

ภาคผนวกที่ 5

เอกสารสอบเทียบความถูกต้องของเครื่องมือ

- | | | |
|--------|-----|---|
| เอกสาร | 5-1 | เอกสารสอบเทียบเครื่องมือการตรวจวัดคุณภาพอากาศ |
| เอกสาร | 5-2 | เอกสารสอบเทียบเครื่องมือการตรวจวัดระดับเสียง |
| เอกสาร | 5-3 | เอกสารสอบเทียบเครื่องมือการตรวจวิเคราะห์คุณภาพน้ำทิ้ง |

ตารางสรุปรายการเอกสารการสอบเทียบเครื่องมือตรวจวัดคุณภาพสิ่งแวดล้อม

รายการตรวจวัด	เครื่องมือเก็บตัวอย่าง	เครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
คุณภาพอากาศ		
- TSP	- High Volume Air Sampler NO. B02, B05, B13, B15, B30	- Electronic Balance
- PM ₁₀	- High Volume PM-10 Air Sampler NO. B12, B25, B29, B30, B32	- Electronic Balance
- CO	- CO Analyzer NO. B01, B03, B04, B11, B12, B13, R03	- CO Analyzer NO. B01, B03, B04, B11, B12, B13, R03
- THC	- Personal Pump SKC NO. B20 - Rotameter NO. L-1	
- NO ₂	- NO ₂ Analyzer NO. B01, B02, B04, B07, B19	- NO ₂ Analyzer NO. B01, B02, B04, B07, B19
- SO ₂	- Gas Sampler Box NO. B13, B14	- Spectrophotometer
ระดับเสียง		
- Leq 24 hr, Lmax และเสียงรบกวน	- Acoustic Calibrator - Sound Level Meter NL 21-B18 ACO-B05, B14, B31	- -
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
- Fecal Coliform Bacteria	-	- Electronic Balance

เอกสารที่ 5-1

เอกสารสอบเทียบเครื่องมือการตรวจวัดคุณภาพอากาศ

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 (ft ³ /min)	R ²
B01	B01	01/11/2021	y = 1.254x-6.224	0.998
B02	B02	03/11/2021	y = 1.080x+0.873	0.999
B03	B03	01/11/2021	y = 1.049x+1.608	0.995
B04	B04	01/11/2021	y = 1.140x-2.855	1.000
B05	B05	01/11/2021	y = 1.148x-2.655	0.996
B06	B06	01/11/2021	y = 1.203x-4.180	0.997
B07	B07	03/11/2021	y = 1.136x-3.132	0.996
B08	B08	03/11/2021	y = 1.211x-6.101	0.995
B09	B09	03/11/2021	y = 1.291x-7.760	0.997
B10	B10	09/11/2021	y = 1.091x+0.142	0.995
B11	B11	03/11/2021	y = 1.090x-0.694	0.996
B12	B12	03/11/2021	y = 1.165x-2.613	1.000
B13	B13	03/11/2021	y = 1.115x-2.068	1.000
B14	B14	03/11/2021	y = 1.174x-2.498	0.998
B15	B15	01/11/2021	y = 1.109x-0.219	0.999
B16	B16	01/11/2021	y = 1.211x-5.379	0.995
B17	B17	01/11/2021	y = 1.160x-2.153	0.997
B18	B18	01/11/2021	y = 1.235x-6.315	0.999
B19	B19	04/11/2021	y = 1.262x-7.960	0.997
B20	B20	04/11/2021	y = 1.263x-8.626	0.995
B21	B21	04/11/2021	y = 1.128x-1.642	0.998
B22	B22	04/11/2021	y = 1.224x-5.593	0.996
B23	B23	03/11/2021	y = 1.145x-2.521	0.999
B24	B24	03/11/2021	y = 1.097x-0.331	0.995
B25	B25	03/11/2021	y = 1.029x+2.874	0.997
B26	B26	03/11/2021	y = 1.121x-1.443	0.996
B27	B27	03/11/2021	y = 1.191x-5.420	0.997
B28	B28	03/11/2021	y = 1.248x-6.941	0.995
B29	B29	03/11/2021	y = 1.223x-5.741	0.997
B30	B30	03/11/2021	y = 1.171x-3.691	0.997
B31	B31	03/11/2021	y = 1.158x-2.458	1.000
B32	B32	03/11/2021	y = 1.197x-3.536	0.997
B33	B33	02/11/2021	y = 1.248x-6.869	0.999
B34	B34	09/11/2021	y = 1.251x-7.511	0.998

High Volume Air Sampler Calibration Report				
Calibration Method : Multipoint Orifice Flow Transfer Standard			Model : TE 50 25A	S/N : 3095
Calibration Data				
High Volume Air Sampler Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²
B35	B35	02/11/2021	y = 1.268x-7.802	1.000
B36	B36	02/11/2021	y = 1.127x-2.341	0.995
B37	B37	03/11/2021	y = 1.117x+0.086	0.997
B38	B38	03/11/2021	y = 1.141x-2.288	0.998
B39	B39	03/11/2021	y = 1.255x-6.396	1.000
B40	B40	03/11/2021	y = 1.177x-3.231	0.997
B41	B41	03/11/2021	y = 1.128x-0.683	0.998
B42	B42	04/11/2021	y = 1.126x-0.904	1.000
B43	B43	04/11/2021	y = 1.083x+0.949	0.996
B44	B44	04/11/2021	y = 1.338x-10.349	0.998
R01	R01	05/11/2021	y = 1.198x-4.664	0.997
R02	R02	02/11/2021	y = 1.176x-4.215	0.999
R03	R03	02/11/2021	y = 1.186x-5.147	0.996
R04	R04	02/11/2021	y = 1.115x-1.051	0.997
R05	R05	09/11/2021	y = 1.244x-7.591	0.996
R06	R06	02/11/2021	y = 1.339x-10.396	0.996
R07	R07	09/11/2021	y = 1.073x+0.747	0.996
R08	R08	09/11/2021	y = 1.157x-3.653	0.996
R09	R09	04/11/2021	y = 1.208x-5.357	0.997
R10	R10	04/11/2021	y = 1.211x-5.464	1.000
R11	R11	05/11/2021	y = 1.067x+1.406	0.996
R12	R12	04/11/2021	y = 1.188x-5.042	0.996
R13	R13	04/11/2021	y = 1.129x-1.431	0.999
R14	R14	08/11/2021	y = 1.105x-0.232	0.998
R15	R15	09/11/2021	y = 1.062x+1.362	0.995
R16	R16	01/11/2021	y = 1.144x-3.331	1.000
R17	R17	01/11/2021	y = 1.203x-4.883	0.999
R18	R18	01/11/2021	y = 1.285x-8.875	0.998
R19	R19	02/11/2021	y = 1.223x-4.925	1.000
R20	R20	02/11/2021	y = 1.201x-4.814	0.996

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 (l/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 (l/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 = 1.333x-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				
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	0.999
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				
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	

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	

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	Standard 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			
				Normal Condition	Standard 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

