

ภาคผนวกที่ 5

เอกสารสอบเทียบความถูกต้องของเครื่องมือ

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| เอกสาร | 5-1 | เอกสารสอบเทียบเครื่องมือการตรวจวัดคุณภาพอากาศ |
| เอกสาร | 5-2 | เอกสารสอบเทียบเครื่องมือการตรวจวัดระดับเสียง |
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**ตารางสรุปรายการเอกสารการสอบเทียบความถูกต้องของ
เครื่องมือตรวจวัดคุณภาพสิ่งแวดล้อม**

รายงานตรวจวัด	เครื่องมือเก็บตัวอย่าง	เครื่องมือตรวจวิเคราะห์
คุณภาพอากาศ		
- TSP	- High Volume Air Sampler	- Electronic Balance
- PM ₁₀	- High Volume PM ₁₀ Sampler	- Electronic Balance
- SO ₂	- Gas Sampler Box	- Spectrophotometer
	- Rotameter	
- NO ₂	- NO ₂ Analyzer	- NO ₂ Analyzer
- CO	- CO Analyzer	- CO Analyzer
- THC	- Personal Pump SKC	- THC Analyzer
	- Rotameter	
ระดับเสียง		
- Leq 24 hr, Lmax, Ldn, L ₁₀ , L ₉₀ , L ₅ และเสียงรบกวน	- Acoustic Calibrator	-
	- Sound Level Meter	-
คุณภาพน้ำทิ้ง		
- pH	-	- pH Meter
- BOD ₅	-	- DO Meter
- Total Suspended Solids	-	- Electronic Balance
- Total Dissolved Solids	-	- Electronic Balance
- TKN	-	- Block Digestion
- Sulfide	-	-
- Settleable Solid	-	-
- Grease & Oil	-	- Electronic Balance

เอกสารที่ 5-1

เอกสารสอบเทียบเครื่องมือการตรวจวัดคุณภาพอากาศ



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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	04/05/2022	y = 1.313x-9.642	0.999
B02	B02	02/05/2022	y = 1.062x+2.593	1.000
B03	B03	04/05/2022	y = 1.045x+0.767	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 = 1.222x-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 = 1.146x-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



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Model : TE 5025A

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High Volume Air Sampler Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /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	0.996
R07	R07	06/05/2022	y = 1.042x+1.155	0.995
R08	R08	04/05/2022	y = 1.220x-6.674	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 = 1.325x-12.252	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



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High Volume Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard

Model : TE 5025A

S/N : 3611

Calibration Data

High Volume Air Sampler Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²
B01	B01	01/08/2022	y = 1.310x-7.517	0.998
B02	B02	01/08/2022	y = 1.098x+2.659	0.997
B03	B03	01/08/2022	y = 1.089x+0.857	0.998
B04	B04	01/08/2022	y = 1.206x-3.858	0.995
B05	B05	01/08/2022	y = 1.285x-7.595	0.997
B06	B06	01/08/2022	y = 1.287x-6.981	0.998
B07	B07	01/08/2022	y = 1.197x-4.681	0.998
B08	B08	01/08/2022	y = 1.224x-5.592	0.999
B09	B09	01/08/2022	y = 1.275x-6.394	0.997
B10	B10	01/08/2022	y = 1.121x+1.091	0.995
B11	B11	04/08/2022	y = 1.165x-2.766	0.998
B12	B12	04/08/2022	y = 1.230x-4.896	0.998
B13	B13	01/08/2022	y = 1.249x-6.430	0.996
B14	B14	02/08/2022	y = 1.232x-4.320	0.996
B15	B15	02/08/2022	y = 1.134x-0.926	0.997
B16	B16	02/08/2022	y = 1.261x-6.890	0.998
B17	B17	02/08/2022	y = 1.175x-2.039	0.997
B18	B18	02/08/2022	y = 1.290x-7.805	0.999
B19	B19	02/08/2022	y = 1.375x-11.753	0.995
B20	B20	02/08/2022	y = 1.262x-7.100	0.999
B21	B21	03/08/2022	y = 1.142x-1.809	0.999
B22	B22	02/08/2022	y = 1.289x-8.540	0.997
B23	B23	02/08/2022	y = 1.216x-4.912	0.999
B24	B24	01/08/2022	y = 1.147x-1.299	1.000
B25	B25	02/08/2022	y = 1.025x+3.341	0.997
B26	B26	02/08/2022	y = 1.184x-3.486	0.995
B27	B27	03/08/2022	y = 1.237x-6.825	0.996
B28	B28	02/08/2022	y = 1.284x-7.704	0.998
B29	B29	02/08/2022	y = 1.305x-8.854	0.996
B30	B30	03/08/2022	y = 1.227x-5.387	0.996
B31	B31	03/08/2022	y = 1.215x-4.628	0.995
B32	B32	03/08/2022	y = 1.313x-8.558	0.995
B33	B33	03/08/2022	y = 1.330x-7.545	1.000
B34	B34	03/08/2022	y = 1.287x-8.617	0.999



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Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²
B35	B35	03/08/2022	y = 1.324x-9.985	0.995
B36	B36	02/08/2022	y = 1.199x-5.068	0.998
B37	B37	01/08/2022	y = 1.263x-6.105	0.995
B38	B38	01/08/2022	y = 1.200x-4.049	0.998
B39	B39	01/08/2022	y = 1.323x-9.022	0.998
B40	B40	01/08/2022	y = 1.223x-4.993	0.997
B41	B41	01/08/2022	y = 1.236x-5.071	0.998
B42	B42	01/08/2022	y = 1.230x-4.886	0.998
B43	B43	02/08/2022	y = 1.189x-3.190	0.998
B44	B44	02/08/2022	y = 1.336x-10.058	0.996
R01	R01	02/08/2022	y = 1.271x-7.214	0.999
R02	R02	02/08/2022	y = 1.254x-7.346	1.000
R03	R03	02/08/2022	y = 1.258x-7.858	0.998
R04	R04	02/08/2022	y = 1.175x-2.851	0.998
R05	R05	02/08/2022	y = 1.240x-7.136	0.999
R06	R06	01/08/2022	y = 1.389x-11.486	0.998
R07	R07	01/08/2022	y = 1.060x+2.168	0.998
R08	R08	01/08/2022	y = 1.208x-5.068	0.997
R09	R09	01/08/2022	y = 1.275x-7.830	0.998
R10	R10	02/08/2022	y = 1.260x-6.945	0.998
R11	R11	02/08/2022	y = 1.116x-1.299	0.999
R12	R12	02/08/2022	y = 1.294x-8.990	0.996
R13	R13	02/08/2022	y = 1.133x-0.833	0.999
R14	R14	03/08/2022	y = 1.157x-2.099	0.999
R15	R15	03/08/2022	y = 1.178x-3.248	0.999
R16	R16	03/08/2022	y = 1.203x-5.180	0.999
R17	R17	03/08/2022	y = 1.267x-6.960	0.999
R18	R18	04/08/2022	y = 1.281x-7.586	0.995
R19	R19	04/08/2022	y = 1.223x-4.898	0.995
R20	R20	04/08/2022	y = 1.350x-11.132	0.998



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Model : TE 5025A

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Recorder No.	Blower No.	Date	Actual Flowrate (l ³ /min)	R ²
B01	B01	01/11/2022	y = 1.277x-6.403	0.999
B02	B02	03/11/2022	y = 1.083x+3.505	0.995
B03	B03	03/11/2022	y = 1.143x-1.010	0.996
B04	B04	04/11/2022	y = 1.206x-3.858	0.995
B05	B05	01/11/2022	y = 1.317x-8.733	0.997
B06	B06	01/11/2022	y = 1.268x-5.920	0.998
B07	B07	01/11/2022	y = 1.228x-6.265	0.998
B08	B08	08/11/2022	y = 1.160x-3.496	0.995
B09	B09	03/11/2022	y = 1.245x-5.341	0.997
B10	B10	01/11/2022	y = 1.097x+1.837	0.997
B11	B11	07/11/2022	y = 1.153x-2.164	0.998
B12	B12	04/11/2022	y = 1.201x-3.884	0.998
B13	B13	01/11/2022	y = 1.266x-6.916	0.995
B14	B14	02/11/2022	y = 1.269x-6.120	0.999
B15	B15	02/11/2022	y = 1.149x-1.829	0.997
B16	B16	02/11/2022	y = 1.212x-4.259	0.999
B17	B17	04/11/2022	y = 1.172x-2.143	0.997
B18	B18	04/11/2022	y = 1.321x-9.413	0.996
B19	B19	02/11/2022	y = 1.356x-11.184	0.997
B20	B20	04/11/2022	y = 1.310x-8.682	0.997
B21	B21	03/11/2022	y = 1.156x-2.174	0.999
B22	B22	02/11/2022	y = 1.288x-8.740	0.998
B23	B23	04/11/2022	y = 1.247x-5.764	0.996
B24	B24	01/11/2022	y = 1.161x-2.123	0.999
B25	B25	02/11/2022	y = 1.025x+3.341	0.997
B26	B26	02/11/2022	y = 1.234x-6.128	0.995
B27	B27	03/11/2022	y = 1.220x-5.822	0.997
B28	B28	02/11/2022	y = 1.253x-6.605	0.999
B29	B29	08/11/2022	y = 1.311x-8.876	0.997
B30	B30	07/11/2022	y = 1.264x-7.252	0.998
B31	B31	07/11/2022	y = 1.215x-4.628	0.995
B32	B32	03/11/2022	y = 1.258x-6.433	0.997
B33	B33	03/11/2022	y = 1.329x-7.779	0.995
B34	B34	03/11/2022	y = 1.267x-7.491	0.998



