	$1.012x - 26.298$	0.999
B52	SKC	224-PCXR8	098318	11/04/2022	1,000	1,500	2,000	996	1,498	1,994	$0.997x - 1.240$	1.000
B53	SKC	224-PCXR8	707670	01/04/2022	1,000	1,500	2,000	1,002	1,499	2,004	$1.012x - 22.742$	0.999
B54	SKC	224-PCXR3	609821	11/04/2022	1,000	1,500	2,000	993	1,501	2,001	$1.018x - 33.718$	0.999
B55	SKC	224-PCXR3	510710	01/04/2022	1,000	1,500	2,000	1,000	1,484	1,994	$0.984x + 4.655$	1.000
B56	SKC	224-PCXR3	511450	01/04/2022	1,000	1,500	2,000	1,002	1,500	2,001	$1.011x - 20.684$	0.999
B57	SKC	224-PCXR3	510796	12/04/2022	1,000	1,500	2,000	997	1,493	1,996	$1.001x + 3.398$	1.000
B58	SKC	224-PCXR3	509652	04/04/2022	1,000	1,500	2,000	1,001	1,498	2,000	$1.007x - 19.631$	0.999
B59	SKC	224-PCXR3	509862	01/04/2022	1,000	1,500	2,000	996	1,503	1,995	$0.998x + 2.916$	1.000
B60	SKC	224-PCXR3	512655	01/04/2022	1,000	1,500	2,000	1,002	1,500	2,004	$1.013x - 23.891$	0.999
B61	SKC	224-PCXR3	503915	12/04/2022	1,000	1,500	2,000	994	1,489	1,999	$1.004x - 11.786$	1.000
B62	SKC	224-PCXR3	505975	12/04/2022	1,000	1,500	2,000	989	1,494	1,995	$0.997x - 9.503$	1.000
B63	SKC	224-PCXR3	511432	01/04/2022	1,000	1,500	2,000	991	1,501	2,000	$1.017x - 36.139$	0.999
B64	SKC	224-PCXR3	508302	04/04/2022	1,000	1,500	2,000	997	1,493	1,990	$0.994x + 3.892$	1.000
B65	SKC	224-PCXR3	608310	01/04/2022	1,000	1,500	2,000	1,002	1,500	2,003	$1.012x - 23.109$	0.999
B66	SKC	224-PCXR3	509861	12/04/2022	1,000	1,500	2,000	1,002	1,491	1,991	$0.987x + 14.701$	1.000
B67	SKC	224-PCXR3	506295	12/04/2022	1,000	1,500	2,000	993	1,507	2,004	$1.017x - 33.104$	0.999
B68	SKC	224-PCXR3	506872	12/04/2022	1,000	1,500	2,000	1,002	1,491	1,997	$0.994x + 3.556$	1.000
B69	SKC	224-PCXR3	508375	01/04/2022	1,000	1,500	2,000	1,001	1,500	2,000	$1.010x - 21.689$	0.999
B70	SKC	224-PCXR3	510623	11/04/2022	1,000	1,500	2,000	992	1,503	1,997	$1.012x - 6.693$	1.000
B71	SKC	224-PCXR3	504967	12/04/2022	1,000	1,500	2,000	991	1,506	2,002	$1.018x - 36.227$	0.999
B72	SKC	224-PCXR3	505977	12/04/2022	1,000	1,500	2,000	1,001	1,498	1,993	$0.992x + 7.087$	1.000
B73	SKC	224-PCXR3	612606	01/04/2022	1,000	1,500	2,000	1,001	1,501	2,005	$1.014x - 24.517$	0.999
B74	SKC	224-PCXR3	505993	12/04/2022	1,000	1,500	2,000	996	1,495	1,994	$0.999x - 4.363$	1.000
B75	SKC	224-PCXR3	509820	12/04/2022	1,000	1,500	2,000	996	1,499	1,992	$0.995x + 2.459$	1.000
B76	SKC	224-PCXR3	509811	12/04/2022	1,000	1,500	2,000	992	1,498	1,998	$1.007x - 15.940$	1.000
B77	SKC	224-PCXR3	508301	12/04/2022	1,000	1,500	2,000	1,000	1,501	2,003	$1.014x - 26.643$	0.999
B78	SKC	224-PCXR3	510877	01/04/2022	1,000	1,500	2,000	996	1,503	1,999	$1.013x - 27.540$	0.999
B79	SKC	224-PCXR3	510920	01/04/2022	1,000	1,500	2,000	994	1,493	1,994	$1.019x - 3.705$	1.000

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Rotameter Calibration Report (For Personal Pump Low Flow Adjust)											
Calibration Method : Dry Cal Primary Flowmeter					Model : Defender 510-H						
					S/N : 136633						
Calibration Data											
Rotameter Data				Calibration Data							
No.	Brand	Model	Date	Flow Rate (ml/min)						Value From Calibration Curve	
				Actual (Q std.)						y	R ²
				1	2	3	1	2	3		
L-B01	Dwyer	VFA-21	01/10/2021	50	100	200	49.7	98.7	201.6	1.002x - 0.298	1.000
L-B02	Dwyer	VFA-21	04/10/2021	50	100	200	49.5	99.7	200.5	0.989x + 0.651	1.000
L-B03	Dwyer	VFA-21	06/10/2021	50	100	200	49.9	98.8	197.6	0.998x - 0.812	1.000
L-B04	Dwyer	VFA-21	05/10/2021	50	100	200	49.8	98.4	199.3	1.002x - 1.169	1.000
L-B05	Dwyer	VFA-21	04/10/2021	50	100	200	50.4	100.3	198.8	0.988x + 1.330	1.000
L-B06	Dwyer	VFA-21	04/10/2021	50	100	200	50.1	100.7	200.2	0.992x + 0.996	1.000
L-B07	Dwyer	VFA-21	04/10/2021	50	100	200	49.9	98.8	202.4	0.999x - 0.095	1.000
L-B08	Dwyer	VFA-21	01/10/2021	50	100	200	50.1	99.4	200.7	1.005x - 0.462	1.000
L-B09	Dwyer	VFA-21	01/10/2021	50	100	200	50.1	99.3	201.5	0.997x + 0.544	1.000
L-B10	Dwyer	VFA-21	01/10/2021	50	100	200	49.4	100.0	200.5	1.008x - 0.997	1.000

Rotameter Calibration Report (For Personal Pump Low Flow Adjust)											
Calibration Method : Dry Cal Primary Flowmeter					Model : Defender 510-H						
					S/N : 136164						
Calibration Data											
Rotameter Data			Calibration Data								
No.	Brand	Model	Date	Flow Rate (ml/min)						Value From Calibration Curve	
				Flow Rate (Reading)			Actual (Q std.)				
				1	2	3	1	2	3	y	R ²
L-B01	Dwyer	VFA-21	05/01/2022	50	100	200	50.5	99.3	199.9	0.992x + 0.587	1.000
L-B02	Dwyer	VFA-21	05/01/2022	50	100	200	49.4	99.2	199.3	0.993x - 0.049	1.000
L-B03	Dwyer	VFA-21	06/01/2022	50	100	200	50.0	98.8	198.5	0.998x - 0.422	1.000
L-B04	Dwyer	VFA-21	06/01/2022	50	100	200	49.5	100.4	200.3	0.994x + 0.727	1.000
L-B05	Dwyer	VFA-21	06/01/2022	50	100	200	49.8	98.4	198.2	1.004x - 1.156	1.000
L-B06	Dwyer	VFA-21	07/01/2022	50	100	200	49.9	100.7	198.8	0.992x + 0.922	1.000
L-B07	Dwyer	VFA-21	07/01/2022	50	100	200	49.8	100.2	199.2	1.007x - 1.047	1.000
L-B08	Dwyer	VFA-21	06/01/2022	50	100	200	50.2	99.9	200.7	0.994x + 0.769	1.000
L-B09	Dwyer	VFA-21	07/01/2022	50	100	200	49.8	99.8	199.6	1.010x - 1.438	1.000
L-B10	Dwyer	VFA-21	05/01/2022	50	100	200	50.6	100.2	201.6	0.991x + 1.825	1.000