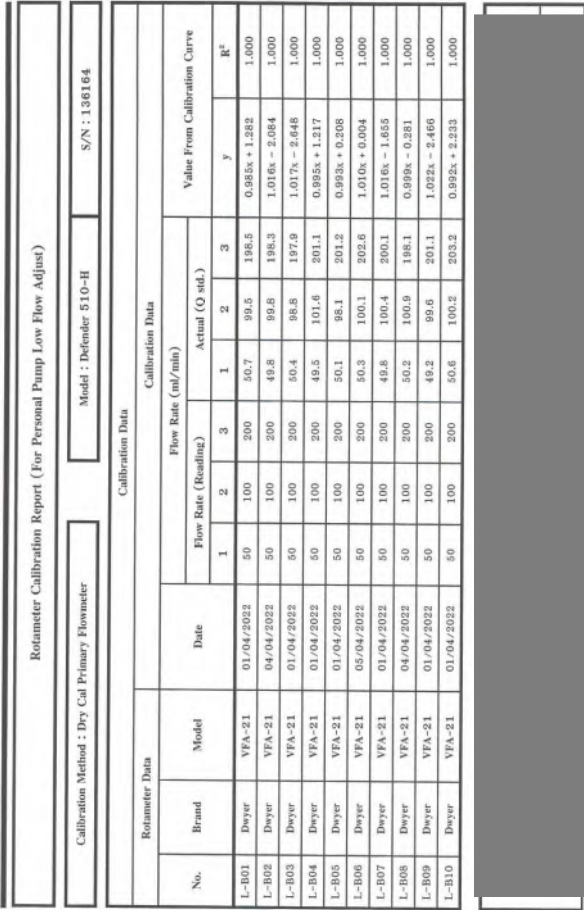
Gas Sampler Box Calibration Report

Calibration Method : Dry Cal Primary Flowmeter	Model : Dry Cal DCL-ML	S/N : 136164
--	------------------------	--------------

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

Rotameter Calibration Report (For Personal Pump Low Flow Adjust)											
Calibration Method : Dry Cal Primary Flowmeter				Model : Defender 510-H				S/N : 136833			
Rotameter Data				Calibration Data							
No.	Brand	Model	Date	Flow Rate (ml/min)						Value From Calibration Curve	
				Flow Rate (Reading)			Actual (Q std.)			y	R ²
				1	2	3	1	2	3		
L-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				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	199.2	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



Personal Pump Calibration Report												
Calibration Method : Dry Cal Primary Flowmeter					Model : Defender 510-H							
Environmental Conditions												
Temperature				25 ± 3 °C								
Pressure				1010 ± 15 mmbar								
Personal Pump Data					Calibration Data							
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)			Actual (Q std.)			Value From Calibration Curve	
					1	2	Setting	1	2	3	y	R²
B41	SKC	224-PCXR4	612669	04/04/2022	1,000	1,500	2,000	998	1,496	1,989	0.994x + 3.819	1,000
B42	SKC	224-PCXR4	626041	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	529394	12/04/2022	1,000	1,500	2,000	997	1,498	1,992	0.995x + 2.928	1,000
B46	SKC	224-PCXR8	566743	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 - 24.202	0.999
B48	SKC	224-PCXR8	566753	01/04/2022	1,000	1,500	2,000	999	1,494	1,997	0.999x + 1.795	1,000
B49	SKC	224-PCXR8	566780	12/04/2022	1,000	1,500	2,000	1,003	1,502	2,003	1.011x - 21.031	0.999
B50	SKC	224-PCXR8	590400	01/04/2022	1,000	1,500	2,000	1,002	1,495	2,002	1.001x + 2.900	1,000
B51	SKC	224-PCXR8	600363	01/04/2022	1,000	1,500	2,000	995	1,504	2,000	1.012x - 26.268	0.999
B52	SKC	224-PCXR8	093186	11/04/2022	1,000	1,500	2,000	995	1,498	1,994	0.997x - 1.840	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	599821	11/04/2022	1,000	1,500	2,000	993	1,501	2,001	1.016x - 33.718	0.999
B55	SKC	224-PCXR3	510710	01/04/2022	1,000	1,500	2,000	1,000	1,494	1,994	0.994x + 4.635	1,000
B56	SKC	224-PCXR3	511450	01/04/2022	1,000	1,500	2,000	1,002	1,500	2,001	1.011x + 2.988	0.999
B57	SKC	224-PCXR3	510798	12/04/2022	1,000	1,500	2,000	997	1,493	1,998	1.001x + 3.398	1,000
B58	SKC	224-PCXR3	509852	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	509375	12/04/2022	1,000	1,500	2,000	999	1,494	1,995	0.997x - 0.503	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 + 3.992	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	508295	12/04/2022	1,000	1,500	2,000	993	1,507	2,004	1.017x - 33.104	0.999
B68	SKC	224-PCXR3	505872	12/04/2022	1,000	1,500	2,000	1,002	1,491	1,997	0.994x + 5.556	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	1.002x - 6.693	1,000
B71	SKC	224-PCXR3	508367	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	512606	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	505999	12/04/2022	1,000	1,500	2,000	998	1,495	1,994	0.999x - 4.363	1,000
B75	SKC	224-PCXR3	509850	12/04/2022	1,000	1,500	2,000	996	1,499	1,992	0.995x + 2.429	1,000
B76	SKC	224-PCXR3	509811	12/04/2022	1,000	1,500	2,000	992	1,498	1,998	1.007x - 15.040	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	510677	01/04/2022	1,000	1,500	2,000	996	1,503	1,999	1.012x - 27.520	0.999
B79	SKC	224-PCXR3	510920	01/04/2022	1,000	1,500	2,000	994	1,493	1,994	0.999x - 3.705	1,000

CALIBRATION REPORT									
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER									
DATE : 09 January 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		Expired Date : 01 June 2022		Cylinder Conc. : 49.9 ppm			
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	
Zero		0		-0.10		-		0	
NO Span		400		400.1		0.025		400.0	
NO _x Span		400		400.3		0.075		400.0	
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		103.1		mV		-20 - 150			
AZERO		93.8		mV		-20 - 150			
HVPS		671		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		315.4		°C		315 ± 5			
RCELL PRESS		8.2		IN-Hg-A		2 - 10 constant			
SAMPLE PRESS		28.4		IN-Hg-A		25 - 30 constant			
NO Span Conc		400		PPB		20 - 20,000			
NO _x Span Conc		400		PPB		20 - 20,000			
NO Slope		1.005		-		1.0 ± 0.3			
NO _x Slope		1.010		-		1.0 ± 0.3			
NO Offset		1.4		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 ₂ / NO _x ANALYZER									
DATE : 09 January 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		Expired Date : 01 June 2022		Cylinder Conc. : 49.9 ppm			
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	
Zero		0		0.10		-		0	
NO Span		400		400.2		0.050		400.0	
NO _x Span		400		400.5		0.125		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		505		cc/min		500 ± 50			
OZONE FLOW		78		cc/min		80 ± 15			
PMT		103.4		mV		-20 - 150			
AZERO		94.2		mV		-20 - 150			
HVPS		669		V		420 - 900 constant			
RCELL TEMP		50.3		°C		50 ± 1			
BOX TEMP		29.5		°C		8 - 48			
PMT TEMP		7.1		°C		7 ± 2			
MOLY TEMP		314.8		°C		315 ± 5			
RCELL PRESS		8.4		IN-Hg-A		2 - 10 constant			
SAMPLE PRESS		28.6		IN-Hg-A		25 - 30 constant			
NO Span Conc		400		PPB		20 - 20,000			
NO _x Span Conc		400		PPB		20 - 20,000			
NO Slope		1.007		-		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 :	01 February 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			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	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 200A NO _x Analyzer Check List									
Test Values	Observed Value	Units	Nominal Range						
RANGE	500	PPB	500 standard						
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air						
SAMPLE FLOW	509	cc/min	500 ± 50						
OZONE FLOW	79	cc/min	80 ± 15						
PMT	103.0	mV	-20 - 150						
AZERO	94.2	mV	-20 - 150						
HVPS	670	V	420 - 900 constant						
RCCELL TEMP	50.5	°C	50 ± 1						
BOX TEMP	29.2	°C	8 - 48						
PMT TEMP	7.4	°C	7 ± 2						
MOLY TEMP	315.2	°C	315 ± 5						
RCCELL PRESS	8.2	IN-Hg-A	2 - 10 constant						
SAMPLE PRESS	28.4	IN-Hg-A	25 - 30 constant						
NO Span Conc	400	PPB	20 - 20,000						
NO _x Span Conc	400	PPB	20 - 20,000						
NO Slope	1.004	-	1.0 ± 0.3						
NO _x Slope	1.008	-	1.0 ± 0.3						
NO Offset	1.1	mV	-20 to +150						
NO _x Offset	0.7	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 / NO ₂ / NO _x ANALYZER									
DATE :	01 February 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			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	Analyzer Response	Slope				
Zero	0	0.11	-	0	-				
NO Span	400	400.1	0.025	400.0	1.005				
NO _x Span	400	400.3	0.075	400.0	1.010				
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	503	cc/min	500 ± 50						
OZONE FLOW	78	cc/min	80 ± 15						
PMT	103.3	mV	-20 - 150						
AZERO	94.1	mV	-20 - 150						
HVPS	675	V	420 - 900 constant						
RCCELL TEMP	50.2	°C	50 ± 1						
BOX TEMP	29.4	°C	8 - 48						
PMT TEMP	7.1	°C	7 ± 2						
MOLY TEMP	314.8	°C	315 ± 5						
RCCELL 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	1.005	-	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 / NO₂ ANALYZER