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Recorder No.	Blower No.	Date	Actual Flowrate (l ³ /min)	R ²
B35	B35	03/11/2022	y = 1.306x-9.466	0.997
B36	B36	02/11/2022	y = 1.213x-5.932	0.996
B37	B37	01/11/2022	y = 1.253x-5.209	0.999
B38	B38	01/11/2022	y = 1.228x-5.530	0.995
B39	B39	01/11/2022	y = 1.319x-9.149	0.998
B40	B40	01/11/2022	y = 1.196x-4.045	0.999
B41	B41	07/11/2022	y = 1.179x-2.611	0.999
B42	B42	01/11/2022	y = 1.209x-3.713	0.995
B43	B43	02/11/2022	y = 1.187x-3.331	0.998
B44	B44	07/11/2022	y = 1.298x-8.171	0.996
R01	R01	02/11/2022	y = 1.289x-8.287	0.998
R02	R02	07/11/2022	y = 1.307x-10.165	0.999
R03	R03	03/11/2022	y = 1.259x-7.634	0.995
R04	R04	04/11/2022	y = 1.157x-2.287	0.995
R05	R05	03/11/2022	y = 1.273x-8.311	0.999
R06	R06	01/11/2022	y = 1.297x-8.271	0.999
R07	R07	02/11/2022	y = 1.071x+1.468	0.995
R08	R08	01/11/2022	y = 1.206x-6.068	0.997
R09	R09	01/11/2022	y = 1.252x-7.084	0.995
R10	R10	03/11/2022	y = 1.246x-5.817	0.999
R11	R11	03/11/2022	y = 1.117x-1.156	0.998
R12	R12	02/11/2022	y = 1.351x-12.068	0.996
R13	R13	03/11/2022	y = 1.118x-0.601	0.999
R14	R14	03/11/2022	y = 1.164x-2.415	0.996
R15	R15	03/11/2022	y = 1.134x-1.793	0.998
R16	R16	04/11/2022	y = 1.182x-4.717	0.996
R17	R17	07/11/2022	y = 1.218x-5.356	0.998
R18	R18	04/11/2022	y = 1.233x-5.977	0.996
R19	R19	07/11/2022	y = 1.277x-7.752	0.997
R20	R20	04/11/2022	y = 1.327x-10.628	0.997



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High Volume PM-10 Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard

Model : TE 5025A

S/N : 3095

Calibration Data

High Volume PM-10 Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²
B01	B01	02/05/2022	$y = 1.171x - 0.211$	0.997
B02	B02	02/05/2022	$y = 0.960x + 5.104$	0.998
B03	B03	04/05/2022	$y = 1.214x - 5.211$	0.996
B04	B04	02/05/2022	$y = 1.310x - 9.479$	0.999
B05	B05	03/05/2022	$y = 1.202x - 5.734$	0.999
B06	B06	04/05/2022	$y = 1.241x - 7.631$	0.998
B07	B07	04/05/2022	$y = 1.186x - 4.480$	0.999
B08	B08	03/05/2022	$y = 1.322x - 8.634$	0.999
B09	B09	04/05/2022	$y = 1.219x - 5.756$	0.998
B10	B10	03/05/2022	$y = 1.234x - 7.417$	1.000
B11	B11	02/05/2022	$y = 1.260x - 7.479$	0.999
B12	B12	02/05/2022	$y = 1.225x - 5.900$	0.998
B13	B13	04/05/2022	$y = 1.326x - 10.711$	0.999
B14	B14	07/05/2022	$y = 1.197x - 3.534$	0.999
B15	B15	04/05/2022	$y = 1.096x - 0.244$	0.998
B16	B16	04/05/2022	$y = 1.209x - 1.612$	1.000
B17	B17	03/05/2022	$y = 1.198x - 3.075$	0.999
B18	B18	07/05/2022	$y = 1.159x - 2.421$	0.999
B19	B19	03/05/2022	$y = 1.053x + 1.562$	0.999
B20	B20	03/05/2022	$y = 1.206x - 6.147$	1.000
B21	B21	04/05/2022	$y = 1.156x - 0.999$	0.998
B22	B22	04/05/2022	$y = 1.293x - 8.368$	0.998
B23	B23	07/05/2022	$y = 1.149x - 2.644$	1.000
B24	B24	02/05/2022	$y = 1.250x - 7.392$	1.000
B25	B25	03/05/2022	$y = 1.131x - 2.476$	0.999
B26	B26	07/05/2022	$y = 1.154x + 1.978$	1.000
B27	B27	02/05/2022	$y = 1.278x - 8.984$	0.998
B28	B28	04/05/2022	$y = 1.093x - 0.217$	0.999
B29	B29	04/05/2022	$y = 1.280x - 9.168$	0.999
B30	B30	03/05/2022	$y = 1.290x - 8.822$	0.997
B31	B31	03/05/2022	$y = 1.116x - 0.814$	0.997
B32	B32	05/05/2022	$y = 1.156x - 3.473$	0.999
B33	B33	06/05/2022	$y = 1.254x - 8.880$	0.998
B34	B34	03/05/2022	$y = 1.157x - 1.629$	0.999



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High Volume PM-10 Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard

Model : TE 5025A

S/N : 3611

Calibration Data

High Volume PM-10 Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²
B01	B01	02/08/2022	$y = 1.258x - 2.366$	0.998
B02	B02	02/08/2022	$y = 0.987x + 5.729$	0.999
B03	B03	02/08/2022	$y = 1.247x - 5.106$	0.999
B04	B04	01/08/2022	$y = 1.242x - 4.634$	0.997
B05	B05	01/08/2022	$y = 1.245x - 5.869$	0.997
B06	B06	01/08/2022	$y = 1.360x - 10.516$	0.999
B07	B07	01/08/2022	$y = 1.290x - 6.871$	0.999
B08	B08	01/08/2022	$y = 1.353x - 8.231$	0.999
B09	B09	04/08/2022	$y = 1.289x - 6.478$	0.999
B10	B10	04/08/2022	$y = 1.317x - 9.553$	0.998
B11	B11	04/08/2022	$y = 1.331x - 8.248$	0.999
B12	B12	04/08/2022	$y = 1.317x - 9.553$	0.998
B13	B13	01/08/2022	$y = 1.338x - 9.806$	0.999
B14	B14	01/08/2022	$y = 1.230x - 3.665$	0.998
B15	B15	01/08/2022	$y = 1.169x - 2.069$	0.998
B16	B16	01/08/2022	$y = 1.240x - 1.078$	0.998
B17	B17	01/08/2022	$y = 1.241x - 3.121$	0.997
B18	B18	01/08/2022	$y = 1.190x - 1.997$	0.998
B19	B19	02/08/2022	$y = 1.108x + 0.786$	0.999
B20	B20	02/08/2022	$y = 1.251x - 6.369$	0.997
B21	B21	02/08/2022	$y = 1.176x - 0.519$	0.999
B22	B22	02/08/2022	$y = 1.291x - 7.071$	0.999
B23	B23	02/08/2022	$y = 1.177x - 2.290$	0.998
B24	B24	03/08/2022	$y = 1.367x - 11.212$	0.997
B25	B25	03/08/2022	$y = 1.178x - 3.689$	0.999
B26	B26	03/08/2022	$y = 1.204x - 3.755$	0.999
B27	B27	03/08/2022	$y = 1.331x - 10.619$	0.998
B28	B28	03/08/2022	$y = 1.139x - 1.295$	0.999
B29	B29	03/08/2022	$y = 1.333x - 10.813$	0.999
B30	B30	01/08/2022	$y = 1.344x - 10.463$	0.997
B31	B31	01/08/2022	$y = 1.162x + 0.382$	0.997
B32	B32	01/08/2022	$y = 1.204x - 2.345$	0.999
B33	B33	01/08/2022	$y = 1.349x - 10.216$	0.999
B34	B34	01/08/2022	$y = 1.289x - 4.593$	1.000



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High Volume PM-10 Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard

Model : TE 5025A

S/N : 3611

Calibration Data

High Volume PM-10 Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²
B01	B01	02/11/2022	$y = 1.206x - 0.557$	0.998
B02	B02	02/11/2022	$y = 1.024x + 3.762$	0.999
B03	B03	02/11/2022	$y = 1.243x - 4.455$	0.998
B04	B04	03/11/2022	$y = 1.293x - 7.303$	0.997
B05	B05	03/11/2022	$y = 1.252x - 5.903$	0.999
B06	B06	04/11/2022	$y = 1.313x - 7.710$	0.997
B07	B07	02/11/2022	$y = 1.290x - 6.671$	0.999
B08	B08	04/11/2022	$y = 1.330x - 6.996$	0.999
B09	B09	04/11/2022	$y = 1.260x - 6.331$	0.995
B10	B10	02/11/2022	$y = 1.298x - 8.225$	0.997
B11	B11	04/11/2022	$y = 1.278x - 5.540$	0.995
B12	B12	04/11/2022	$y = 1.282x - 7.018$	0.996
B13	B13	01/11/2022	$y = 1.320x - 9.281$	0.998
B14	B14	02/11/2022	$y = 1.230x - 3.665$	0.998
B15	B15	02/11/2022	$y = 1.166x - 2.184$	0.997
B16	B16	01/11/2022	$y = 1.260x - 2.121$	0.998
B17	B17	04/11/2022	$y = 1.277x - 4.847$	0.998
B18	B18	01/11/2022	$y = 1.165x - 1.164$	0.999
B19	B19	02/11/2022	$y = 1.094x + 1.145$	0.999
B20	B20	02/11/2022	$y = 1.221x - 5.301$	0.997
B21	B21	01/11/2022	$y = 1.176x - 0.519$	0.999
B22	B22	02/11/2022	$y = 1.286x - 7.131$	0.998
B23	B23	03/11/2022	$y = 1.181x - 2.246$	0.999
B24	B24	03/11/2022	$y = 1.253x - 5.274$	0.995
B25	B25	04/11/2022	$y = 1.159x - 3.062$	0.996
B26	B26	03/11/2022	$y = 1.264x - 6.317$	0.998
B27	B27	03/11/2022	$y = 1.332x - 10.385$	0.996
B28	B28	03/11/2022	$y = 1.165x - 2.689$	0.998
B29	B29	03/11/2022	$y = 1.271x - 7.065$	0.996
B30	B30	01/11/2022	$y = 1.274x - 7.435$	0.996
B31	B31	01/11/2022	$y = 1.244x - 3.676$	0.999
B32	B32	01/11/2022	$y = 1.186x - 1.847$	0.999
B33	B33	04/11/2022	$y = 1.268x - 6.742$	0.996
B34	B34	01/11/2022	$y = 1.321x - 5.654$	0.998



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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
B01	2 (A&B)	01/06/2022	200	200.4	199.0	200.6	199.2
B02	2 (A&B)	01/06/2022	200	200.6	199.1	200.5	199.0
B03	2 (A&B)	03/06/2022	200	200.5	199.0	200.5	199.1
B04	2 (A&B)	02/06/2022	200	200.5	199.1	200.6	199.2
B05	2 (A&B)	01/06/2022	200	200.4	199.0	200.5	199.1
B06	2 (A&B)	01/06/2022	200	200.5	199.1	200.4	198.9
B07	2 (A&B)	03/06/2022	200	200.3	198.9	200.5	199.1
B08	2 (A&B)	01/06/2022	200	200.5	199.1	200.4	199.0
B09	2 (A&B)	01/06/2022	200	200.4	199.0	200.3	198.9
B10	2 (A&B)	02/06/2022	200	200.5	199.0	200.5	199.0
B11	2 (A&B)	01/06/2022	200	200.4	199.0	200.7	199.2
B12	2 (A&B)	01/06/2022	200	200.5	199.1	200.5	199.0
B13	2 (A&B)	02/06/2022	200	200.4	199.0	200.5	199.1
B14	2 (A&B)	02/06/2022	200	200.5	199.0	200.4	198.9
B15	2 (A&B)	03/06/2022	200	200.6	199.2	200.6	199.2
B16	2 (A&B)	01/06/2022	200	200.5	199.0	200.5	199.1
B17	2 (A&B)	01/06/2022	200	200.5	199.0	200.4	199.0



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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
B01	2 (A&B)	01/09/2022	200	200.6	199.2	200.4	199.0
B02	2 (A&B)	01/09/2022	200	200.4	199.0	200.5	199.0
B03	2 (A&B)	02/09/2022	200	200.6	199.2	200.6	199.1
B04	2 (A&B)	01/09/2022	200	200.4	199.0	200.4	199.0
B05	2 (A&B)	01/09/2022	200	200.5	199.1	200.6	199.1
B06	2 (A&B)	05/09/2022	200	200.4	199.0	200.5	199.1
B07	2 (A&B)	01/09/2022	200	200.6	199.1	200.5	199.0
B08	2 (A&B)	05/09/2022	200	200.4	199.0	200.4	199.0
B09	2 (A&B)	02/09/2022	200	200.5	199.0	200.6	199.2
B10	2 (A&B)	01/09/2022	200	200.6	199.1	200.5	199.0
B11	2 (A&B)	05/09/2022	200	200.6	199.1	200.7	199.3
B12	2 (A&B)	01/09/2022	200	200.5	199.0	200.5	199.0
B13	2 (A&B)	05/09/2022	200	200.4	199.0	200.7	199.2
B14	2 (A&B)	01/09/2022	200	200.6	199.1	200.6	199.2
B15	2 (A&B)	02/09/2022	200	200.4	199.0	200.5	199.0
B16	2 (A&B)	02/09/2022	200	200.6	199.1	200.5	199.1
B17	2 (A&B)	01/09/2022	200	200.5	199.0	200.6	199.1



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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
B01	2 (A&B)	01/12/2022	200	200.4	199.0	200.5	199.1
B02	2 (A&B)	01/12/2022	200	200.5	199.1	200.8	199.3
B03	2 (A&B)	05/12/2022	200	200.4	199.0	200.5	199.0
B04	2 (A&B)	05/12/2022	200	200.8	199.3	200.7	199.3
B05	2 (A&B)	02/12/2022	200	200.5	199.1	200.4	199.0
B06	2 (A&B)	02/12/2022	200	200.4	199.0	200.5	199.1
B07	2 (A&B)	02/12/2022	200	200.8	199.4	200.9	199.5
B08	2 (A&B)	06/12/2022	200	200.4	199.0	200.5	199.1
B09	2 (A&B)	06/12/2022	200	200.6	199.2	200.4	199.0
B10	2 (A&B)	01/12/2022	200	200.6	199.1	200.5	199.1
B11	2 (A&B)	02/12/2022	200	200.4	199.0	200.7	199.3
B12	2 (A&B)	05/12/2022	200	200.8	199.4	200.5	199.0
B13	2 (A&B)	06/12/2022	200	200.6	199.1	200.8	199.3
B14	2 (A&B)	02/12/2022	200	200.7	199.2	200.5	199.1
B15	2 (A&B)	01/12/2022	200	200.4	199.0	200.7	199.2
B16	2 (A&B)	01/12/2022	200	200.6	199.1	200.4	199.0
B17	2 (A&B)	02/12/2022	200	200.5	199.0	200.6	199.1



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Rotameter Calibration Report (For Personal Pump Low Flow Adjust)

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

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	04/07/2022	50	100	200	50.7	99.1	198.9	0.986x + 1.078	1.000
L-B02	Dwyer	VFA-21	04/07/2022	50	100	200	50.2	99.4	198.3	1.004x - 1.615	0.999
L-B03	Dwyer	VFA-21	05/07/2022	50	100	200	50.8	98.8	198.3	1.016x - 2.213	1.000
L-B04	Dwyer	VFA-21	05/07/2022	50	100	200	49.9	102.0	201.1	0.994x + 1.640	1.000
L-B05	Dwyer	VFA-21	01/07/2022	50	100	200	50.5	98.1	200.8	0.991x + 0.476	1.000
L-B06	Dwyer	VFA-21	04/07/2022	50	100	200	50.3	100.5	203.0	0.999x + 0.476	0.999
L-B07	Dwyer	VFA-21	04/07/2022	50	100	200	49.4	100.8	199.7	1.016x - 1.898	1.000
L-B08	Dwyer	VFA-21	01/07/2022	50	100	200	49.8	101.3	198.1	0.999x - 0.218	1.000
L-B09	Dwyer	VFA-21	01/07/2022	50	100	200	49.6	99.6	200.7	1.010x - 1.907	0.999
L-B10	Dwyer	VFA-21	04/07/2022	50	100	200	51.0	100.2	202.8	0.992x + 2.266	1.000



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Rotameter Calibration Report (For Personal Pump Low Flow Adjust)