CALIBRATION REPORT									
CHEMILUMINESCENT NO / NO _x ANALYZER									
DATE :	05 January 2022	BRAND :	API	MODEL :	200E				
NO.	NOX-B11			SERIAL NO.	4467				
Calibrator (Dilution System)									
Brand	: API			Model	: 700				
Last Cal. Date	: 05 August 2021			Serial No.	: 911				
Reference Standard Gas									
Standard Gas	: Nitric Oxide (NO)			Cylinder No.	: A00917SK				
Certified Date	: 01 June 2020			Expired Date	: 01 June 2022 : 49.9 ppm				
CALIBRATING CONDITION									
Pressure	1011	mmbar	Temp.	24.5	°C	% RH	49		
CALIBRATION SETTING									
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB					
	Set Point	Expected Concentration	Analyzer Response	%Diff	Analyzer Response	Slope			
Zero	0	0.11	-	0	-	-			
NO Span	400	400.1	0.025	400.0	1.006	-			
NO _x Span	400	400.5	0.125	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		103.1	mV		-20 - 150				
AZERO		93.9	mV		-20 - 150				
HVPS		675	V		420 - 900 constant				
RCCELL TEMP		50.3	°C		50 ± 1				
BOX TEMP		29.0	°C		8 - 48				
PMT TEMP		7.1	°C		7 ± 2				
MOLY TEMP		315.2	°C		315 ± 5				
RCCELL 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		1.006	-		1.0 ± 0.3				
NO _x Slope		1.011	-		1.0 ± 0.3				
NO Offset		1.6	mV		-20 to +150				
NO _x Offset		1.0	mV		-20 to 150				
Stability at Zero		0.1	PPB		< 0.2				
Stability at Span		0.2	PPB		< 2 ppb @ 400 ppb span gas				

CALIBRATION REPORT									
CHEMILUMINESCENT NO / NO _x ANALYZER									
DATE :	05 January 2022	BRAND :	API	MODEL :	200E				
NO.	NOX-R09			SERIAL NO.	252				
Calibrator (Dilution System)									
Brand	: API			Model	: 700				
Last Cal. Date	: 05 August 2021			Serial No.	: 911				
Reference Standard Gas									
Standard Gas	: Nitric Oxide (NO)			Cylinder No.	: A00917SK				
Certified Date	: 01 June 2020			Expired Date	: 01 June 2022 : 49.9 ppm				
CALIBRATING CONDITION									
Pressure	1011	mmbar	Temp.	24.5	°C	% RH	49		
CALIBRATION SETTING									
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB					
	Set Point	Expected Concentration	Analyzer Response	%Diff	Analyzer Response	Slope			
Zero	0	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		509	cc/min		500 ± 50				
OZONE FLOW		78	cc/min		80 ± 15				
PMT		103.3	mV		-20 - 150				
AZERO		94.0	mV		-20 - 150				
HVPS		674	V		420 - 900 constant				
RCCELL TEMP		50.2	°C		50 ± 1				
BOX TEMP		29.5	°C		8 - 48				
PMT TEMP		7.3	°C		7 ± 2				
MOLY TEMP		314.7	°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		1.003	-		1.0 ± 0.3				
NO _x Slope		1.007	-		1.0 ± 0.3				
NO Offset		1.0	mV		-20 to +150				
NO _x Offset		0.6	mV		-20 to 150				
Stability at Zero		0.1	PPB		< 0.2				
Stability at Span		0.2	PPB		< 2 ppb @ 400 ppb span gas				

CALIBRATION REPORT

CHEMILUMINESCENT NO / NO_x / NO₂ ANALYZER

DATE :	31 January 2022	BRAND :	API	MODEL :	200E
NO.	NOX-B11			SERIAL NO.	4467
Calibrator (Dilution System)					
Brand :	API				
Last Cal. Date :	05 August 2021				
	Model :				
	Serial No. :				
Reference Standard Gas					
Standard Gas :	Nitric Oxide (NO)				
Certified Date :	01 June 2020				
	Expired Date : 01 June 2022				
	Cylinder No. : A00917SK				
	Cylinder Conc. : 49.9 ppm				
CALIBRATING CONDITION					
Pressure	1011 mmbar	Temp.	24.5 °C	% RH	49

CALIBRATION SETTING

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

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	504	cc/min	500 ± 50
OZONE FLOW	78	cc/min	80 ± 15
PMT	103.2	mV	-20 - 150
AZERO	93.9	mV	-20 - 150
HVPS	870	V	420 - 900 constant
RCCELL TEMP	50.1	°C	50 ± 1
BOX TEMP	29.4	°C	8 - 48
PMT TEMP	7.3	°C	7 ± 2
MOLY TEMP	314.9	°C	315 ± 5
RCCELL 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	0.999	-	1.0 ± 0.3
NO _x Slope	1.004	-	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

CALIBRATION REPORT

CHEMILUMINESCENT NO / NO_x / NO₂ ANALYZER

DATE :	31 January 2022	BRAND :	API	MODEL :	200E
NO.	NOX-R09			SERIAL NO.	252
Calibrator (Dilution System)					
Brand :	API				
Last Cal. Date :	05 August 2021				
	Model :				
	Serial No. :				
Reference Standard Gas					
Standard Gas :	Nitric Oxide (NO)				
Certified Date :	01 June 2020				
	Expired Date : 01 June 2022				
	Cylinder No. : A00917SK				
	Cylinder Conc. : 49.9 ppm				
CALIBRATING CONDITION					
Pressure	1011 mmbar	Temp.	24.5 °C	% RH	49

CALIBRATION SETTING

Span	Initial Reading (Before Adj.), PPB	% Dif	Analyzer Response	Final Reading (After Adj.), PPB
Set Point	Expected Concentration			
Zero	0	0.10	0	0
NO Span	400	399.8	-0.050	400.0
NO _x Span	400	400.2	0.050	400.0

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	512	cc/min	500 ± 50
OZONE FLOW	79	cc/min	80 ± 15
PMT	103.3	mV	-20 - 150
AZERO	94.2	mV	-20 - 150
HVPS	875	V	420 - 900 constant
RCCELL TEMP	50.2	°C	50 ± 1
BOX TEMP	29.1	°C	8 - 48
PMT TEMP	7.4	°C	7 ± 2
MOLY TEMP	314.7	°C	315 ± 5
RCCELL PRESS	8.4	IN-Hg-A	2 - 10 constant
SAMPLE PRESS	28.6	IN-Hg-A	25 - 30 constant
NO Span Conc	400	PPB	20 - 20,000
NO _x Span Conc	400	PPB	20 - 20,000
NO Slope	1.004	-	1.0 ± 0.3
NO _x Slope	1.007	-	1.0 ± 0.3
NO Offset	1.1	mV	-20 to +150
NO _x Offset	0.7	mV	-20 to 150
Stability at Zero	0.1	PPB	< 0.2
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas

CALIBRATION REPORT
CHEMILUMINESCENT NO / NO₂ / NO_x ANALYZER

DATE : 07 March 2022 BRAND : API MODEL : 200E
NO. NOX-B11 SERIAL NO. 4467

Calibrator (Dilution System)
Brand : API Model : 700
Last Cal. Date : 05 August 2021 Serial No. : 911

Reference Standard Gas
Standard Gas : Nitric Oxide (NO)
Cylinder No. : A00917SK
Certified Date : 01 June 2020 Expired Date : 01 June 2022 Cylinder Conc. : 49.9 ppm

CALIBRATING CONDITION
Pressure 1011 mmbar Temp. 24.5 °C % RH 49

CALIBRATION SETTING				
Span	Initial Reading (Before Adj.),PPB		Final Reading (After Adj.),PPB	
	Set Point	Expected Concentration	Analyzer Response	%Dif
Zero	0	400	0.10	-
			399.6	-0.100
NO Span	400	400	399.8	-0.050
NO _x Span	400	400	400.0	0.000

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		504	cc/min	500 ± 50
OZONE FLOW		78	cc/min	80 ± 15
PMT		103.0	mV	-20 - 150
AZERO		93.7	mV	-20 - 150
HVPS		674	V	420 - 900 constant
RCELL TEMP		50.1	°C	50 ± 1
BOX TEMP		29.0	°C	8 - 48
PMT TEMP		7.2	°C	7 ± 2
MOLY TEMP		315.2	°C	315 ± 5
RCELL PRESS		8.3	IN-Hg-A	2 - 10 constant
SAMPLE PRESS		28.4	IN-Hg-A	25 - 30 constant
NO Span Conc		400	PPB	20 - 20,000
NO _x Span Conc		400	PPB	20 - 20,000
NO Slope		0.998	-	1.0 ± 0.3
NO _x Slope		1.003	-	1.0 ± 0.3
NO Offset		1.0	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

CALIBRATION REPORT
CHEMILUMINESCENT NO / NO₂ / NO_x ANALYZER

DATE : 07 March 2022 BRAND : API MODEL : 200E
NO. NOX-R09 SERIAL NO. 252

Calibrator (Dilution System)
Brand : API Model : 700
Last Cal. Date : 05 August 2021 Serial No. : 911

Reference Standard Gas
Standard Gas : Nitric Oxide (NO)
Cylinder No. : A00917SK
Certified Date : 01 June 2020 Expired Date : 01 June 2022 Cylinder Conc. : 49.9 ppm

CALIBRATING CONDITION
Pressure 1011 mmbar Temp. 24.5 °C % RH 49

CALIBRATION SETTING				
Span	Initial Reading (Before Adj.),PPB		Final Reading (After Adj.),PPB	
	Set Point	Expected Concentration	Analyzer Response	%Dif
Zero	0	400	0.10	-
			400.1	0.025
NO Span	400	400	400.3	0.075
NO _x Span	400	400	400.0	0.000

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		511	cc/min	500 ± 50
OZONE FLOW		79	cc/min	80 ± 15
PMT		103.3	mV	-20 - 150
AZERO		94.2	mV	-20 - 150
HVPS		671	V	420 - 900 constant
RCELL TEMP		50.3	°C	50 ± 1
BOX TEMP		29.2	°C	8 - 48
PMT TEMP		7.4	°C	7 ± 2
MOLY TEMP		314.7	°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		1.005	-	1.0 ± 0.3
NO _x Slope		1.010	-	1.0 ± 0.3
NO Offset		1.3	mV	-20 to +150
NO _x Offset		0.9	mV	-20 to 150
Stability at Zero		0.1	PPB	< 0.2
Stability at Span		0.2	PPB	< 2 ppb @ 400 ppb span gas

CALIBRATION REPORT									
CHEMILUMINESCENT NO / NO _x ANALYZER									
DATE :	10 April 2022	BRAND :	API	MODEL :	200A				
NO.	NOX-B02	SERIAL NO.	2409						
Calibrator (Dilution System)									
Brand	: API			Model	: 700				
Last Cal. Date	: 05 August 2021			Serial No.	: 911				
Reference Standard Gas									
Standard Gas	: Nitric Oxide (NO)			Cylinder No.	: A00917SK				
Certified Date	: 01 June 2020			Expired Date	: 01 June 2022				
CALIBRATING CONDITION									
Pressure	1011	mmbar	Temp.	24.5	°C	% RH	48		
CALIBRATION SETTING									
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB					
Set Point	Expected Concentration	Analyzer Response	%Diff	Analyzer Response	Slope				
Zero	0	-0.10	-	0	-				
NO Span	400	399.7	-0.075	400.0	1.002				
NO _x Span	400	400.1	0.025	400.0	1.005				
API Model 200A NO _x Analyzer Check List									
Test Values		Observed Value		Units		Nominal Range			
RANGE		500	PPB			500 standard			
STABILITY (Zero Gas)		0.1	PPB			< 2 with zero air			
SAMPLE FLOW		511	cc/min			500 ± 50			
OZONE FLOW		79	cc/min			80 ± 15			
PMT		103.2	mV			-20 - 150			
AZERO		94.0	mV			-20 - 150			
HVPS		673	V			420 - 900 constant			
RCCELL TEMP		50.0	°C			50 ± 1			
BOX TEMP		28.8	°C			8 - 48			
PMT TEMP		7.3	°C			7 ± 2			
MOLY TEMP		314.8	°C			315 ± 5			
RCCELL PRESS		8.2	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		1.002	-			1.0 ± 0.3			
NO _x Slope		1.005	-			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			

CALIBRATION REPORT									
CHEMILUMINESCENT NO / NO _x ANALYZER									
DATE :	10 April 2022	BRAND :	API	MODEL :	200E				
NO.	NOX-B04	SERIAL NO.	750						
Calibrator (Dilution System)									
Brand	: API			Model	: 700				
Last Cal. Date	: 05 August 2021			Serial No.	: 911				
Reference Standard Gas									
Standard Gas	: Nitric Oxide (NO)			Cylinder No.	: A00917SK				
Certified Date	: 01 June 2020			Expired Date	: 01 June 2022				
CALIBRATING CONDITION									
Pressure	1011	mmbar	Temp.	24.5	°C	% RH	48		
CALIBRATION SETTING									
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB					
Set Point	Expected Concentration	Analyzer Response	%Diff	Analyzer Response	Slope				
Zero	0	0.10	-	0	-				
NO Span	400	400.2	0.050	400.0	1.008				
NO _x Span	400	400.4	0.100	400.0	1.012				
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		93.9	mV			-20 - 150			
HVPS		671	V			420 - 900 constant			
RCCELL TEMP		50.4	°C			50 ± 1			
BOX TEMP		29.3	°C			8 - 48			
PMT TEMP		7.1	°C			7 ± 2			
MOLY TEMP		315.3	°C			315 ± 5			
RCCELL 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		1.008	-			1.0 ± 0.3			
NO _x Slope		1.012	-			1.0 ± 0.3			
NO Offset		1.7	mV			-20 to +150			
NO _x Offset		1.0	mV			-20 to 150			
Stability at Zero		0.1	PPB			< 0.2			
Stability at Span		0.2	PPB			< 2 ppb @ 400 ppb span gas			