DATE : 15 March 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
Cylinder Conc. : 49.9 ppm

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	Slope
Zero	0	0.10	0	-	-
NO Span	400	400.2	400.0	0.050	1.007
NO _x Span	400	400.3	400.0	0.075	1.012

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	507	cc/min	500 ± 50
OZONE FLOW	78	cc/min	80 ± 15
PMT	103.3	mV	-20 - 150
AZERO	94.2	mV	-20 - 150
HVPS	670	V	420 - 900 constant
RCCELL TEMP	50.3	°C	50 ± 1
BOX TEMP	29.4	°C	8 - 48
PMT TEMP	7.2	°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	1.007	-	1.0 ± 0.3
NO _x Slope	1.012	-	1.0 ± 0.3
NO Offset	1.5	mV	-20 to +150
NO _x Offset	0.9	mV	-20 to 150
Stability at Zero	0.1	PPB	< 0.2
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas

CALIBRATION REPORT

CHEMILUMINESCENT NO / NO_x / NO₂ ANALYZER

DATE : 15 March 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
Cylinder Conc. : 49.9 ppm

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	Slope
Zero	0	0	0.11	-	0
NO Span	400	400	399.6	-0.100	0.999
NO _x Span	400	400	399.9	-0.025	1.004

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	94.1	mV	-20 - 150
HVPS	675	V	420 - 900 constant
RCCELL TEMP	50.5	°C	50 ± 1
BOX TEMP	29.2	°C	8 - 48
PMT TEMP	7.1	°C	7 ± 2
MOLY TEMP	315.3	°C	315 ± 5
RCCELL 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	0.999	-	1.0 ± 0.3
NO _x Slope	1.004	-	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 / NO_x / NO₂ ANALYZER

DATE : 19 April 2022 BRAND : API MODEL : 200A
NO. NOX-B01 SERIAL NO. 2368

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. 24.6 °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	Zero	0	0.10	-	0	-
NO Span	NO Span	400	400.2	0.050	400.0	1.009
NO _x Span	NO _x Span	400	400.3	0.075	400.0	1.011

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	503	cc/min	500 ± 50
OZONE FLOW	78	cc/min	80 ± 15
PMT	103.2	mV	-20 - 150
AZERO	93.3	mV	-20 - 150
HVPS	671	V	420 - 900 constant
RECELL 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
RECELL 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	1.009	-	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 / NO₂ ANALYZER

DATE : 19 April 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. 24.6 °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	Zero	0	-0.10	-	0	-
NO Span	NO Span	400	399.7	-0.075	400.0	1.003
NO _x Span	NO _x Span	400	400.1	0.025	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	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
RECELL TEMP	50.1	°C	50 ± 1
BOX TEMP	29.2	°C	8 - 48
PMT TEMP	7.4	°C	7 ± 2
MOLY TEMP	314.8	°C	315 ± 5
RECELL 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	1.003	-	1.0 ± 0.3
NO _x Slope	1.007	-	1.0 ± 0.3
NO Offset	1.0	mV	-20 to +150
NO _x Offset	0.5	mV	-20 to 150
Stability at Zero	0.1	PPB	< 0.2
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas

CALIBRATION REPORT									
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER									
DATE :	22 May 2022	BRAND :	API	MODEL :	200A				
NO.	NOX-B01	SERIAL NO.	2368						
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.	24.6 °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	1.008				
NO _x Span	400	400.2	0.050	400.0	1.011				
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	512	cc/min	500 ± 50						
OZONE FLOW	79	cc/min	80 ± 15						
PMT	103.3	mV	-20 - 150						
AZERO	94.1	mV	-20 - 150						
HVPS	675	V	420 - 900 constant						
RECELL TEMP	50.2	°C	50 ± 1						
BOX TEMP	29.3	°C	8 - 48						
PMT TEMP	7.4	°C	7 ± 2						
MOLY TEMP	315.3	°C	315 ± 5						
RECELL PRESS	8.2	IN-Hg-A	2 - 10 constant						
SAMPLE PRESS	28.4	IN-Hg-A	25 - 30 constant						
NO Span Conc	400	PPB	20 - 20,000						
NO _x Span Conc	400	PPB	20 - 20,000						
NO Slope	1.008	-	1.0 ± 0.3						
NO _x Slope	1.011	-	1.0 ± 0.3						
NO Offset	1.3	mV	-20 to +150						
NO _x Offset	0.9	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 ₂ / NO _x ANALYZER									
DATE :	22 May 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	Cylinder Conc.	: 49.9 ppm				
CALIBRATING CONDITION									
Pressure	1011 mmbar	Temp.	24.6 °C	% RH	49				
CALIBRATION SETTING									
Span	Initial Reading (Before Adj.),PPB		Final Reading (After Adj.),PPB						
Set Point	Expected Concentration	Analyzer Response	%Diff	Analyzer Response	Slope				
Zero	0	0.10	-	0	-				
NO Span	400	400.2	0.050	400.0	1.009				
NO _x Span	400	400.3	0.075	400.0	1.014				
API Model 200E NO _x Analyzer Check List									
Test Values	Observed Value	Units	Nominal Range						
RANGE	500	PPB	500 standard						
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air						
SAMPLE FLOW	508	cc/min	500 ± 50						
OZONE FLOW	78	cc/min	80 ± 15						
PMT	103.1	mV	-20 - 150						
AZERO	93.8	mV	-20 - 150						
HVPS	673	V	420 - 900 constant						
RECELL TEMP	50.4	°C	50 ± 1						
BOX TEMP	29.1	°C	8 - 48						
PMT TEMP	7.5	°C	7 ± 2						
MOLY TEMP	314.8	°C	315 ± 5						
RECELL 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	1.009	-	1.0 ± 0.3						
NO _x Slope	1.014	-	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 / NO _x ANALYZER									
DATE : 22 June 2022	BRAND : API		MODEL : 200E						
NO. NOX-B05			SERIAL NO. 2284						
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. : A00681SK						
Certified Date : 24 August 2020			Expired Date : 24 August 2022		Cylinder Conc. : 51.0 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	Analyzer Response	Slope				
Zero	0	0.10	-	0	-				
NO Span	400	399.8	-0.050	400.0	1.004				
NO _x Span	400	400.1	0.025	400.0	1.008				
API Model 200E NO _x Analyzer Check List									
Test Values		Observed Value		Units	Nominal Range				
RANGE		500	PPB		500 standard				
STABILITY (Zero Gas)		0.1	PPB		< 2 with zero air				
SAMPLE FLOW		505	cc/min		500 ± 50				
OZONE FLOW		78	cc/min		80 ± 15				
PMT		102.9	mV		-20 - 150				
AZERO		93.8	mV		-20 - 150				
HVPS		670	V		420 - 900 constant				
RCCELL TEMP		50.1	°C		50 ± 1				
BOX TEMP		29.2	°C		8 - 48				
PMT TEMP		7.4	°C		7 ± 2				
MOLY TEMP		314.7	°C		315 ± 5				
RCCELL 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		0.9	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 / NO _x ANALYZER									
DATE : 22 June 2022	BRAND : API		MODEL : 200E						
NO. NOX-B07			SERIAL NO. 4338						
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. : A00681SK						
Certified Date : 24 August 2020			Expired Date : 24 August 2022		Cylinder Conc. : 51.0 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	Analyzer Response	Slope				
Zero	0	0.11	-	0	-				
NO Span	400	400.2	0.050	400.0	1.009				
NO _x Span	400	400.3	0.075	400.0	1.014				
API Model 200E NO _x Analyzer Check List									
Test Values		Observed Value		Units	Nominal Range				
RANGE		500	PPB		500 standard				
STABILITY (Zero Gas)		0.1	PPB		< 2 with zero air				
SAMPLE FLOW		509	cc/min		500 ± 50				
OZONE FLOW		79	cc/min		80 ± 15				
PMT		103.2	mV		-20 - 150				
AZERO		94.1	mV		-20 - 150				
HVPS		675	V		420 - 900 constant				
RCCELL TEMP		50.2	°C		50 ± 1				
BOX TEMP		29.3	°C		8 - 48				
PMT TEMP		7.1	°C		7 ± 2				
MOLY TEMP		314.9	°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		1.009	-		1.0 ± 0.3				
NO _x Slope		1.014	-		1.0 ± 0.3				
NO Offset		1.7	mV		-20 to +150				
NO _x Offset		1.0	mV		-20 to 150				
Stability at Zero		0.1	PPB		< 0.2				
Stability at Span		0.2	PPB		< 2 ppb @ 400 ppb span gas				