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Calibration Data											
Rotameter Data				Calibration Data							
No.	Brand	Model	Date	Flow Rate (ml/min)						Value From Calibration Curve	
				Flow Rate (Reading)			Actual (Q std.)				
				1	2	3	1	2	3	y	R²
L-B01	Dwyer	VFA-21	05/10/2022	50	100	200	50.7	99.1	198.9	0.985x + 1.192	1.000
L-B02	Dwyer	VFA-21	04/10/2022	50	100	200	49.8	99.4	198.3	1.012x - 2.104	1.000
L-B03	Dwyer	VFA-21	04/10/2022	50	100	200	50.8	99.2	198.3	1.009x - 1.544	0.999
L-B04	Dwyer	VFA-21	04/10/2022	50	100	200	49.9	101.6	201.1	0.996x + 1.334	1.000
L-B05	Dwyer	VFA-21	04/10/2022	50	100	200	50.1	98.5	200.8	0.992x + 0.311	1.000
L-B06	Dwyer	VFA-21	04/10/2022	50	100	200	50.3	100.5	203.4	1.009x + 0.376	1.000
L-B07	Dwyer	VFA-21	04/10/2022	50	100	200	49.4	100.8	199.7	1.005x - 1.24	0.999
L-B08	Dwyer	VFA-21	04/10/2022	50	100	200	49.8	101.3	198.1	0.998x - 0.116	1.000
L-B09	Dwyer	VFA-21	06/10/2022	50	100	200	49.6	99.2	200.7	1.013x - 1.491	1.000
L-B10	Dwyer	VFA-21	06/10/2022	50	100	200	50.6	100.2	202.8	0.993x + 2.011	1.000



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CALIBRATION REPORT					
NON-DISPERSIVE INFRARED CO ANALYZER					
DATE :	19 July 2022	BRAND :	Thermo	MODEL :	48C
NO.	CO-B07	SERIAL NO.	0335203746		
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	Analyzer Response	%Dif	Analyzer Response	
Zero	0	-0.10	-	0	
CO Span	40.00	39.92	-0.200	40.00	
INSTRUMENT STATUS					
CHAMBER TEMP	47.4	°C	FLOW	1.5	LPM
PRESSURE	730.9	mm Hg	MOTOR SPEED	100.00	%



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CALIBRATION REPORT					
NON-DISPERSIVE INFRARED CO ANALYZER					
DATE :	19 July 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.	24.5	°C
			% RH	49	
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPM			Final Reading (After Adj.),PPM	
Set Point	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	
Zero	0	0.10	-	0	
CO Span	40.00	39.96	-0.100	40.00	
INSTRUMENT STATUS					
CHAMBER TEMP	47.5	°C	FLOW	1.5	LPM
PRESSURE	730.6	mm Hg	MOTOR SPEED	100.00	%



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CALIBRATION REPORT					
NON-DISPERSIVE INFRARED CO ANALYZER					
DATE :	15 August 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	Analyzer Response	%Dif	Analyzer Response	
Zero	0	0.11	-	0	
CO Span	40.00	39.95	-0.125	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	4015.1	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	28.7	In-Hg-A	~2" < ambient absolute pressure		
SAMPLE FLOW	811	cc/min	800 ± 10%		
SAMPLE TEMPERATURE	48.5	°C	48 ± 4		
BENCH TEMPERATURE	48.2	°C	48 ± 2		
WHEEL TEMPERATURE	68.3	°C	68 ± 2		
BOX TEMPERATURE	30.8	°C	Ambient temp + 7 ± 10		
PHOTO-DRIVE	3026.4	mV	250 mV to 4750 mV		
SLOPE	1.017	-	1.0 ± 0.3		
OFFSET	0.2	-	0 ± 0.3		



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CALIBRATION REPORT					
NON-DISPERSIVE INFRARED CO ANALYZER					
DATE :	15 August 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.	24.5	°C
% RH	49				
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPM			Final Reading (After Adj.),PPM	
Set Point	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	
Zero	0	0.10	-	0	
CO Span	40.00	40.08	0.200	40.00	
INSTRUMENT STATUS					
CHAMBER TEMP	47.5	°C	FLOW	1.5 LPM	
PRESSURE	730.9	mm Hg	MOTOR SPEED	100.00%	



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CALIBRATION REPORT					
NON-DISPERSIVE INFRARED CO ANALYZER					
DATE :	21 September 2022	BRAND :	Thermo	MODEL :	48C
NO.	CO-B12	SERIAL NO.	TL-65343-348		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 06 September 2022		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 48					
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPM			Final Reading (After Adj.),PPM	
Set Point	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	
Zero	0	-0.10	-	0	
CO Span	40.00	40.08	0.200	40.00	
INSTRUMENT STATUS					
CHAMBER TEMP	47.5	°C	FLOW	1.5	LPM
PRESSURE	730.6	mm Hg	MOTOR SPEED	100.00	%



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CALIBRATION REPORT					
NON-DISPERSIVE INFRARED CO ANALYZER					
DATE :	21 September 2022	BRAND :	API	MODEL :	300EU
NO.	CO-B14	SERIAL NO.	131		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 06 September 2022		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 48					
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPM			Final Reading (After Adj.),PPM	
Set Point	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	
Zero	0	-0.10	-	0	
CO Span	40.00	40.05	0.125	40.00	
API Model 300EU 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	4016.2	mV	2500-4800 mV		
CO REFERENCE	3948.7	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	807	cc/min	800 ± 10%		
SAMPLE TEMPERATURE	48.3	°C	48 ± 4		
BENCH TEMPERATURE	48.1	°C	48 ± 2		
WHEEL TEMPERATURE	68.4	°C	68 ± 2		
BOX TEMPERATURE	30.8	°C	Ambient temp + 7 ± 10		
PHOTO-DRIVE	3033.7	mV	250 mV to 4750 mV		
SLOPE	1.017	-	1.0 ± 0.3		
OFFSET	0.2	-	0 ± 0.3		



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CALIBRATION REPORT					
NON-DISPERSIVE INFRARED CO ANALYZER					
DATE :	04 October 2022	BRAND :	Thermo	MODEL :	48C
NO.	CO-B08	SERIAL NO.	0508011067		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 06 September 2022		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	Analyzer Response	%Dif	Analyzer Response	
Zero	0	-0.10	-	0	
CO Span	40.00	39.96	-0.100	40.00	
INSTRUMENT STATUS					
CHAMBER TEMP	47.2	°C	FLOW	1.5 LPM	
PRESSURE	730.7	mm Hg	MOTOR SPEED	100.00%	



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CALIBRATION REPORT					
NON-DISPERSIVE INFRARED CO ANALYZER					
DATE :	04 October 2022	BRAND :	Thermo	MODEL :	48C
NO.	CO-B09	SERIAL NO.	65433-348		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 06 September 2022		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	Analyzer Response	%Dif	Analyzer Response	
Zero	0	0.10	-	0	
CO Span	40.00	40.03	0.075	50.00	
INSTRUMENT STATUS					
CHAMBER TEMP	47.5	°C	FLOW	1.5 LPM	
PRESSURE	730.4	mm Hg	MOTOR SPEED	100.00%	



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CALIBRATION REPORT					
NON-DISPERSIVE INFRARED CO ANALYZER					
DATE :	08 November 2022	BRAND :	Thermo	MODEL :	48C
NO.	CO-B07	SERIAL NO.	0335203746		
Calibrator (Dilution System)					
Brand : API		Model : 700			
Last Cal. Date : 06 September 2022		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	Analyzer Response	%Dif	Analyzer Response	
Zero	0	0.10	-	0	
CO Span	40.00	39.92	-0.200	40.00	
INSTRUMENT STATUS					
CHAMBER TEMP	47.2 °C	FLOW	1.5 LPM		
PRESSURE	730.4 mm Hg	MOTOR SPEED	100.00%		



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CALIBRATION REPORT					
NON-DISPERSIVE INFRARED CO ANALYZER					
DATE :	08 November 2022	BRAND :	Thermo	MODEL :	48C
NO.	CO-B11	SERIAL NO.	0401304262		
Calibrator (Dilution System)					
Brand : API		Model : 700			
Last Cal. Date : 06 September 2022		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	Analyzer Response	%Dif	Analyzer Response	
Zero	0	0.10	-	0	
CO Span	40.00	39.91	-0.225	40.00	
INSTRUMENT STATUS					
CHAMBER TEMP	47.3 °C	FLOW	1.5 LPM		
PRESSURE	730.5 mm Hg	MOTOR SPEED	100.00%		



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CALIBRATION REPORT					
NON-DISPERSIVE INFRARED CO ANALYZER					
DATE :	'18 December 2022	BRAND :	Thermo	MODEL :	48C
NO.	CO-B07	SERIAL NO.	0335203746		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 06 September 2022		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	%Dif	Analyzer Response	
Zero	0	-0.10	-	0	
CO Span	40.00	39.92	-0.200	40.00	
INSTRUMENT STATUS					
CHAMBER TEMP	47.6	°C	FLOW	1.5	LPM
PRESSURE	730.7	mm Hg	MOTOR SPEED	100.00	%