CALIBRATION REPORT									
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER									
DATE :	09 May 2022		BRAND :	API		MODEL :	200E		
NO.	NOX-B11					SERIAL NO.	4467		
Calibrator (Dilution System)									
Brand	: API			Model	: 700				
Last Cal. Date	: 05 August 2021			Serial No.	: 911				
Reference Standard Gas									
Standard Gas	: Nitric Oxide (NO)			Cylinder No.	: A00917SK				
Certified Date	: 01 June 2020			Expired Date	: 01 June 2022		Cylinder Conc.	: 49.9 ppm	
CALIBRATING CONDITION									
Pressure	1011 mmbar		Temp.	24.5 °C		% RH	49		
CALIBRATION SETTING									
Span	Initial Reading (Before Adj.),PPB					Final Reading (After Adj.),PPB			
Set Point	Expected Concentration		Analyzer Response		%Diff	Analyzer Response		Slope	
Zero	0		0.10		-	0		-	
NO Span	400		399.8		-0.050	400.0		1.004	
NO _x Span	400		400.2		0.050	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		508		cc/min		500 ± 50			
OZONE FLOW		78		cc/min		80 ± 15			
PMT		103.2		mV		-20 - 150			
AZERO		94.1		mV		-20 - 150			
HVPS		670		V		420 - 900 constant			
RCELL TEMP		50.3		°C		50 ± 1			
BOX TEMP		29.4		°C		8 - 48			
PMT TEMP		7.1		°C		7 ± 2			
MOLY TEMP		314.9		°C		315 ± 5			
RCELL PRESS		8.3		IN-Hg-A		2 - 10 constant			
SAMPLE PRESS		28.6		IN-Hg-A		25 - 30 constant			
NO Span Conc		400		PPB		20 - 20,000			
NO _x Span Conc		400		PPB		20 - 20,000			
NO Slope		1.004		-		1.0 ± 0.3			
NO _x Slope		1.008		-		1.0 ± 0.3			
NO Offset		1.2		mV		-20 to +150			
NO _x Offset		0.8		mV		-20 to 150			
Stability at Zero		0.1		PPB		< 0.2			
Stability at Span		0.2		PPB		< 2 ppb @ 400 ppb span gas			

CALIBRATION REPORT											
CHEMILUMINESCENT NO / NO _x / NO ₂ ANALYZER											
DATE : 09 May 2022		BRAND : API		MODEL : 200E							
NO. NOX-B19						SERIAL NO. 353					
Calibrator (Dilution System)											
Brand : API		Model : 700									
Last Cal. Date : 05 August 2021		Serial No. : 911									
Reference Standard Gas											
Standard Gas : Nitric Oxide (NO)		Cylinder No. : A00917SK									
Certified Date : 01 June 2020		Expired Date : 01 June 2022		Cylinder Conc. : 49.9 ppm							
CALIBRATING CONDITION											
Pressure 1011 mmbar		Temp. 24.5 °C		% RH 49							
CALIBRATION SETTING											
Span		Initial Reading (Before Adj.),PPB				Final Reading (After Adj.),PPB					
Set Point		Expected Concentration		Analyzer Response		%Diff		Analyzer Response		Slope	
Zero		0		-0.10		-		0		-	
NO Span		400		400.1		0.025		400.0		1.007	
NO _s Span		400		400.4		0.100		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		511		cc/min		500 ± 50					
OZONE FLOW		79		cc/min		80 ± 15					
PMT		103.0		mV		-20 - 150					
AZERO		93.8		mV		-20 - 150					
HVPS		674		V		420 - 900 constant					
RCELL TEMP		50.2		°C		50 ± 1					
BOX TEMP		29.1		°C		8 - 48					
PMT TEMP		7.0		°C		7 ± 2					
MOLY TEMP		314.7		°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 _s Span Conc		400		PPB		20 - 20,000					
NO Slope		1.007		-		1.0 ± 0.3					
NO _s Slope		1.011		-		1.0 ± 0.3					
NO Offset		1.6		mV		-20 to +150					
NO _s Offset		1.0		mV		-20 to 150					
Stability at Zero		0.1		PPB		< 0.2					
Stability at Span		0.2		PPB		< 2 ppb @ 400 ppb span gas					

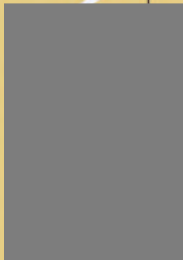


CERTIFICATE No : 21M3169
REFERENCE No : 60627-5

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 : 19-Mar-21
APPROVED BY : 
ISSUED DATE : 20-Mar-21
RECEIVED DATE : 19-Mar-21

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



CERTIFICATE No : 21M3169

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : METTLER TOLEDO
ID No : BA 05/50
AIR PRESSURE : 1009mbar \pm 1mbar
AMBIENT TEMPERATURE : 24°C \pm 1°C
MODEL : XS105DU
S/N : 1126422905
RECEIVED DATE : 19-Mar-21
CALIBRATION DATE : 19-Mar-21
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 ADJUSTED USING WEIGHT OF QUALITY CALIBRATION TO ADJUST. 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	C02210415	09-Feb-23
2) STANDARD WEIGHT	E2	15843	C02210419	10-Feb-23
3) STANDARD WEIGHT	E2	QK-1-349	M21032355	26-Mar-23

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:-

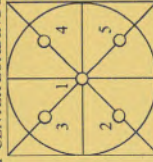
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH CENTRAL BUREAU OF WEIGHTS&MEASURES

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL
2. TARE FUNCTION : NORMAL
3. REPEATABILITY OF READING AT 100 g WAS 0.000055 g
4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (± g)
0.00	0.00000	0.00000	0.000066
0.02	0.01998	0.00002	0.000066
0.10	0.10001	-0.00001	0.000066
0.20	0.20001	-0.00001	0.000067
0.50	0.49996	0.00004	0.000065
1.00	0.99997	0.00003	0.000066
2.00	2.00000	0.00000	0.000067
5.00	5.00002	-0.00002	0.000068
10.00	10.00003	-0.00003	0.000070
20.00	20.00000	0.00000	0.000075
50.00	50.00000	0.00000	0.00013
100.00	100.0001	-0.0001	0.00019
170.00	170.0001	-0.0001	0.00022

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	50.0000
2	50.0000
3	50.0000
4	50.0000
5	50.0000
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
COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT




CERTIFICATE No : 22M2567
REFERENCE No : 64386-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : METTLER TOLEDO
MODEL : XS 105DU
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 : TETNITHI W.
CALIBRATION DATE : 11-Mar-22
APPROVED BY : 
ISSUED DATE : 17-Mar-22
RECEIVED DATE : 11-Mar-22