CALIBRATION REPORT									
NON-DISPERSIVE INFRARED CO ANALYZER									
DATE :	09 January 2022	BRAND :	API	MODEL :	300E				
NO.	CO-B03			SERIAL NO.	3019				
Calibrator (Dilution System)									
Brand	: API			Model	: 700				
Last Cal. Date	: 20 September 2021			Serial No.	: 421				
Reference Standard Gas									
Standard Gas	: Carbon Monoxide (CO)			Cylinder No.	: D824478				
Certified Date	: 15 April 2020			Expired Date	: 14 April 2022			Cylinder Conc.	: 4,740 PPM
CALIBRATING CONDITION									
Pressure	1011	mmbar	Temp.	24.6	°C	% RH	48		
CALIBRATION SETTING									
Span	Initial Reading (Before Adj.),PPM			Final Reading (After Adj.),PPM					
Set Point	Expected Concentration			Analyzer Response	%Diff	Analyzer Response			
Zero	0			-0.10	-	0			
CO Span	40.00			40.09	0.225	40.00			
API Model 300E CO Analyzer Check list									
Parameter	Observed Value	Units	Nominal Range						
RANGE	50	PPM	0-1000 ppm						
STABILITY	0.10	PPM	< 1 ppm with zero air						
CO MEASURE	4015.9	mV	2500-4800 mV						
CO REFERENCE	3948.2	mV	2500-4800 mV						
MEASURE/REFERENCE RATIO	1.180	-	1.1-1.3 w/zero air						
SAMPLE PRESSURE	28.4	In-Hg-A	~2"± ambient absolute pressure						
SAMPLE FLOW	811	cc/min	800 ± 10%						
SAMPLE TEMPERATURE	48.3	°C	48 ± 4						
BENCH TEMPERATURE	48.1	°C	48 ± 2						
WHEEL TEMPERATURE	68.3	°C	68 ± 2						
BOX TEMPERATURE	30.9	°C	Ambient temp + 7 ± 10						
PHOTO-DRIVE	3021.7	mV	250 mV to 4750 mV						
SLOPE	1.017	-	1.0 ± 0.3						
OFFSET	0.2	-	0 ± 0.3						

CALIBRATION REPORT									
NON-DISPERSIVE INFRARED CO ANALYZER									
DATE :	09 January 2022	BRAND :	API	MODEL :	300E				
NO.	CO-B13			SERIAL NO.	176				
Calibrator (Dilution System)									
Brand	: API			Model	: 700				
Last Cal. Date	: 20 September 2021			Serial No.	: 421				
Reference Standard Gas									
Standard Gas	: Carbon Monoxide (CO)			Cylinder No.	: D824478				
Certified Date	: 15 April 2020			Expired Date	: 14 April 2022			Cylinder Conc.	: 4,740 PPM
CALIBRATING CONDITION									
Pressure	1011	mmbar	Temp.	24.6	°C	% RH	48		
CALIBRATION SETTING									
Span	Initial Reading (Before Adj.),PPM			Final Reading (After Adj.),PPM					
Set Point	Expected Concentration			Analyzer Response	%Diff	Analyzer Response			
Zero	0			0.11	-	0			
CO Span	40.00			39.96	-0.100	40.00			
API Model 300E CO Analyzer Check list									
Parameter	Observed Value	Units	Nominal Range						
RANGE	50	PPM	0-1000 ppm						
STABILITY	0.10	PPM	< 1 ppm with zero air						
CO MEASURE	4014.7	mV	2500-4800 mV						
CO REFERENCE	3947.3	mV	2500-4800 mV						
MEASURE/REFERENCE RATIO	1.180	-	1.1-1.3 w/zero air						
SAMPLE PRESSURE	28.7	In-Hg-A	~2"± ambient absolute pressure						
SAMPLE FLOW	809	cc/min	800 ± 10%						
SAMPLE TEMPERATURE	48.5	°C	48 ± 4						
BENCH TEMPERATURE	48.3	°C	48 ± 2						
WHEEL TEMPERATURE	68.5	°C	68 ± 2						
BOX TEMPERATURE	30.8	°C	Ambient temp + 7 ± 10						
PHOTO-DRIVE	3044.8	mV	250 mV to 4750 mV						
SLOPE	1.017	-	1.0 ± 0.3						
OFFSET	0.2	-	0 ± 0.3						

CALIBRATION REPORT									
NON-DISPERSIVE INFRARED CO ANALYZER									
DATE :	01 February 2022	BRAND :	API	MODEL :	300E				
NO.	CO-B03			SERIAL NO.	3019				
Calibrator (Dilution System)									
Brand	: API			Model	: 700				
Last Cal. Date	: 20 September 2021			Serial No.	: 421				
Reference Standard Gas									
Standard Gas	: Carbon Monoxide (CO)			Cylinder No.	: D824478				
Certified Date	: 15 April 2020			Expired Date	: 14 April 2022			Cylinder Conc.	: 4,740 PPM
CALIBRATING CONDITION									
Pressure	1011	mmbar	Temp.	24.5	°C	% RH	49		
CALIBRATION SETTING									
Span	Initial Reading (Before Adj.),PPM			Final Reading (After Adj.),PPM					
Set Point	Expected Concentration	Analyzer Response	%Diff						
Zero	0	-0.10	-	0					
CO Span	40.00	39.96	-0.100	40.00					
API Model 300E CO Analyzer Check list									
Parameter	Observed Value	Units	Nominal Range						
RANGE	50	PPM	0-1000 ppm						
STABILITY	0.10	PPM	< 1 ppm with zero air						
CO MEASURE	4014.2	mV	2500-4800 mV						
CO REFERENCE	3948.4	mV	2500-4800 mV						
MEASURE/REFERENCE RATIO	1.179	-	1.1-1.3 w/zero air						
SAMPLE PRESSURE	28.6	In-Hg-A	~2"± ambient absolute pressure						
SAMPLE FLOW	810	cc/min	800 ± 10%						
SAMPLE TEMPERATURE	48.4	°C	48 ± 4						
BENCH TEMPERATURE	48.1	°C	48 ± 2						
WHEEL TEMPERATURE	68.3	°C	68 ± 2						
BOX TEMPERATURE	30.7	°C	Ambient temp + 7 ± 10						
PHOTO-DRIVE	2988.4	mV	250 mV to 4750 mV						
SLOPE	1.017	-	1.0 ± 0.3						
OFFSET	0.2	-	0 ± 0.3						