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CALIBRATION REPORT					
NON-DISPERSIVE INFRARED CO ANALYZER					
DATE :	'18 December 2022	BRAND :	Thermo	MODEL :	48C
NO.	CO-B09	SERIAL NO.	65433-348		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 06 September 2022		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	%Dif	Analyzer Response	
Zero	0	0.10	-	0	
CO Span	40.00	39.95	-0.125	40.00	
INSTRUMENT STATUS					
CHAMBER TEMP	47.5	°C	FLOW	1.5	LPM
PRESSURE	730.4	mm Hg	MOTOR SPEED	100.00	%

CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	19 July 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	-0.10	-	0	-
NO Span	400	399.5	-0.125	400.0	0.998
NO _x Span	400	399.8	-0.050	400.0	1.003
API Model 200E NO _x Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	504	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.2	mV	-20 ~ 150		
AZERO	94.1	mV	-20 ~ 150		
HVPS	670	V	420 ~ 900 constant		
RCELL 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		
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	0.998	-	1.0 ± 0.3		
NO _x Slope	1.003	-	1.0 ± 0.3		
NO Offset	1.0	mV	-20 to +150		
NO _x Offset	0.6	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		

CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	19 July 2022	BRAND :	API	MODEL :	TML-41M
NO.	NOX-B22	SERIAL NO.	NO1618		
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	399.7	-0.075	400.0	1.003
NO _x Span	400	400.1	0.025	400.0	1.007
API Model TML-41M 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	102.9	mV	-20 ~ 150		
AZERO	93.7	mV	-20 ~ 150		
HVPS	675	V	420 ~ 900 constant		
RCELL TEMP	50.1	°C	50 ± 1		
BOX TEMP	29.2	°C	8 ~ 48		
PMT TEMP	7.3	°C	7 ± 2		
MOLY TEMP	315.1	°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	1.003	-	1.0 ± 0.3		
NO _x Slope	1.007	-	1.0 ± 0.3		
NO Offset	1.1	mV	-20 to +150		
NO _x Offset	0.7	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	15 August 2022	BRAND :	API	MODEL :	200E
NO.	NOX-B07	SERIAL NO.	4338		
Calibrator (Dilution System)					
Brand :	API		Model :	700	
Last Cal. Date :	04 August 2022		Serial No. :	911	
Reference Standard Gas					
Standard Gas :	Nitric Oxide (NO)		Cylinder No. :	D636192	
Certified Date :	20 April 2022	Expired Date :	20 April 2024	Cylinder Conc. :	49.1 ppm
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.5	°C
			% RH	49	
CALIBRATION SETTING					
Span Set Point	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	0.10	-	0	-
NO Span	400	400.2	0.050	400.0	1.009
NO _x Span	400	400.4	0.100	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	506	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.3	mV	-20 - 150		
AZERO	93.9	mV	-20 - 150		
HVPS	673	V	420 - 900 constant		
RCELL 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		
RCELL PRESS	8.5	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.7	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO _x Span Conc	400	PPB	20 - 20,000		
NO Slope	1.009	-	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		



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	15 August 2022	BRAND :	API	MODEL :	200E
NO.	NOX-B09	SERIAL NO.	4412		
Calibrator (Dilution System)					
Brand :	API		Model :	700	
Last Cal. Date :	04 August 2022		Serial No. :	911	
Reference Standard Gas					
Standard Gas :	Nitric Oxide (NO)		Cylinder No. :	D636192	
Certified Date :	20 April 2022	Expired Date :	20 April 2024	Cylinder Conc. :	49.1 ppm
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.5	°C
			% RH	49	
CALIBRATION SETTING					
Span Set Point	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	-0.10	-	0	-
NO Span	400	399.7	-0.075	400.0	1.004
NO _x Span	400	400.1	0.025	400.0	1.006
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	675	V	420 - 900 constant		
RCELL TEMP	50.0	°C	50 ± 1		
BOX TEMP	28.8	°C	8 - 48		
PMT TEMP	7.2	°C	7 ± 2		
MOLY TEMP	314.8	°C	315 ± 5		
RCELL PRESS	8.3	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.4	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO _x Span Conc	400	PPB	20 - 20,000		
NO Slope	1.004	-	1.0 ± 0.3		
NO _x Slope	1.006	-	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		



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	21 September 2022	BRAND :	API	MODEL :	200E
NO.	NOX-B07	SERIAL NO.	4338		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 04 August 2022		Serial No.	: 911	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: D636192	
Certified Date	: 20 April 2022		Expired Date	: 20 April 2024	
			Cylinder Conc.	: 49.1 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	399.6	-0.100	400.0	1.002
NO _x Span	400	399.9	-0.025	400.0	1.005
API Model 200E NO _x Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	506	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.2	mV	-20 ~ 150		
AZERO	94.1	mV	-20 ~ 150		
HVPS	670	V	420 ~ 900 constant		
RCELL 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		
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	1.002	-	1.0 ± 0.3		
NO _x Slope	1.005	-	1.0 ± 0.3		
NO Offset	1.1	mV	-20 to +150		
NO _x Offset	0.6	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	21 September 2022	BRAND :	API	MODEL :	TML-41M
NO.	NOX-B22	SERIAL NO.	NO1618		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 04 August 2022		Serial No.	: 911	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: D636192	
Certified Date	: 20 April 2022		Expired Date	: 20 April 2024	
			Cylinder Conc.	: 49.1 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	400.1	0.025	400.0	1.006
NO _x Span	400	400.2	0.050	400.0	1.011
API Model TML-41M NO _x Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	505	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.1	mV	-20 ~ 150		
AZERO	93.7	mV	-20 ~ 150		
HVPS	671	V	420 ~ 900 constant		
RCELL TEMP	50.1	°C	50 ± 1		
BOX TEMP	29.2	°C	8 ~ 48		
PMT TEMP	7.3	°C	7 ± 2		
MOLY TEMP	315.1	°C	315 ± 5		
RCELL PRESS	8.4	IN-Hg-A	2 ~ 10 constant		
SAMPLE PRESS	28.6	IN-Hg-A	25 ~ 30 constant		
NO Span Conc	400	PPB	20 ~ 20,000		
NO _x Span Conc	400	PPB	20 ~ 20,000		
NO Slope	1.006	-	1.0 ± 0.3		
NO _x Slope	1.011	-	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		



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	04 October 2022	BRAND :	API	MODEL :	200E
NO.	NOX-B05	SERIAL NO.	2284		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 04 August 2022		Serial No.	: 911	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: D636192	
Certified Date	: 20 April 2022	Expired Date	: 20 April 2024	Cylinder Conc.	: 49.1 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	400.1	0.025	400.0	1.008
NO _x Span	400	400.3	0.075	400.0	1.011
API Model 200E NO _x Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	505	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.5	mV	-20 - 150		
AZERO	94.2	mV	-20 - 150		
HVPS	670	V	420 - 900 constant		
RCELL TEMP	50.1	°C	50 ± 1		
BOX TEMP	29.2	°C	8 - 48		
PMT TEMP	7.4	°C	7 ± 2		
MOLY TEMP	314.9	°C	315 ± 5		
RCELL PRESS	8.3	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.5	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	1.008	-	1.0 ± 0.3		
NO _x Slope	1.011	-	1.0 ± 0.3		
NO Offset	1.5	mV	-20 to +150		
NO _x Offset	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		



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	04 October 2022	BRAND :	API	MODEL :	200A
NO.	NOX-B14	SERIAL NO.	212		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 04 August 2022		Serial No.	: 911	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: D636192	
Certified Date	: 20 April 2022	Expired Date	: 20 April 2024	Cylinder Conc.	: 49.1 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	399.9	-0.025	400.0	1.006
NO _x Span	400	400.2	0.050	400.0	1.009
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	103.0	mV	-20 - 150		
AZERO	93.8	mV	-20 - 150		
HVPS	669	V	420 - 900 constant		
RCELL TEMP	50.5	°C	50 ± 1		
BOX TEMP	29.3	°C	8 - 48		
PMT TEMP	7.2	°C	7 ± 2		
MOLY TEMP	315.2	°C	315 ± 5		
RCELL PRESS	8.4	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.6	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO _x Span Conc	400	PPB	20 - 20,000		
NO Slope	1.006	-	1.0 ± 0.3		
NO _x Slope	1.009	-	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		



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 November 2022	BRAND :	API	MODEL :	200E
NO.	NOX-B05	SERIAL NO.	2284		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 04 August 2022		Serial No.	: 911	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: D636192	
Certified Date	: 20 April 2022	Expired Date	: 20 April 2024	Cylinder Conc.	: 49.1 ppm
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
			% RH	49	
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	0.11	-	0	-
NO Span	400	400.1	0.025	400.0	1.011
NO _x Span	400	400.4	0.100	400.0	1.015
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	103.5	mV	-20 - 150		
AZERO	94.2	mV	-20 - 150		
HVPS	670	V	420 - 900 constant		
RCELL TEMP	50.1	°C	50 ± 1		
BOX TEMP	29.2	°C	8 - 48		
PMT TEMP	7.4	°C	7 ± 2		
MOLY TEMP	314.9	°C	315 ± 5		
RCELL PRESS	8.3	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.4	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO _x Span Conc	400	PPB	20 - 20,000		
NO Slope	1.011	-	1.0 ± 0.3		
NO _x Slope	1.015	-	1.0 ± 0.3		
NO Offset	1.8	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		