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



CERTIFICATE No : 22M2567

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : METTLER TOLEDO
MODEL : XS 105DU
ID No : BA 05/50
SERIAL No : 1126422905
RECEIVED DATE : 11-Mar-22
CALIBRATION DATE : 11-Mar-22
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 :-

1) STANDARD WEIGHT SET
INSTRUMENT : MODEL : SERIAL No : CERTIFICATE No : DUE DATE :
E2 QK-1-151 C02210415 09-Feb-23

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

1. ZERO SETTING FUNCTION : NORMAL

2. TARE FUNCTION : NORMAL

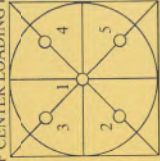
3. REPEATABILITY OF READING AT 20 g WAS 0.000004 g

4. REPEATABILITY OF READING AT 100 g WAS 0.0000048 g

5. DEPARTURE FROM NOMINAL VALUE/LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.00	0.00000	0.00000	0.000058
0.02	0.01999	0.00001	0.000058
0.10	0.09999	0.00001	0.000059
0.20	0.19999	0.00001	0.000059
0.50	0.50001	-0.00001	0.000058
1.00	1.00001	-0.00001	0.000059
2.00	2.00000	0.00000	0.000059
5.00	5.00001	-0.00001	0.000061
10.00	10.00005	-0.00005	0.000063
20.00	20.00006	-0.00006	0.000069
50.00	50.00000	0.00000	0.00011
100.00	100.00001	-0.00001	0.00019
120.00	120.00001	-0.00001	0.00022

6. OFF CENTER LOADING ERROR



POINT	READING (g)
1	10.00001
2	10.00002
3	10.00001
4	10.00001
5	10.00002
OFF-CENTER LOADING	0.00001

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

Lambda UV Preventive Maintenance (PM)

Company Name:	S.P.S. CONSULTING SERVICE CO., LTD.		
Address:	7, Soi Phaholyothin24, Ladyao, Jatujak, Bangkok		
User Name:		WO Number:	WO-01338285
Telephone Number:		PM Number:	6 of 6 P
Customer Support Engineer:		Certificate Number:	UV2043-2021
Date PM Performed: (DD-MMM-YYYY)	27-Jul-2021	Next PM Due Date: (DD-MMM-YYYY)	27-Jan-2022

Part Number	Release	Publication Date
09370504	B	March 2013

Scope

The purpose of this PM is to ensure the continued functionality of the PerkinElmer Lambda UV/Vis Spectrophotometer 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. 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 Model	Serial #	Software Version	Configuration Notes
Lambda 25	501S14123010	6.2.0.0741	STD 1.27
-	-	-	-
-	-	-	-
-	-	-	-

Parts Lists

Parts Included with the PM			
Part Number (if applicable)	Description	Quantity	Batch/Lot/SN # Expiration Date (MM/YY)
B250 0999	Stray Light standard		
	NaI cell	1	11200
	NaNO ₂ cell	1	21175
	KCl cell	1	31873
B050 7805	H ₂ O	1	72075
	Secondary Standards for calibration of wavelength and photometric accuracy or use NBS/NIST 390 standards		
	Gray Glass G1	1	4660
	Gray Glass G2	1	4575
	Gray Glass G3	1	4525
	Holmium Glass	1	5499

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

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.
- ☒ Inspect the customer log book and make any appropriate PM entries.
- ☒ Perform general inspection of system for cleanliness.

2. Optical checks:

- ☒ Lamp Alignment/Energy
- ☒ Sample Compartment Windows/Monochromator
- ☒ Mirror and Grating Alignment
- ☒ Cell Holder Alignment

3. Mechanical:

- ☒ Physical inspection – Please write any comments in the additional comments section.
- ☒ Grating Drive Mechanism.
- ☒ Lamp Change Mechanism.
- ☐ Slit Drive Manual Servo.

4. Test:

Refer to Appendix A for the specifications of the instrument being tested.

- ☒ D2 Wavelength accuracy

	Actual Value	Specification
Accuracy at 656.1 nm	656.09	± 0.1

☒ Holmium Oxide wavelength accuracy

Filter ID #		5499		
Test	Calibration Value	Actual Value	Deviation	Specification
279.3 nm	279.3	279.37	-0.07	± 0.5
360.8 nm	360.9	360.92	-0.02	± 0.5
459.9 nm	459.9	460.00	-0.10	± 0.5
536.4 nm	536.2	536.33	-0.13	± 0.5

☒ Scattered Light.

Test	Filter ID #	Result	Specification
NaI @ 220 nm	11200	-0.1294	< 0.02 %T
NaNO ₂ @ 340 nm	21175	0.0034	< 0.02 %T
NaNO ₂ @ 370 nm	21175	0.0027	< 0.02 %T
KCl @ 200 nm	31873	2.2355	≥ 2 A

☒ Baseline Flatness.

Corrected Baseline	Specification
0.000316	± 0.001 A

☒ Noise Test @ 500 nm.

Actual Value	Specification
0.0000250	± 0.00008 A

☒ Photometric Accuracy.

Filter 1 ID #		4660		
Test	Calibrated Value	Actual Value	Deviation	Specification
440 nm	0.3208	0.3240	-0.0032	± 0.006 A
546 nm	0.3029	0.3049	-0.0020	± 0.006 A
635 nm	0.3572	0.3584	-0.0012	± 0.006 A
Filter 2 ID #		4575		
Test	Calibrated Value	Actual Value	Deviation	Specification
440 nm	1.06	1.0627	-0.0027	± 0.006 A
546 nm	0.9835	0.9851	-0.0016	± 0.006 A
635 nm	1.007	1.0087	-0.0017	± 0.006 A
Filter 3 ID #		4525		
Test	Calibrated Value	Actual Value	Deviation	Specification
440 nm	0.4981	0.4998	-0.0017	± 0.006 A
546 nm	0.4739	0.4751	-0.0012	± 0.006 A
635 nm	0.5274	0.5286	-0.0012	± 0.006 A

5. Accessory (where applicable):

- ☐ Integrating Sphere
☐ Reflecting Attachment
☐ Cell Changer
☐ Sipper
☐ Auto Sampler



6. 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

The preventive maintenance checks and if applicable performance tests for Lambda UV have been completed.	
This Lambda UV Passes <input checked="" type="checkbox"/> Fails <input type="checkbox"/> the preventive maintenance.	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative:	Date: 9-Aug-21 (DD-MM-YYYY)
Authorized Customer Representative:	Date: 9-Aug-21 (DD-MM-YYYY)



Lambda UV Preventive Maintenance (PM)		
Company Name:	S.P.S. CONSULTING SERVICE CO., LTD.	
Address:	7, Soi Phaholyothin24, Ladyao, Jatujak, Bangkok	
User Name:	WO Number: WO-01550999	
Telephone Number:	PM Number: 6 of 6 P	
Customer Support Engineer:	Certificate Number: UV2004-2022	
Date PM Performed: (DD-MM-YYYY)	25-Jan-2022 Next PM Due Date: (DD-MM-YYYY) 25-Jul-2022	
Part Number	Release	Publication Date
09370504	B	March 2013
PerkinElmer For the Better		

Scope

The purpose of this PM is to ensure the continued functionality of the PerkinElmer Lambda UV/Vis Spectrophotometer 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 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
Lambda 25	501S14123010	6.2.0.0741	STD 1.27
NA	NA	NA	NA

Parts Lists

Parts Included with the PM				
Part Number (if applicable)	Description	Quantity	Serial Number	Expiration Date (MM/YY)
B250 0099	Stray Light standard			
	Nal cell	1	1943	Jan-22
	NaNO2 cell	1	2963	
	KCl cell	1	31030	
	H2O	1	71497	
B050 7805	Secondary Standards for calibration of wavelength and photometric accuracy or use NBS/NIST 390 standards			
	Gray Glass G1	1	2926	Jan-22
	Gray Glass G2	1	3501	
	Gray Glass G3	1	2552	
	Holmium Glass	1	1085	

Additional Tools Required for PM

Part Number (if applicable)	Description	Quantity	Serial #	Remark
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

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.
- ☒ Inspect the customer log book and make any appropriate PM entries.
- ☒ Perform general inspection of system for cleanliness.