CALIBRATION REPORT									
NON-DISPERSIVE INFRARED CO ANALYZER									
DATE :	01 February 2022	BRAND :	API	MODEL :	300E				
NO.	CO-B13			SERIAL NO.	176				
Calibrator (Dilution System)									
Brand	: API			Model	: 700				
Last Cal. Date	: 20 September 2021			Serial No.	: 421				
Reference Standard Gas									
Standard Gas	: Carbon Monoxide (CO)			Cylinder No.	: D824478				
Certified Date	: 15 April 2020			Expired Date	: 14 April 2022			Cylinder Conc.	: 4,740 PPM
CALIBRATING CONDITION									
Pressure	1011	mmbar	Temp.	24.5	°C	% RH	49		
CALIBRATION SETTING									
Span	Initial Reading (Before Adj.),PPM			Final Reading (After Adj.),PPM					
Set Point	Expected Concentration	Analyzer Response	%Diff						
Zero	0	0.10	-	0					
CO Span	40.00	40.04	0.100	40.00					
API Model 300E CO Analyzer Check list									
Parameter	Observed Value	Units	Nominal Range						
RANGE	50	PPM	0-1000 ppm						
STABILITY	0.10	PPM	< 1 ppm with zero air						
CO MEASURE	4015.2	mV	2500-4800 mV						
CO REFERENCE	3949.5	mV	2500-4800 mV						
MEASURE/REFERENCE RATIO	1.179	-	1.1-1.3 w/zero air						
SAMPLE PRESSURE	28.4	In-Hg-A	~2"± ambient absolute pressure						
SAMPLE FLOW	808	cc/min	800 ± 10%						
SAMPLE TEMPERATURE	48.3	°C	48 ± 4						
BENCH TEMPERATURE	48.2	°C	48 ± 2						
WHEEL TEMPERATURE	68.5	°C	68 ± 2						
BOX TEMPERATURE	30.6	°C	Ambient temp + 7 ± 10						
PHOTO-DRIVE	3004.6	mV	250 mV to 4750 mV						
SLOPE	1.017	-	1.0 ± 0.3						
OFFSET	0.2	-	0 ± 0.3						

CALIBRATION REPORT

NON-DISPERSIVE INFRARED CO ANALYZER

DATE :	15 March 2022	BRAND :	Thermo	MODEL :	48C
NO.	CO-B12			SERIAL NO.	TL-65343-348
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 20 September 2021		Serial No.	: 421	
Reference Standard Gas					
Standard Gas	: Carbon Monoxide (CO)		Cylinder No.	: D824478	
Certified Date	: 15 April 2020	Expired Date	: 14 April 2022	Cylinder Conc.	: 4,740 PPM

CALIBRATING CONDITION

Pressure	1011	mmbar	Temp.	24.5	°C	% RH	48
----------	------	-------	-------	------	----	------	----

CALIBRATION SETTING

Span	Initial Reading (Before Adj.), PPM		Final Reading (After Adj.), PPM	
	Set Point	Expected Concentration	Analyzer Response	% Dif
	Zero	0	-0.10	-
	CO Span	40.00	40.12	0.300

INSTRUMENT STATUS

CHAMBER TEMP	47.4 °C	FLOW	1.5 LPM
PRESSURE	730.4 mm Hg	MOTOR SPEED	100.00%

CALIBRATION REPORT

NON-DISPERSIVE INFRARED CO ANALYZER

DATE :	15 March 2022	BRAND :	API	MODEL :	300E
NO.	CO-B13			SERIAL NO.	176
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 20 September 2021		Serial No.	: 421	
Reference Standard Gas					
Standard Gas	: Carbon Monoxide (CO)		Cylinder No.	: D824478	
Certified Date	: 15 April 2020	Expired Date	: 14 April 2022	Cylinder Conc.	: 4,740 PPM

CALIBRATING CONDITION

Pressure	1011	mmbar	Temp.	24.5	°C	% RH	48
----------	------	-------	-------	------	----	------	----

CALIBRATION SETTING

Span	Initial Reading (Before Adj.), PPM		Final Reading (After Adj.), PPM	
	Set Point	Expected Concentration	Analyzer Response	% Dif
	Zero	0	0.11	-
	CO Span	40.00	39.93	-0.175

API Model 300E CO Analyzer Check list

Parameter	Observed Value	Units	Nominal Range
RANGE	50	PPM	0-1000 ppm
STABILITY	0.10	PPM	< 1 ppm with zero air
CO MEASURE	4013.5	mV	2500-4800 mV
CO REFERENCE	3947.8	mV	2500-4800 mV
MEASURE/REFERENCE RATIO	1.179	-	1.1-1.3 w/zero air
SAMPLE PRESSURE	28.5	In-Hg-A	-2" ± ambient absolute pressure
SAMPLE FLOW	805	cc/min	800 ± 10%
SAMPLE TEMPERATURE	48.4	°C	48 ± 4
BENCH TEMPERATURE	48.2	°C	48 ± 2
WHEEL TEMPERATURE	68.3	°C	68 ± 2
BOX TEMPERATURE	30.9	°C	Ambient temp + 7 ± 10
PHOTO-DRIVE	3064.8	mV	250 mV to 4750 mV
SLOPE	1.017	-	1.0 ± 0.3
OFFSET	0.2	-	0 ± 0.3

CALIBRATION REPORT

NON-DISPERSIVE INFRARED CO ANALYZER

DATE : 19 April 2022	BRAND : API	MODEL : 300E
NO. CO-B01		SERIAL NO. 782
Calibrator (Dilution System)		
Brand : API	Model : 700	
Last Cal. Date : 20 September 2021	Serial No. : 421	
Reference Standard Gas		
Standard Gas : Carbon Monoxide (CO)	Cylinder No. : D196045	
Certified Date : 16 April 2022	Expired Date : 15 April 2024	Cylinder Conc. : 4,570 PPM
CALIBRATING CONDITION		
Pressure 1011 mmbar	Temp. 24.6 °C	% RH 49
CALIBRATION SETTING		
Span	Initial Reading (Before Adj.), PPM	Final Reading (After Adj.), PPM
Set Point	Expected Concentration	% Dif
Zero	0	0.11
CO Span	40.00	39.98
API Model 300E CO Analyzer Check list		
Parameter	Observed Value	Units
RANGE	50	PPM
STABILITY	0.10	PPM
CO MEASURE	4014.9	mV
CO REFERENCE	3948.4	mV
MEASURE/REFERENCE RATIO	1.180	-
SAMPLE PRESSURE	28.7	In-Hg-A
SAMPLE FLOW	811	cc/min
SAMPLE TEMPERATURE	48.5	°C
BENCH TEMPERATURE	48.2	°C
WHEEL TEMPERATURE	68.4	°C
BOX TEMPERATURE	30.8	°C
PHOTO-DRIVE	3026.7	mV
SLOPE	1.017	-
OFFSET	0.2	-