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 November 2022	BRAND :	API	MODEL :	200A
NO.	NOX-B14	SERIAL NO.	212		
Calibrator (Dilution System)					
Brand	: API		Model	: 700	
Last Cal. Date	: 04 August 2022		Serial No.	: 911	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: D636192	
Certified Date	: 20 April 2022	Expired Date	: 20 April 2024	Cylinder Conc.	: 49.1 ppm
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
			% RH	49	
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	-0.10	-	0	-
NO Span	400	400.1	0.025	400.0	1.007
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	509	cc/min	500 ± 50		
OZONE FLOW	79	cc/min	80 ± 15		
PMT	103.1	mV	-20 - 150		
AZERO	93.8	mV	-20 - 150		
HVPS	669	V	420 - 900 constant		
RCELL TEMP	50.5	°C	50 ± 1		
BOX TEMP	29.1	°C	8 - 48		
PMT TEMP	7.2	°C	7 ± 2		
MOLY TEMP	315.2	°C	315 ± 5		
RCELL PRESS	8.5	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.7	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO _x Span Conc	400	PPB	20 - 20,000		
NO Slope	1.007	-	1.0 ± 0.3		
NO _x Slope	1.011	-	1.0 ± 0.3		
NO Offset	1.5	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 :	18 December 2022	BRAND :	API	MODEL :	200A
NO.	NOX-B02	SERIAL NO.	2409		
Calibrator (Dilution System)					
Brand : API		Model : 700			
Last Cal. Date : 04 August 2022		Serial No. : 911			
Reference Standard Gas					
Standard Gas : Nitric Oxide (NO)		Cylinder No. : D636192			
Certified Date : 20 April 2022		Expired Date : 20 April 2024		Cylinder Conc. : 49.1 ppm	
CALIBRATING CONDITION					
Pressure	1011 mmbar	Temp.	24.6 °C	% RH	49
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	-0.10	-	0	-
NO Span	400	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	503	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.1	mV	-20 ~ 150		
AZERO	93.9	mV	-20 ~ 150		
HVPS	670	V	420 ~ 900 constant		
RCELL TEMP	50.3	°C	50 ± 1		
BOX TEMP	29.4	°C	8 ~ 48		
PMT TEMP	7.2	°C	7 ± 2		
MOLY TEMP	314.9	°C	315 ± 5		
RCELL 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	1.008	-	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 ₂ / NO _x ANALYZER					
DATE :	18 December 2022	BRAND :	API	MODEL :	200A
NO.	NOX-B14	SERIAL NO.	212		
Calibrator (Dilution System)					
Brand : API		Model : 700			
Last Cal. Date : 04 August 2022		Serial No. : 911			
Reference Standard Gas					
Standard Gas : Nitric Oxide (NO)		Cylinder No. : D636192			
Certified Date : 20 April 2022		Expired Date : 20 April 2024		Cylinder Conc. : 49.1 ppm	
CALIBRATING CONDITION					
Pressure	1011 mmbar	Temp.	24.6 °C	% RH	49
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	-0.10	-	0	-
NO Span	400	400.2	0.050	400.0	1.010
NO _x Span	400	400.3	0.075	400.0	1.014
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	513	cc/min	500 ± 50		
OZONE FLOW	79	cc/min	80 ± 15		
PMT	103.5	mV	-20 ~ 150		
AZERO	94.2	mV	-20 ~ 150		
HVPS	669	V	420 ~ 900 constant		
RCELL TEMP	50.1	°C	50 ± 1		
BOX TEMP	29.2	°C	8 ~ 48		
PMT TEMP	7.3	°C	7 ± 2		
MOLY TEMP	315.2	°C	315 ± 5		
RCELL PRESS	8.3	IN-Hg-A	2 ~ 10 constant		
SAMPLE PRESS	28.5	IN-Hg-A	25 ~ 30 constant		
NO Span Conc	400	PPB	20 ~ 20,000		
NO _x Span Conc	400	PPB	20 ~ 20,000		
NO Slope	1.010	-	1.0 ± 0.3		
NO _x Slope	1.014	-	1.0 ± 0.3		
NO Offset	1.8	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		



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

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

Personal Pump Data				Calibration Data									
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve		
					Setting			Actual (Q std.)					
					1	2	3	1	2	3	y	R ²	
B01	SKC	224-PCXR4	626101	04/07/2022	1,000	1,500	2,000	994	1,497	1,998	1.002x - 4.028	1.000	
B02	SKC	224-PCXR4	626166	01/07/2022	1,000	1,500	2,000	1,002	1,505	2,001	1.009x - 20.106	0.999	
B03	SKC	224-PCXR4	612968	04/07/2022	1,000	1,500	2,000	996	1,494	2,001	1.006x - 12.907	1.000	
B04	SKC	224-PCXR4	602804	04/07/2022	1,000	1,500	2,000	1,000	1,502	1,996	1.001x - 2.688	1.000	
B05	SKC	224-PCXR4	612693	04/07/2022	1,000	1,500	2,000	1,003	1,499	2,003	1.012x - 22.383	0.999	
B06	SKC	224-PCXR4	262188	04/07/2022	1,000	1,500	2,000	996	1,508	2,009	1.020x - 35.110	0.999	
B07	SKC	224-PCXR4	626262	01/07/2022	1,000	1,500	2,000	998	1,492	1,995	0.992x + 6.884	1.000	
B08	SKC	224-PCXR4	626100	01/07/2022	1,000	1,500	2,000	1,003	1,499	2,003	1.012x - 23.269	0.999	
B09	SKC	224-PCXR4	626479	01/07/2022	1,000	1,500	2,000	997	1,490	1,994	0.993x + 3.909	1.000	
B10	SKC	224-PCXR4	091950	01/07/2022	1,000	1,500	2,000	993	1,503	2,001	1.017x - 33.950	0.999	
B11	SKC	224-PCXR8	564315	04/07/2022	1,000	1,500	2,000	995	1,490	1,999	1.004x - 10.290	1.000	
B12	SKC	224-PCXR4	034656	04/07/2022	1,000	1,500	2,000	1,003	1,503	2,003	1.010x - 19.404	0.999	
B13	SKC	224-PCXR4	602073	04/07/2022	1,000	1,500	2,000	995	1,500	1,999	1.001x - 3.554	1.000	
B14	SKC	224-PCXR4	626313	04/07/2022	1,000	1,500	2,000	999	1,491	1,998	0.992x + 7.243	1.000	
B15	SKC	224-PCXR4	626474	04/07/2022	1,000	1,500	2,000	1,003	1,502	2,006	1.013x - 23.723	0.999	
B16	SKC	224-PCXR4	626477	01/07/2022	1,000	1,500	2,000	994	1,504	2,001	1.015x - 31.425	0.999	
B17	SKC	224-PCXR4	626860	04/07/2022	1,000	1,500	2,000	997	1,495	1,991	0.997x - 0.558	1.000	
B18	SKC	224-PCXR4	691484	01/07/2022	1,000	1,500	2,000	1,003	1,500	2,001	1.009x - 18.825	0.999	
B19	SKC	224-PCXR4	691599	01/07/2022	1,000	1,500	2,000	995	1,503	1,999	1.005x - 7.985	1.000	
B20	SKC	224-PCXR4	691587	01/07/2022	1,000	1,500	2,000	993	1,504	1,999	1.014x - 30.719	0.999	
B21	SKC	224-PCXR4	691531	04/07/2022	1,000	1,500	2,000	993	1,499	1,994	1.001x - 7.187	1.000	
B22	SKC	224-PCXR4	691654	01/07/2022	1,000	1,500	2,000	1,004	1,501	2,003	1.011x - 19.990	0.999	
B23	SKC	224-PCXR4	798393	04/07/2022	1,000	1,500	2,000	993	1,505	2,002	1.017x - 34.763	0.999	
B24	SKC	224-PCXR4	626363	01/07/2022	1,000	1,500	2,000	1,000	1,502	2,000	1.011x - 22.826	0.999	
B25	SKC	224-PCXR4	798489	04/07/2022	1,000	1,500	2,000	1,001	1,512	2,001	0.998x + 4.850	1.000	
B26	SKC	224-PCXR4	798479	05/07/2022	1,000	1,500	2,000	999	1,499	1,993	0.996x + 2.692	1.000	
B27	SKC	224-PCXR4	691673	05/07/2022	1,000	1,500	2,000	993	1,503	2,002	1.017x - 32.988	0.999	
B28	SKC	224-PCXR4	691570	05/07/2022	1,000	1,500	2,000	1,001	1,500	2,002	1.012x - 23.632	0.999	
B29	SKC	224-PCXR4	626472	05/07/2022	1,000	1,500	2,000	999	1,494	1,998	1.002x - 6.856	1.000	
B30	SKC	224-PCXR4	691489	05/07/2022	1,000	1,500	2,000	1,004	1,500	2,004	1.013x - 22.910	0.999	
B31	SKC	224-PCXR4	691509	04/07/2022	1,000	1,500	2,000	993	1,495	1,998	1.004x - 9.879	1.000	
B32	SKC	224-PCXR4	091567	05/07/2022	1,000	1,500	2,000	992	1,504	2,001	1.016x - 32.243	0.999	
B33	SKC	224-PCXR4	091756	05/07/2022	1,000	1,500	2,000	994	1,496	1,991	0.996x + 0.634	1.000	
B34	SKC	224-PCXR4	612962	01/07/2022	1,000	1,500	2,000	1,002	1,501	2,002	1.011x - 21.693	0.999	
B35	SKC	224-PCXR4	602682	04/07/2022	1,000	1,500	2,000	993	1,498	1,996	1.001x - 7.411	1.000	
B36	SKC	224-PCXR4	626164	04/07/2022	1,000	1,500	2,000	999	1,495	1,999	1.000x - 4.946	1.000	
B37	SKC	224-PCXR4	626256	01/07/2022	1,000	1,500	2,000	994	1,506	2,000	1.014x - 28.892	0.999	
B38	SKC	224-PCXR4	626167	04/07/2022	1,000	1,500	2,000	997	1,496	1,996	1.002x - 5.504	1.000	
B39	SKC	224-PCXR4	034637	04/07/2022	1,000	1,500	2,000	1,003	1,500	2,002	1.011x - 22.048	0.999	
B40	SKC	224-PCXR4	798349	05/07/2022	1,000	1,500	2,000	992	1,505	1,998	1.015x - 32.514	0.999	