2. Optical checks:

- ☒ Lamp Alignment/Energy
- ☒ Sample Compartment Windows/Monochromator
- ☒ Mirror and Grating Alignment
- ☒ Cell Holder Alignment

3. Mechanical:

- ☒ Physical inspection – Please write any comments in the additional comments section.
- ☒ Grating Drive Mechanism.
- ☒ Lamp Change Mechanism.
- ☐ Slit Drive Manual Servo.

4. Test:

Refer to **Appendix A** for the specifications of the instrument being tested.

- ☒ D2 Wavelength accuracy

	Actual Value	Specification
Accuracy at 656.1 nm	656.16	± 0.1

- ☒ Holmium Oxide wavelength accuracy

Filter ID #		1085	
Test	Calibration Value	Actual Value	Deviation
279.3 nm	279.3	279.39	-0.09
360.8 nm	360.9	360.93	-0.03
459.9 nm	460.0	460.07	-0.07
536.4 nm	536.2	536.40	-0.20

- ☒ Scattered Light.

Test	Filter ID #	Result	Specification
NaI @ 220 nm	1943	0.0133	< 0.02 %T
NaNO ₂ @ 340 nm	2963	-0.1296	< 0.02 %T
NaNO ₂ @ 370 nm	2963	-0.0002	< 0.02 %T
KCl @ 200 nm	31030	2.4808	≥ 2 A

- ☒ Baseline Flatness.

Corrected Baseline	Specification
0.000163	± 0.001 A

- ☒ Noise Test @ 500 nm.

Actual Value	Specification
0.0000240	± 0.00008 A

☒ Photometric Accuracy.

Filter 1 ID #		2926		
Test	Calibrated Value	Actual Value	Deviation	Specification
440 nm	0.3483	0.3493	-0.0010	± 0.006 A
546 nm	0.3029	0.3046	-0.0017	± 0.006 A
635 nm	0.3200	0.3232	-0.0032	± 0.006 A
Filter 2 ID #		3501		
Test	Calibrated Value	Actual Value	Deviation	Specification
440 nm	1.001	1.0024	-0.0014	± 0.006 A
546 nm	0.9797	0.9813	-0.0016	± 0.006 A
635 nm	1.0285	1.0325	-0.0040	± 0.006 A
Filter 3 ID #		2552		
Test	Calibrated Value	Actual Value	Deviation	Specification
440 nm	0.489	0.4935	-0.0045	± 0.006 A
546 nm	0.4582	0.4595	-0.0013	± 0.006 A
635 nm	0.5046	0.5075	-0.0029	± 0.006 A

5. Accessory (where applicable) :

- ☐ Integrating Sphere
☐ Reflecting Attachment
☐ Cell Changer
☐ Sipper
☐ Auto Sampler

6. 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

The preventive maintenance checks and if applicable performance tests for Lambda UV have been completed.	
This Lambda UV Passes <input checked="" type="checkbox"/> Fails <input type="checkbox"/> the preventive maintenance.	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative:	Date: 25-Jan-2022 (DD-MM-YYYY)
Authorized Customer Representative:	Date: 25-Jan-2022 (DD-MM-YYYY)

เอกสารที่ 5-2

เอกสารสอบเทียบเครื่องมือการตรวจวัดระดับเสียง

Request No. 21-64/0528 MTC No. EEL. BP. 17/0564

CALIBRATION CERTIFICATE

Submitted by : S.P.S. Consulting Services 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) °C
Relative Humidity : (50 ± 15) %
Ambient Pressure : (101.325 ± 1.500) kPa

Standards used :

1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Brüel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Keithley 2015-P S/N 4106495.
7. Condenser Microphone Brüel&Kjaer 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 : 6 May 2021

Date of Calibration : 15 May 2021

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

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Head Office 35 Mu. 3 Tambon Khlong Ha, Amphoe Khlong Luang, Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rumpal@tistr.or.th Website: www.tistr.or.th

Office/Laboratory Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road, Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

FM.BLMTC.002 Rev.4

Request No. 21-64/0528 MTC No. EEL. BP. 17/0564

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 20μPa at 1000 Hz

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

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit
1/2 inch Brüel&Kjaer 4180	93.96	-0.04	± 0.10	IEC60942:2003 Class 1 ±0.40 dB

2. Frequency

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

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit
1/2 inch Brüel&Kjaer 4180	1.26	± 0.50	IEC60942:2003 Class 1 ±3.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :



Approved by :



Acting Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Ref : 2011264050601894002

End of Certificate

2 / 2

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

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

Head Office 35 Mu. 3 Tambon Khlong Ha, Amphoe Khlong Luang, Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rumpal@tistr.or.th Website: www.tistr.or.th

Office/Laboratory Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road, Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

FM.BLMTC.002 Rev.4



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0455

MTC No. EEL. BP. 41/0465

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) °C

Relative Humidity : (50 ± 15) %

Ambient Pressure : (101.325 ± 1.500) kPa

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

2. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.

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

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

5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.

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

7. Condenser Microphone Brüel&Kjær 4180 S/N 2889871.

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 : 22 Apr. 2022

Date of Calibration : 28 Apr. 2022

The results relate only to the items tested/calibrated or value assigned.
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang, 196 Phaholyothin Road, Chatuchak, Bangkok 10900.
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rumpal@tistr.or.th Website: www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road, 196 Phaholyothin Road, Chatuchak, Bangkok 10900.
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

FM.BLMTC.002 Rev.4



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0455

MTC No. EEL. BP. 41/0465

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 20μPa at 1000 Hz

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

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Brüel&Kjær 4180	93.93	-0.07	± 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 Brüel&Kjær 4180	999.9	-0.1	± 1.5	± 1.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Brüel&Kjær 4180	1.44	± 0.50	± 3.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

Approved by :



Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 28 Apr. 2022

Date of Issue : 28 Apr. 2022

Ref : 2011265042601787001

End of Certificate

2 / 2

The results relate only to the items tested/calibrated or value assigned.
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang, 196 Phaholyothin Road, Chatuchak, Bangkok 10900.
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rumpal@tistr.or.th Website: www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road, 196 Phaholyothin Road, Chatuchak, Bangkok 10900.
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

FM.BLMTC.002 Rev.4

Noise_B_001/22

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	15 May 2021		
		Due Date	15 May 2022		
Calibration Data					
Sound Level Meter Data			Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]
ACO-B05	ACO	6236	00142002	05 January 2022	Before Adjustment 94.0
ACO-B24	ACO	6236	00182005	05 January 2022	After Adjustment 94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.96 ± 0.40 dB