CALIBRATION REPORT

NON-DISPERSIVE INFRARED CO ANALYZER

DATE : 19 April 2022	BRAND : Thermo	MODEL : 48C
NO. CO-B11		SERIAL NO. 0401304262
Calibrator (Dilution System)		
Brand : API	Model : 700	
Last Cal. Date : 20 September 2021	Serial No. : 421	
Reference Standard Gas		
Standard Gas : Carbon Monoxide (CO)	Cylinder No. : D196045	
Certified Date : 16 April 2022	Expired Date : 15 April 2024	Cylinder Conc. : 4,570 PPM
CALIBRATING CONDITION		
Pressure 1011 mmbar	Temp. 24.6 °C	% RH 49
CALIBRATION SETTING		
Span	Initial Reading (Before Adj.), PPM	Final Reading (After Adj.), PPM
Set Point	Expected Concentration	% Dif
Zero	0	0.10
CO Span	40.00	40.11
INSTRUMENT STATUS		
CHAMBER TEMP 47.5 °C	FLOW 1.5 LPM	
PRESSURE 730.7 mm Hg	MOTOR SPEED 100.00%	

CALIBRATION REPORT
NON-DISPERSIVE INFRARED CO ANALYZER

DATE : 22 May 2022	BRAND : API	MODEL : 300E
NO. CO-B04		SERIAL NO. 3089
Calibrator (Dilution System)		
Brand : API	Model : 700	
Last Cal. Date : 20 September 2021	Serial No. : 421	
Reference Standard Gas		
Standard Gas : Carbon Monoxide (CO)	Cylinder No. : D196045	
Certified Date : 16 April 2022	Expired Date : 15 April 2024	Cylinder Conc. : 4,570 PPM
CALIBRATING CONDITION		
Pressure 1011 mmbar	Temp. 24.6 °C	% RH 49
CALIBRATION SETTING		
Span	Initial Reading (Before Adj.), PPM	Final Reading (After Adj.), PPM
Set Point	Expected Concentration	Analyzer Response
Zero	0	-0.10
CO Span	40.00	39.92
API Model 300E CO Analyzer Check list		
Parameter	Observed Value	Units
RANGE	50	PPM
STABILITY	0.10	PPM
CO MEASURE	4016.2	mV
CO REFERENCE	3949.8	mV
MEASURE/REFERENCE RATIO	1.180	-
SAMPLE PRESSURE	28.6	In-Hg-A
SAMPLE FLOW	808	cc/min
SAMPLE TEMPERATURE	48.2	°C
BENCH TEMPERATURE	48.0	°C
WHEEL TEMPERATURE	68.4	°C
BOX TEMPERATURE	30.7	°C
PHOTO-DRIVE	3009.5	mV
SLOPE	1.017	-
OFFSET	0.2	-

CALIBRATION REPORT
NON-DISPERSIVE INFRARED CO ANALYZER

DATE : 22 May 2022	BRAND : API	MODEL : 300E
NO. CO-R03		SERIAL NO. 1352
Calibrator (Dilution System)		
Brand : API	Model : 700	
Last Cal. Date : 20 September 2021	Serial No. : 421	
Reference Standard Gas		
Standard Gas : Carbon Monoxide (CO)	Cylinder No. : D196045	
Certified Date : 16 April 2022	Expired Date : 15 April 2024	Cylinder Conc. : 4,570 PPM
CALIBRATING CONDITION		
Pressure 1011 mmbar	Temp. 24.6 °C	% RH 49
CALIBRATION SETTING		
Span	Initial Reading (Before Adj.), PPM	Final Reading (After Adj.), PPM
Set Point	Expected Concentration	Analyzer Response
Zero	0	0.11
CO Span	40.00	40.09
API Model 300E CO Analyzer Check list		
Parameter	Observed Value	Units
RANGE	50	PPM
STABILITY	0.10	PPM
CO MEASURE	4014.7	mV
CO REFERENCE	3948.2	mV
MEASURE/REFERENCE RATIO	1.180	-
SAMPLE PRESSURE	28.7	In-Hg-A
SAMPLE FLOW	811	cc/min
SAMPLE TEMPERATURE	48.5	°C
BENCH TEMPERATURE	48.2	°C
WHEEL TEMPERATURE	68.3	°C
BOX TEMPERATURE	30.8	°C
PHOTO-DRIVE	3024.3	mV
SLOPE	1.017	-
OFFSET	0.2	-

CALIBRATION REPORT
NON-DISPERSIVE INFRARED CO ANALYZER

DATE : 22 June 2022	BRAND : API	MODEL : 300E
NO. CO-B01		SERIAL NO. 782
Calibrator (Dilution System)		
Brand : API	Model : 700	
Last Cal. Date : 20 September 2021	Serial No. : 421	
Reference Standard Gas		
Standard Gas : Carbon Monoxide (CO)	Cylinder No. : D196045	
Certified Date : 16 April 2022	Expired Date : 15 April 2024	Cylinder Conc. : 4.570 PPM
CALIBRATING CONDITION		
Pressure 1011 mmbar	Temp. 24.5 °C	% RH 49
CALIBRATION SETTING		
Span	Initial Reading (Before Adj.),PPM	Final Reading (After Adj.),PPM
Set Point	Expected Concentration	%Dif
Zero	0	-
CO Span	40.00	-0.175
API Model 300E CO Analyzer Check list		
Parameter	Observed Value	Units
RANGE	50	PPM
STABILITY	0.10	PPM
CO MEASURE	4014.3	mV
CO REFERENCE	3948.7	mV
MEASURE/REFERENCE RATIO	1.179	-
SAMPLE PRESSURE	28.5	In-Hg-A
SAMPLE FLOW	808	cc/min
SAMPLE TEMPERATURE	48.5	°C
BENCH TEMPERATURE	48.2	°C
WHEEL TEMPERATURE	68.3	°C
BOX TEMPERATURE	30.7	°C
PHOTO-DRIVE	3014.7	mV
SLOPE	1.017	-
OFFSET	0.2	-

CALIBRATION REPORT
NON-DISPERSIVE INFRARED CO ANALYZER

DATE : 22 June 2022	BRAND : API	MODEL : 300E
NO. CO-B03		SERIAL NO. 3019
Calibrator (Dilution System)		
Brand : API	Model : 700	
Last Cal. Date : 20 September 2021	Serial No. : 421	
Reference Standard Gas		
Standard Gas : Carbon Monoxide (CO)	Cylinder No. : D196045	
Certified Date : 16 April 2022	Expired Date : 15 April 2024	Cylinder Conc. : 4.570 PPM
CALIBRATING CONDITION		
Pressure 1011 mmbar	Temp. 24.5 °C	% RH 49
CALIBRATION SETTING		
Span	Initial Reading (Before Adj.),PPM	Final Reading (After Adj.),PPM
Set Point	Expected Concentration	%Dif
Zero	0	-
CO Span	40.00	0.150
API Model 300E CO Analyzer Check list		
Parameter	Observed Value	Units
RANGE	50	PPM
STABILITY	0.10	PPM
CO MEASURE	4015.1	mV
CO REFERENCE	3947.4	mV
MEASURE/REFERENCE RATIO	1.180	-
SAMPLE PRESSURE	28.7	In-Hg-A
SAMPLE FLOW	804	cc/min
SAMPLE TEMPERATURE	48.2	°C
BENCH TEMPERATURE	48.1	°C
WHEEL TEMPERATURE	68.4	°C
BOX TEMPERATURE	30.9	°C
PHOTO-DRIVE	3011.2	mV
SLOPE	1.017	-
OFFSET	0.2	-



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.