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

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

Personal Pump Data					Calibration Data								
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve		
					Setting			Actual (Q std.)					
					1	2	3	1	2	3	y	R ²	
B01	SKC	224-PCXR4	262101	06/10/2022	1,000	1,500	2,000	994	1,497	1,998	1.001x - 3.789	1.000	
B02	SKC	224-PCXR4	626166	03/10/2022	1,000	1,500	2,000	1,002	1,505	2,001	1.009x - 19.707	0.999	
B03	SKC	224-PCXR4	612968	03/10/2022	1,000	1,500	2,000	996	1,494	2,001	1.006x - 12.308	1.000	
B04	SKC	224-PCXR4	602804	03/10/2022	1,000	1,500	2,000	1,000	1,502	2,000	1.004x - 5.919	1.000	
B05	SKC	224-PCXR4	612693	06/10/2022	1,000	1,500	2,000	1,003	1,499	2,003	1.012x - 22.622	0.999	
B06	SKC	224-PCXR4	262188	06/10/2022	1,000	1,500	2,000	995	1,507	1,999	1.005x - 11.738	1.000	
B07	SKC	224-PCXR4	626262	04/10/2022	1,000	1,500	2,000	998	1,492	1,995	0.993x + 6.405	1.000	
B08	SKC	224-PCXR4	626100	04/10/2022	1,000	1,500	2,000	1,002	1,499	2,003	1.013x - 24.15	0.999	
B09	SKC	224-PCXR4	626479	06/10/2022	1,000	1,500	2,000	996	1,490	1,994	0.994x + 1.675	1.000	
B10	SKC	224-PCXR4	091950	03/10/2022	1,000	1,500	2,000	993	1,503	2,001	1.017x - 34.588	0.999	
B11	SKC	224-PCXR8	564315	06/10/2022	1,000	1,500	2,000	994	1,490	2,003	1.007x - 14.438	1.000	
B12	SKC	224-PCXR4	034656	03/10/2022	1,000	1,500	2,000	1,003	1,503	2,003	1.010x - 19.005	0.999	
B13	SKC	224-PCXR4	602073	03/10/2022	1,000	1,500	2,000	995	1,500	1,993	0.997x + 2.708	1.000	
B14	SKC	224-PCXR4	626313	03/10/2022	1,000	1,500	2,000	998	1,491	1,988	0.992x + 6.007	1.000	
B15	SKC	224-PCXR4	626474	03/10/2022	1,000	1,500	2,000	1,003	1,502	2,005	1.003x - 10.123	0.999	
B16	SKC	224-PCXR4	626477	03/10/2022	1,000	1,500	2,000	993	1,504	2,001	1.015x - 31.624	0.999	
B17	SKC	224-PCXR4	626860	03/10/2022	1,000	1,500	2,000	997	1,494	1,991	0.997x - 0.239	1.000	
B18	SKC	224-PCXR4	691484	03/10/2022	1,000	1,500	2,000	1,003	1,500	2,001	1.008x - 16.073	0.999	
B19	SKC	224-PCXR4	691599	03/10/2022	1,000	1,500	2,000	993	1,503	2,000	1.005x - 8.623	1.000	
B20	SKC	224-PCXR4	691587	03/10/2022	1,000	1,500	2,000	991	1,504	1,999	1.016x - 33.631	0.999	
B21	SKC	224-PCXR4	691531	06/10/2022	1,000	1,500	2,000	993	1,500	1,994	1.001x - 6.669	1.000	
B22	SKC	224-PCXR4	691654	04/10/2022	1,000	1,500	2,000	1,003	1,501	2,003	1.011x - 20.429	0.999	
B23	SKC	224-PCXR4	798393	04/10/2022	1,000	1,500	2,000	993	1,505	2,002	1.018x - 34.843	0.999	
B24	SKC	224-PCXR4	626363	06/10/2022	1,000	1,500	2,000	999	1,502	2,000	1.012x - 23.225	0.999	
B25	SKC	224-PCXR4	798489	06/10/2022	1,000	1,500	2,000	1,001	1,512	2,001	0.998x + 5.049	1.000	
B26	SKC	224-PCXR4	798479	06/10/2022	1,000	1,500	2,000	999	1,499	1,993	0.996x + 2.892	1.000	
B27	SKC	224-PCXR4	691673	06/10/2022	1,000	1,500	2,000	994	1,503	1,999	1.011x - 22.778	0.999	
B28	SKC	224-PCXR4	691570	04/10/2022	1,000	1,500	2,000	1,001	1,500	2,002	1.007x - 13.301	1.000	
B29	SKC	224-PCXR4	626472	06/10/2022	1,000	1,500	2,000	1,000	1,496	1,998	1.002x - 5.261	1.000	
B30	SKC	224-PCXR4	691489	03/10/2022	1,000	1,500	2,000	1,007	1,500	2,004	1.010x - 18.482	0.999	
B31	SKC	224-PCXR4	691509	03/10/2022	1,000	1,500	2,000	993	1,497	1,998	1.004x - 8.852	1.000	
B32	SKC	224-PCXR4	091567	03/10/2022	1,000	1,500	2,000	992	1,504	2,001	1.007x - 15.930	1.000	
B33	SKC	224-PCXR4	091756	06/10/2022	1,000	1,500	2,000	994	1,496	1,991	0.998x + 0.714	1.000	
B34	SKC	224-PCXR4	612962	03/10/2022	1,000	1,500	2,000	1,002	1,501	2,001	1.009x - 17.944	0.999	
B35	SKC	224-PCXR4	802682	03/10/2022	1,000	1,500	2,000	993	1,498	1,995	1.001x - 7.331	1.000	
B36	SKC	224-PCXR4	626164	06/10/2022	1,000	1,500	2,000	999	1,495	1,999	1.000x - 4.866	1.000	
B37	SKC	224-PCXR4	626256	06/10/2022	1,000	1,500	2,000	994	1,506	1,999	1.013x - 28.214	0.999	
B38	SKC	224-PCXR4	626167	06/10/2022	1,000	1,500	2,000	997	1,496	1,995	1.002x - 6.342	1.000	
B39	SKC	224-PCXR4	034683	06/10/2022	1,000	1,500	2,000	1,006	1,500	2,001	1.008x - 16.624	0.999	
B40	SKC	224-PCXR4	798349	05/10/2022	1,000	1,500	2,000	994	1,505	1,998	1.014x - 29.642	0.999	

**QUALITY CALIBRATION CO.,LTD.**

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

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

www.qcalibration.com

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 :

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.

F-G010 REV 02

**QUALITY CALIBRATION CO.,LTD.**

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

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CERTIFICATE No : 22M2567

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : XS 105DU

MANUFACTURER : METTLER TOLEDO S/N : 1126422905

ID No : BA 05/50 RECEIVED DATE : 11-Mar-22

AIR PRESSURE : 1008mbar \pm 1mbar CALIBRATION DATE : 11-Mar-22

AMBIENT TEMPERATURE : 22° C \pm 1° C RELATIVE HUMIDITY : 49 %RH \pm 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

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

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) STANDARD WEIGHT SET	E2	QK-I-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 0.000048 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	100.0001	-0.0001	0.00019
120.00	120.0001	-0.0001	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
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-01550999
Telephone Number:		PM Number:	6 of 6 P
Customer Support Engineer:		Certificate Number:	UV2004-2022
Date PM Performed: (DD-MMM-YYYY)		Next PM Due Date: (DD-MMM-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.