Noise_B_045/22

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	15 May 2021		
		Due Date	15 May 2022		
Calibration Data					
Sound Level Meter Data			Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]
ACO-B05	ACO	6236	00142002	31 January 2022	Before Adjustment 94.1
ACO-B24	ACO	6236	00182005	31 January 2022	After Adjustment 94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.96 ± 0.40 dB



Noise B_119/22

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	15 May 2021			
		Due Date	15 May 2022			
Calibration Data						
Sound Level Meter Data			Calibration Data			
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-B05	ACO	6236	00142002	07 March 2022	93.9	94.0
ACO-B24	ACO	6236	00182005	07 March 2022	93.9	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.96 ± 0.40 dB	

Noise B_201/22

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	15 May 2021		
		Due Date	15 May 2022		
Calibration Data					
Sound Level Meter Data				Calibration Data	
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]
ACO-B05	ACO	6236	00142002	10 April 2022	Before Adjustment 93.9
ACO-B14	ACO	6236	00172034	10 April 2022	After Adjustment 94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.96 ± 0.40 dB

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			15 May 2021		
				Due Date			15 May 2022		
Calibration Data									
Sound Level Meter Data					Calibration Data				
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]				
ACO-B14	ACO	6236	00172034	09 May 2022	Before Adjustment		After Adjustment		
ACO-B24	ACO	6236	00182005	09 May 2022	93.9		94.0		
					93.9		94.0		
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.96 ± 0.40 dB				



เอกสารที่ 5-3

เอกสารสอบเทียบเครื่องมือการตรวจวิเคราะห์คุณภาพน้ำทิ้ง



CALIBRATION LABORATORY Co., LTD.

210-11, 14, 55 Soi Prasert Manukit 29 Yeak 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 : pH METER
MANUFACTURER : ECOSENSE/YSI
MODEL / TYPE : PH100A
SERIAL NO. : JC03148/YSI60537718A[PH 05/61]
CLID. NO. : 272101139
JOB CONTROL NO. : 210428037544

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

DATE OF RECEIVED : 28 April 2021

DATE OF ISSUED : 04 May 2021

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

Calibrated By : Sukgasem Sechanart
Pimsiri Hontanon
Calibration Engineer



Approved By :

Authorized Signatory
04 May 2021

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. Q21037544

F3-011-04/01-12

page 1 of 3



@cdcalibration



CALIBRATION LABORATORY Co., LTD.

210-11, 14, 55 Soi Prasert Manukit 29 Yeak 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 : pH METER
MANUFACTURER : ECOSENSE/YSI
MODEL / TYPE : PH100A
SERIAL NO. : JC03148/YSI60537718A[PH 05/61]
DATE OF CALIBRATION : 29 April 2021

ENVIRONMENT CONDITIONS :

Temperature : $(25 \pm 2.5) ^\circ\text{C}$ Relative Humidity : $(50 \pm 15) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPCH-01. The calibration was performed by direct measurement with

Certified Reference Material (CRM) and comparison with Calibration Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. pH Standard Solution, TRM CODE TRM-S-2003, TRM CODE TRM-S-2005, TRM CODE TRM-S-2007.
2. Calibration Bath, Kambic Model OB-22/2 ULT S/N. 17115653.
3. Precision Thermometer, ASL Model F201 S/N. 016168/09.
4. IPRT, ASL Model T100-250-1D S/N. PO106346-1-13.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand). Lot Number. 280319, 280119, 080719. Due Date 16 June 2021.
2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q21006472. Due Date 23 January 2022.
3. The measurements are traceable to International System of Units (SI), through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 814/63, Due Date 12 August 2021.
4. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand). Certificate No. TT-0014-21, Due Date 10 February 2022.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q21037544

F3-011-04/01-12

page 2 of 3



@cdcalibration



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of pH meter.

CALIBRATION DATA

1. pH METER RESULT @ 25 °C

Standard pH Buffer Solution (pH)	pH Meter Reading (pH)	pH Meter Reading (mV)	Correction (pH)	Uncertainty of pH Measurement (\pm pH)	k Factor
4.003	4.00	149	+0.003	0.012	2,20
7.025	7.01	-27	+0.015	0.012	2,17
10.008	10.00	-195	+0.008	0.016	2,00

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 006 Page 2,3 of 57

*2. TEMPERATURE RESULT [PROBE pH]

Immersion depth (mm)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty \pm (°C)
100	25.00	24.9	+0.10	0.07

Note. * means Calibrations marked " Not ANAB Accredited " in this Certificate have been included for completeness.

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of $k = 2,00$.

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

End of Certificate



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : pH METER
MANUFACTURER : ECOSENSE/YSI
MODEL / TYPE : PH100A
SERIAL NO. : JC03148/YSI60537718A[PH 05/61]
CLID. NO. : 272101139
JOB CONTROL NO. : 220419039554

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

DATE OF RECEIVED : 19 April 2022 DATE OF ISSUED : 23 April 2022

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

Calibrated By : Sukgasem Sehanart
Pimsiri Hemtanon
Calibration Engineer



Approved By :

Authorized Signatory
23 April 2022

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





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



ANAB
ACCREDITED
CALIBRATION
LABORATORY
DIMENSIONAL MEASUREMENT
ACDM-2814



CLC
Accredited
ISO/IEC 17025

REPORT OF CALIBRATION

FOR

NOMENCLATURE : pH METER
MANUFACTURER : ECOSENSE/YSI
MODEL / TYPE : PH100A
SERIAL NO. : JC03148/YSI60537718A[PH 05/61]
DATE OF CALIBRATION : 20 April 2022

ENVIRONMENT CONDITIONS :

Temperature : $(25 \pm 2.5) ^\circ\text{C}$ Relative Humidity : $(50 \pm 15) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CFCH-01, CLC-CPTH-04. The calibration was performed by direct measurement with Certified Reference Material (CRM) and comparison with Calibration Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. pH Standard Solution, TRM CODE TRM-S-2003, TRM CODE TRM-S-2007.
2. pH Standard Solution, Catalog Number 06-664-260, 11754256, Lot Number CC728484.
3. Calibration Bath, Kambic Model OB-22/2 ULT S/N. 17115653.
4. Precision Thermometer, ASL Model F200 S/N. 014433/03.
5. IPRT, ASL Model T100-250-ID S/N. L0193A-1-1.

Certificate No. Q22039554

F3-011-04/01-12

page 2 of 4



@calibration



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ANAB
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CALIBRATION
LABORATORY
DIMENSIONAL MEASUREMENT
ACDM-2814



CLC
Accredited
ISO/IEC 17025

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).
Lot Number. 160221, 180121. Due Date 14 June 2022.
2. The measurements are traceable to International System of Units (SI), through Control Company.
Certificate No. 4281-12405788, Due Date 30 June 2023.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No. Q22007520, Due Date 22 January 2023.
4. The measurements are traceable to International System of Units (SI), through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 0717/64. Due Date 14 June 2022.
5. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).
Certificate No. TT-0121-21, Due Date 24 November 2022.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2021)"

Certificate No. Q22039554

F3-011-04/01-12

page 3 of 4



@calibration



CALIBRATION LABORATORY CO., LTD.