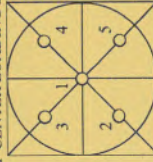
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH CENTRAL BUREAU OF WEIGHTS&MEASURES

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	100.00001	-0.00001	0.00019
170.00	170.00001	-0.00001	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

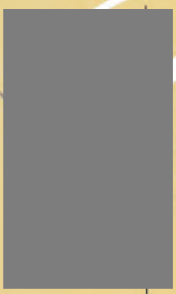


CERTIFICATE No : 22M2567
REFERENCE No : 64386-1

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

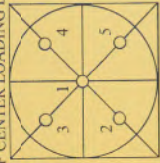
3. REPEATABILITY OF READING AT 20 g WAS 0.000004 g

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	 For the Better
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.

Copyright Information

This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this publication may be reproduced in any form whatsoever or translated into any language without the prior, written permission of PerkinElmer, Inc. Copyright © 2009 PerkinElmer, Inc.

Trademarks

Registered names, trademarks, etc. used in this document, even when not specifically marked as such, are protected by law. PerkinElmer is a registered trademark of PerkinElmer, Inc. All other trademarks and registered trademarks not owned by PerkinElmer, Inc. or its subsidiaries that are depicted herein are the property of their respective owners. Except as specifically set forth in its terms and conditions of sale, PerkinElmer makes no Warranty of any kind with regard to this document, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. PerkinElmer shall not be liable for incidental or consequential damages in connection with the furnishing or use of this document.

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 #
B250 0999	Stray Light standard		
	NaI cell	1	11200
	NaNO ₂ cell	1	21175
	KCl cell	1	31873
	H ₂ O	1	72075
B050 7805	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 ☒ Fails ☐ 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:	K. Benjawan	WO Number:	WO-01550999
Telephone Number:	086-141-2523	PM Number:	6 of 6 P
Customer Support Engineer:	K. Anon	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

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.

Copyright Information

This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this publication may be reproduced in any form whatsoever or translated into any language without the prior, written permission of PerkinElmer, Inc. Copyright © 2009 PerkinElmer, Inc.

Trademarks

Registered names, trademarks, etc. used in this document, even when not specifically marked as such, are protected by law. PerkinElmer is a registered trademark of PerkinElmer, Inc. All other trademarks and registered trademarks not owned by PerkinElmer, Inc. or its subsidiaries that are depicted herein are the property of their respective owners. Except as specifically set forth in its terms and conditions of sale, PerkinElmer makes no Warranty of any kind with regard to this document, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. PerkinElmer shall not be liable for incidental or consequential damages in connection with the furnishing or use of this document.

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	Specification
279.3 nm	279.3	279.39	-0.09	± 0.5
360.8 nm	360.9	360.93	-0.03	± 0.5
459.9 nm	460.0	460.07	-0.07	± 0.5
536.4 nm	536.2	536.40	-0.20	± 0.5

- ☒ 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

<i>The preventive maintenance checks and if applicable performance tests for Lambda UV have been completed.</i>	
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.

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

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 :

Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 15 May 2021

Date of Issue : 18 May 2021

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, 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

FM.BLMTC.002 Rev.4

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

Office

196 Phaholyothin Road, Chatuchak, Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sunalee@tistr.or.th



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

Date of Calibration : 28 Apr. 2022

Date of Issue : 28 Apr. 2022

End of Certificate

Ref : 2011265042601787001

Industrial Metrology and Testing Service Centre

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

Office

196 Phaholyothin Road, Chatuchak, Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sunalee@tistr.or.th

FM.BLMTC.002 Rev.4

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]
NL 21-B18	RION	NL-21	005543286	02 January 2022	Before Adjustment 94.1 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 January 2022	Before Adjustment 93.9 After Adjustment 94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.96 ± 0.40 dB

Noise B_014/22

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]
NL 21-B18	RION	NL-21	00554236	09 January 2022	Before Adjustment After Adjustment
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)				94.1	94.0
				93.96 ± 0.40 dB	

Noise B_029/22

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]
NL 21-B18	RION	NL-21	00554236	16 January 2022	Before Adjustment After Adjustment
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)				93.9	94.0
				93.96 ± 0.40 dB	

Noise B_043/22

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]
NL 21-B18	RION	NL-21	00554236	23 January 2022	Before Adjustment After Adjustment
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.96 ± 0.40 dB

Noise B_053/22

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]
NL 21-B18	RION	NL-21	00554236	30 January 2022	Before Adjustment After Adjustment
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.96 ± 0.40 dB

Noise E_046/22

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-B14	ACO	03/56	00172034	01 February 2022	Before Adjustment	After Adjustment			
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					94.1	94.0			
					93.96 ± 0.40 dB				

Noise B_067/22

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]				
NL-21-B18	RION	NL-21	00554236	06 February 2022	Before Adjustment	After Adjustment			
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.9	94.0			
					93.96 ± 0.40 dB				

Noise B. 081/22

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

Sound Level Meter Data			
SLM No.	Brand	Model	Serial No.
NL 21-B18	RION	NL-21	00554236
Date		13 February 2022	
Calibration Data		Actual Reading [dB]	
		Before Adjustment	After Adjustment
		93.9	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)			
93.96 ± 0.40 dB			

Noise B. 101/22

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

Sound Level Meter Data			
SLM No.	Brand	Model	Serial No.
NL 21-B18	RION	NL-21	00554236
Date		20 February 2022	
Calibration Data		Actual Reading [dB]	
		Before Adjustment	After Adjustment
		93.9	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)			
93.96 ± 0.40 dB			

Noise B_118/22

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]
NL 21-B18	RIION	NL-21	00554236	27 February 2022	Before Adjustment 93.9 After Adjustment 94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.96 ± 0.40 dB

Noise B_134/22

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]
NL 21-B18	RIION	NL-21	00554236	06 March 2022	Before Adjustment 93.9 After Adjustment 94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.96 ± 0.40 dB

Noise B_1.41/22

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

Sound Level Meter Data			
SLM No.	Brand	Model	Serial No.
NL 21-B18	RION	NL-21	00554236
Date			13 March 2022
Calibration Data			Actual Reading [dB]
			Before Adjustment
			After Adjustment
			94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)			
93.96 ± 0.40 dB			

Noise B_156/22

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

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

Noise B_157/22

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			
SLM No.	Brand	Model	Serial No.
NL 21-B18	RION	NL-21	00554236
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)			93.96 ± 0.40 dB

Noise B_182/22

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			
SLM No.	Brand	Model	Serial No.
NL 21-B18	RION	NL-21	00554236
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]
NL 21-B18	RION	NL-21	00554236	03 April 2022	Before Adjustment 93.9 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]
NL 21-B18	RION	NL-21	00554236	17 April 2022	Before Adjustment 93.9 After Adjustment 94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.96 ± 0.40 dB

№ 06/22

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-B31	ACO	6236	00182013	19 April 2022	Before Adjustment 93.9
					After Adjustment 94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					
93.96 ± 0.40 dB					

№ 217/22

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]
NL 21-B18	RION	NL-21	00554236	24 April 2022	Before Adjustment 93.9
					After Adjustment 94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					
93.96 ± 0.40 dB					

Noise B_250/22

Sound Level Meter Calibration Report

Acoustic Calibrator Data			
Brand	RION	Number	AC 02/40
Model	NC-73	Serial No.	10727909
Calibration Range	94 dB, 1000 Hz	Last Calibration	16 August 2021
		Due Date	18 August 2022
Calibration Data			
Sound Level Meter Data		Calibration Data	
SLM No.	Brand	Model	Serial No.
NL 21-B18	RION	NL-21	00554236
		Date	08 May 2022
		Before Adjustment	94.0
		After Adjustment	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)			
93.88 ± 0.40 dB			

Noise B_241/22

Sound Level Meter Calibration Report

Acoustic Calibrator Data			
Brand	ACO	Number	AC 02/56
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.
NL 21-B18	RION	NL-21	00554236
		Date	01 May 2022
		Before Adjustment	93.9
		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	RION		Number	AC 02/40	
Model	NC-73		Serial No.	10727909	
Calibration Range	94 dB, 1000 Hz		Last Calibration	16 August 2021	
			Due Date	18 August 2022	
Calibration Data					
Sound Level Meter Data			Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]
NL 21-B18	RION	NL-21	00554236	15 May 2022	Before Adjustment
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)				93.9	After Adjustment
					94.0

Sound Level Meter Calibration Report

Acoustic Calibrator Data					
Brand	RION		Number	AC 02/40	
Model	NC-73		Serial No.	10727909	
Calibration Range	94 dB, 1000 Hz		Last Calibration	16 August 2021	
			Due Date	18 August 2022	
Calibration Data					
Sound Level Meter Data			Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]
NL 21-B18	RION	NL-21	00554236	22 May 2022	Before Adjustment
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)				93.9	After Adjustment
					94.0

Note B_276/22

Sound Level Meter Calibration Report

Acoustic Calibrator Data					
Brand	RION	Number	AC 02/40		
Model	NC-73	Serial No.	10727909		
Calibration Range	94 dB, 1000 Hz	Last Calibration	16 August 2021		
		Due Date	18 August 2022		
Calibration Data					
Sound Level Meter Data			Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]
ACO-B14	ACO	6236	00172034	22 May 2022	Before Adjustment 93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					After Adjustment 94.0
					93.88 ± 0.40 dB

Note B_316/22

Sound Level Meter Calibration Report

Acoustic Calibrator Data					
Brand	RION	Number	AC 02/40		
Model	NC-73	Serial No.	10727909		
Calibration Range	94 dB, 1000 Hz	Last Calibration	16 August 2021		
		Due Date	18 August 2022		
Calibration Data					
Sound Level Meter Data			Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]
NL-21-B18	RION	NL-21	00554236	29 May 2022	Before Adjustment 93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					After Adjustment 94.0
					93.88 ± 0.10 dB

Noise B_315/22

Sound Level Meter Calibration Report

Acoustic Calibrator Data					
Brand	RION	Number	AC 02/40		
Model	NC-73	Serial No.	10727909		
Calibration Range	94 dB, 1000 Hz	Last Calibration	16 August 2021		
		Due Date	18 August 2022		
Calibration Data					
Sound Level Meter Data			Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]
NL 21-B18	RION	NL-21	00554236	05 June 2022	Before Adjustment 93.9
					After Adjustment 94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.88 ± 0.10 dB

Noise B_357/22

Sound Level Meter Calibration Report

Acoustic Calibrator Data					
Brand	RION	Number	AC 02/40		
Model	NC-73	Serial No.	10727909		
Calibration Range	94 dB, 1000 Hz	Last Calibration	16 August 2021		
		Due Date	18 August 2022		
Calibration Data					
Sound Level Meter Data			Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]
NL 21-B18	RION	NL-21	00554236	12 June 2022	Before Adjustment 94.0
					After Adjustment 94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.88 ± 0.10 dB

Noise B_377/22

Sound Level Meter Calibration Report

Acoustic Calibrator Data			
Brand	RION	Number	AC 02/40
Model	NC-73	Serial No.	10727909
Calibration Range	94 dB, 1000 Hz	Last Calibration	16 August 2021
		Due Date	18 August 2022
Calibration Data			
Sound Level Meter Data			
SLM No.	Brand	Model	Serial No.
NL 21-B18	RION	NL-21	00554236
		Date	19 June 2022
		Before Adjustment	93.9
		After Adjustment	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)			
93.88 ± 0.10 dB			

Noise B_371/22

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	28 April 2022
		Due Date	28 April 2023
Calibration Data			
Sound Level Meter Data			
SLM No.	Brand	Model	Serial No.
ACO-B05	ACO	6236	00142002
		Date	22 June 2022
		Before Adjustment	93.9
		After Adjustment	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)			
93.93 ± 0.10 dB			

เอกสารที่ 5-3

เอกสารสอบเทียบเครื่องมือการตรวจวิเคราะห์คุณภาพน้ำทิ้ง



CALIBRATION LABORATORY CO., LTD.

2/10-11, 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 Hentanon
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.

2/10-11, 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



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY CO., LTD.

21/0-11, 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



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 No. Q21037544

F3-011-04/01-12

page 3 of 3



@clcalibration



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
DIMENSIONAL MEASUREMENT
ACDM-2814



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
DIMENSIONAL MEASUREMENT
ACDM-2814

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,
CHATUCHAK, 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 Sechanart

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)

Certificate No. Q22039554

F3-011-04/01-12

page 1 of 4



@calibration



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
DIMENSIONAL MEASUREMENT
ACDM-2814



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
DIMENSIONAL MEASUREMENT
ACDM-2814

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-CPCH-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-222 ULT S/N. 17115653.
4. Precision Thermometer, ASL Model F200 S/N. 014433/03.
5. IPRT, ASL Model T100-250-1D S/N. L0193A-1-1.

Certificate No. Q22039554

F3-011-04/01-12

page 2 of 4



@calibration



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
ASIT National Accreditation Board
ACCREDITED
CALIBRATION
DIMENSIONAL MEASUREMENT
ACDM-2814

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. FSL-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.

2/10-11,14,55 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
ASIT National Accreditation Board
ACCREDITED
CALIBRATION
DIMENSIONAL MEASUREMENT
ACDM-2814

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 :

(/) Mailee Bulkrua
(/) Sathip Meangmai
(/) Warakorn Lengagtrakul

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) (mg/L)	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

-o0o-

a 1053122



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.: 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 Sirthean

Approved by :

() Malee Butkruea
() Sathip Meangmai
() Warakorn Lengagtrakul

Issue Date : 25 April 2022



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 :-				
Sodium Thiosulfate pentahydrate	Merck	AM1763316	Assay	100.2%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: 14J100195

Titration Method (Azide Modification Method) (mg/L)	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

-o0o-



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.



CERTIFICATE No : 21M3168

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : SARTORIUS
MODEL : BSA224S-CW
ID No : BA 08/61
AIR PRESSURE : 1009mbar \pm 1mbar
AMBIENT TEMPERATURE : 24° C \pm 1° C
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	M2103235S	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:-

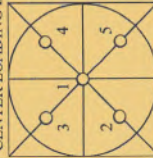
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH CENTRAL BUREAU OF WEIGHTS&MEASURES

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

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

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.0	0.0000	0.0000	0.000075
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	0.000079
5.0	5.0000	0.0000	0.000082
10.0	10.0000	0.0000	0.000086
20.0	20.0000	0.0000	0.00013
50.0	50.0000	-0.0001	0.00019
100.0	100.0001	0.0000	0.00032
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

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 : 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 : 22M2568

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : SARTORIUS
ID No : BA 08/61
MODEL : BSA224S-CW
S/N : 36591842
RECEIVED DATE : 11-Mar-22
CALIBRATION DATE : 11-Mar-22
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 :-

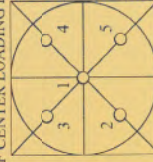
1. STANDARD WEIGHT SET E2
OK-1-151
C02210415
09-Feb-23
3. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL 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 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	99.9990
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