2/10-11, 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



CLC
Accredited
ISO/IEC 17025

CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of pH meter.

CALIBRATION DATA

1. pH METER RESULT @ 25 °C

Standard pH Buffer Solution (pH)	pH Meter Reading (pH)	pH Meter Reading (mV)	Correction (pH)	Uncertainty of pH Measurement (± pH)	k Factor
4.000	3.98	133	+0.020	0.012	2.20
6.996	7.02	-38	-0.024	0.015	2.06
10.007	10.02	-206	-0.013	0.013	2.00

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 008 Page 2,3 of 54

2. TEMPERATURE RESULT [PROBE pH]

Immersion depth (mm)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty ± (°C)
100	25.02	25.0	+0.02	0.07

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 008 Page 47 of 54

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of k = 2.00.

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

End of Certificate

Certificate No. Q22039554

F3-011-04/01-12

page 4 of 4



@calibration



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)

CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES

534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250

TEL. 0-2717-3000 FAX. 0-2719-9484

Cert.No.: 21TW101
Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
 Manufacturer : YSI
 Model : 5000-230V
 Serial No. : 15B100751
 ID No. : -

Received Date : 28 April 2021

Test Date : 30 April 2021

Reference : 2104-0741WN-1

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

Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %

Test Procedure : In - house method : CP-CH9
by Comparison Technique with Azide Modification Method

Tested by : Walalak Sirithean

Approved by :

(/) Mahee Butkruea
 () Sathip Meangmai
 () Warakorn Lerngagtrakul

Issue Date : 7 May 2021

B 0259620



Cert.No.: 21TW101
Page.: 2 of 2

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: 14K100246

Titration Method (Azide Modification Method)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.08	8.09	0.0071

This report was certified only for the instrument we tested it is allowable to use for study the system efficiency. The environmental impact control and present to organization it may concerned Intend to use for advertising and referral purpose is prohibited This report may not be reproduced other in full, without written approval of the laboratory

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a 1053122



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES

534/4 PAITANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250

TEL. 0-2717-3000 FAX. 0-2719-9484

Cert.No.: 22TW98
Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : 5000-230V
Serial No. : 15B100751
ID No. : -
Received Date : 20 April 2022
Test Date : 21 April 2022
Reference : 2204-0429WC-1
Submitted by : S.P.S. Consulting Service Co., Ltd.
7 Phaholyothin 24, Phaholyothin Road,,
Jompol, Chatuchak, Bangkok 10900
Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In - house method : CP-CH9
by Comparison Technique with Azide Modification Method

Tested by : Walalak Sirithean

Approved by :

(/) Malee Butkruea
() Saithip Meangmai
() Warakorn Lengagatrakul

Issue Date : 25 April 2022

B 0286555



Cert.No.: 22TW98
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :
This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1) Burette	-	130BU10	21CG1389	25 Mar 2023
2) Balance	1126143764	140RC004	21MM430	21 Sep 2022

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: 14J100195

Titration Method (Azide Modification Method)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.12	8.14	0.0084

This report was certified only for the instrument we tested. It is allowable to use for study the system efficiency. The environmental impact control and present to organization it may concerned intend to use for advertising and referral purpose is prohibited. This report may not be reproduced other in full, without written approval of the laboratory

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a 1105753



QUALITY CALIBRATION CO., LTD.

235 Petchkasem 63/2 Road, Laksoeng, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4384

www.qcalibration.com



CERTIFICATE No : 21M3168
REFERENCE No : 60627-4

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : SARTORIUS
MODEL : BSA224S-CW
SERIAL No : 36591842
ID No : BA 08/61
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 : 19-Mar-21
APPROVED BY :
ISSUED DATE : 20-Mar-21
RECEIVED DATE : 19-Mar-21

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



QUALITY CALIBRATION CO.,LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

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CERTIFICATE No : 21M3168

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : SARTORIUS
ID No : BA 08/61
AIR PRESSURE : 1009mbar \pm 1mbar
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 ADJUSTED USING WEIGHT OF QUALITY CALIBRATION TO ADJUST. 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.

REFERENCE STANDARD INSTRUMENTS :-

- 1) STANDARD WEIGHT SET
E2
OK-I-151
- 2) STANDARD WEIGHT
E2
15843
- 3) STANDARD WEIGHT
E2
OK-I-349
4. 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

SERIAL No
CERTIFICATE No
DUE DATE

OK-I-151
C02210415
C02210419
M2103235S

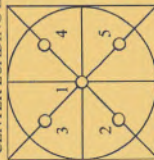
09-Feb-23
10-Feb-23
26-Mar-23

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL
2. TARE FUNCTION : NORMAL
3. REPEATABILITY OF READING AT 200 g WAS 0.000045 g
4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (±g)
0.0	0.0000	0.0000	0.000075
0.1	0.1000	0.0000	0.000075
0.2	0.2000	0.0000	0.000076
0.5	0.5000	0.0000	0.000076
1.0	1.0000	0.0000	0.000077
2.0	2.0000	0.0000	0.000077
5.0	5.0000	0.0000	0.000079
10.0	10.0000	0.0000	0.000082
20.0	20.0000	0.0000	0.000086
50.0	50.0000	0.0000	0.00013
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 COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT

CERTIFICATE No : 22M2568
REFERENCE No : 64386-2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : SARTORIUS
MODEL : BSA224S-CW
SERIAL No : 36591842
ID No : BA 08/61
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 : TETNITHI W.

CALIBRATION DATE : 11-Mar-22

APPROVED BY : [REDACTED]

ISSUED DATE : 17-Mar-22

RECEIVED DATE : 11-Mar-22

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



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CERTIFICATE No : 22M2568

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : BSA224S-CW
MANUFACTURER : SARTORIUS S/N : 36591842
ID No : BA 08/61 RECEIVED DATE : 11-Mar-22
AIR PRESSURE : 1008mbar \pm 1mbar CALIBRATION DATE : 11-Mar-22
AMBIENT TEMPERATURE : 22°C \pm 1°C RELATIVE HUMIDITY : 51 %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 ADJUSTED USING WEIGHT OF QUALITY CALIBRATION TO ADJUST. 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 :-

1) STANDARD WEIGHT SET E2 SERIAL No OK-1-151 CERTIFICATE No C02210415 DUE DATE 09-Feb-23

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

1. ZERO SETTING FUNCTION : NORMAL

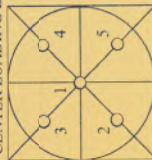
2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 200 g WAS 0.000048 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.00	0.0000	0.0000	0.000078
0.10	0.1000	0.0000	0.000078
0.20	0.2000	0.0000	0.000078
0.50	0.5000	0.0000	0.000079
1.00	1.0000	0.0000	0.000079
2.00	2.0000	0.0000	0.000080
5.00	5.0000	0.0000	0.000081
10.00	10.0000	0.0000	0.000084
20.00	20.0000	0.0000	0.000089
50.00	50.0000	0.0000	0.00011
100.00	100.0000	0.0000	0.00019
200.00	199.9999	0.0001	0.00032

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	99.9999
2	100.0000
3	99.9999
4	100.0000
5	100.0000
OFF-CENTER LOADING	0.0001

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