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Component List

Component Specific Model	Serial #	Software Version		Configuration Notes
Lambda 25	501S14123010	6.2.0.0741	STD	1.27
NA	NA	NA	NA	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			
	NaI 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
Nal @ 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)

Lambda UV Preventive Maintenance (PM)			
Company Name:	S.P.S. CONSULTING SERVICE CO., LTD.		
Address:	7 Phaholyothin 24 Chompol Chatujak Bangkok		
User Name:		WO Number:	WO-01808592
Telephone Number:		PM Number:	1 of 6
Customer Support Engineer:		Certificate Number:	UV5077-2022
Date PM Performed: (DD-MMM-YYYY)	22-Jul-2022	Next PM Due Date: (DD-MMM-YYYY)	22-Jan-2023

Scope

The purpose of this PM is to ensure the continued functionality of the PerkinElmer Lambda UV/Vis Spectrophotometer by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. The customer should save their method before the PM begins.

General Instructions:

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

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Component List

Component Specific Model	Serial #	Software Version		Configuration Notes
LAMBDA25	501S14123010	6.2.0.0741	STD	1.27
NA	NA	NA	NA	NA

Standard Lists

Part Number applicable)	(If	Description	Quantity	Batch/L ot/SN#	Expiration Date (MM-YY)
B250 0999	Stray Light Standard				
	Nal	1	1943	Mar/23	
	NaNO2	1	2963		
	KCl	1	31030		
	H2O	1	71497		
B050-7805	Secondary Standard for calibration of wavelength and photometric accuracy or use NBS/NIST 930 standards				
	Gray Glass G1	1	2926	Mar/23	
	Gray Glass G2	1	3501		
	Gray Glass G3	1	2552		
	Holmium Oxide	1	1085		
	NA	NA	NA		
	NA	NA	NA		

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

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. Performance Test:

- ☐ D2 Wavelength accuracy

	Actual Value	Specification
Accuracy at 656.1 nm	656.12	± 0.1

☒ Holmium Oxide wavelength accuracy. (Specification ± 0.5 nm.)

Filter ID #		1085	
Test	Calibration Value	Actual Value	Deviation
279.3 nm	279.3	279.34	0.04
360.8 nm	360.8	360.9	0.10
459.9 nm	459.9	459.99	0.09
536.4 nm	536.2	536.35	0.15

☒ Stay Light.

Test	Filter ID #	Result	Specification
NaI @ 220 nm	1943	0.0193	< 0.02 %T
NaNO ₂ @ 340 nm	2963	0.0180	< 0.02 %T
NaNO ₂ @ 370 nm	2963	0.0172	< 0.02 %T
KCl @ 200 nm	31030	2.5258	≥ 2 A

☒ Baseline Flatness.

Corrected Baseline	Specification
0.000251	± 0.001 A

☒ Noise Test @ 500 nm.

Actual Value	Specification
0.000015	± 0.00008 A

☒ Photometric Accuracy. (Specification ± 0.006 A.)

Filter 1 ID #		2926	
Test	Calibrated Value	Actual Value	Deviation
440 nm	0.3487	0.3497	0.0010
546.1 nm	0.3038	0.3055	0.0017
635 nm	0.3215	0.3241	0.0026
Filter 2 ID #		3501	
Test	Calibrated Value	Actual Value	Deviation
440 nm	1.0009	1.0040	0.0031
546.1 nm	0.9795	0.9818	0.0023
635 nm	1.0302	1.0333	0.0031
Filter 3 ID #		2552	
Test	Calibrated Value	Actual Value	Deviation
440 nm	0.4940	0.4953	0.0013
546.1 nm	0.4583	0.4593	0.0010
635 nm	0.5058	0.5076	0.0018

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.

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>	
<i>This Lambda UV Passes <input checked="" type="checkbox"/> Fails <input type="checkbox"/> the preventive maintenance.</i>	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative:	Date: 22/Jul/2022 (DD-MMM-YYYY)
Authorized Customer Representative:	Date: 22/Jul/2022 (DD-MMM-YYYY)



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

Calibration Report Total Hydrocarbon Analyzer			
Date :	04 July 2022	Brand :	HORIBA
No.	B01	Model :	APHA-360CE
		Serial No.	4211954001
Calibrator (Dilution System)			
Brand :	API	Model :	700
Last Cal. Date :	05 August 2021	Serial No. :	911
Reference Standard Gas			
Standard Gas :	Methane (CH ₄)	Cylinder No. :	D595075
Certified Date :	17 March 2015	Expired Date :	17 March 2023
		Cylinder Conc. :	456 ppm
Calibrating Condition			
Pressure	1011 mmbar	Temp.	24.5 °C
		% RH	49
		Start Time :	1:00 PM
Pre-Calibration Checks			
Change Particulate Filter	Yes	Station Temp :	25.0 °C
Leak Test	Yes		
Calibration Setting			
Span Set Point	Initial Reading (Before Adj)		Final Reading (After Adj)
	Expected Concentration (PPM)	Analyzer Response (PPM)	Analyzer Response (PPM)
Zero	0	-0.10	0
Span	10	10.03	10
Calibration Setting (Final)			
Span Instrument Gain:	0.997	Finish Time:	2:00 PM
APHA-360 Total Hydrocarbon Analyzer			
Test Values	Observed Value	Units	Nominal Range
Signal (CH ₄)	910.5	mV	800-1,350
Signal (THC)	915.8	mV	800-1,350
Detector	78.1	kPa	((Pressure Air/1013)x100)-20 ± 4 kPa
Purifier	19.0	kPa	8 - 25
NMC	258.3	°C	260 ± 10
Bypass	0.9	L / min	0.9 ± 0.3
Over Flow	0.8	L / Min	0.8



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

Calibration Report Total Hydrocarbon Analyzer			
Date :	01 August 2022	Brand :	HORIBA
No.	B01	Model :	APHA-360CE
		Serial No.	4211954001
Calibrator (Dilution System)			
Brand :	API	Model :	700
Last Cal. Date :	05 August 2021	Serial No. :	911
Reference Standard Gas			
Standard Gas :	Methane (CH ₄)	Cylinder No. :	D595075
Certified Date :	17 March 2015	Expired Date :	17 March 2023
		Cylinder Conc. :	456 ppm
Calibrating Condition			
Pressure	1011 mmbar	Temp.	24.6 °C
		% RH	48
		Start Time :	10:00 AM
Pre-Calibration Checks			
Change Particulate Filter	Yes	Station Temp :	25.0 °C
Leak Test	Yes		
Calibration Setting			
Span Set Point	Initial Reading (Before Adj)		Final Reading (After Adj)
	Expected Concentration (PPM)	Analyzer Response (PPM)	Analyzer Response (PPM)
Zero	0	-0.10	0
Span	10	10.05	10
Calibration Setting (Final)			
Span Instrument Gain:	0.996	Finish Time:	11:00 AM
APHA-360 Total Hydrocarbon Analyzer			
Test Values	Observed Value	Units	Nominal Range
Signal (CH ₄)	911.3	mV	800-1,350
Signal (THC)	916.7	mV	800-1,350
Detector	78.2	kPa	((Pressure Air/1013)x100)-20 ± 4 kPa
Purifier	19.3	kPa	8 - 25
NMC	259.2	°C	260 ± 10
Bypass	0.9	L / min	0.9 ± 0.3
Over Flow	0.8	L / Min	0.8



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

Calibration Report Total Hydrocarbon Analyzer			
Date :	01 September 2022	Brand :	HORIBA
No.	B01	Model :	APHA-360CE
		Serial No.	4211954001
Calibrator (Dilution System)			
Brand :	API	Model :	700
Last Cal. Date :	04 August 2022	Serial No. :	911
Reference Standard Gas			
Standard Gas :	Methane (CH ₄)	Cylinder No. :	D595075
Certified Date :	17 March 2015	Expired Date :	17 March 2023
		Cylinder Conc. :	456 ppm
Calibrating Condition			
Pressure	1011 mmbar	Temp.	24.5 °C
		% RH	49
		Start Time :	9:00 AM
Pre-Calibration Checks			
Change Particulate Filter	Yes	Station Temp :	25.0 °C
Leak Test	Yes		
Calibration Setting			
Span Set Point	Initial Reading (Before Adj)		Final Reading (After Adj)
	Expected Concentration (PPM)	Analyzer Response (PPM)	Analyzer Response (PPM)
Zero	0	-0.10	0
Span	10	10.02	10
Calibration Setting (Final)			
Span Instrument Gain:	0.997	Finish Time:	10:00 AM
APHA-360 Total Hydrocarbon Analyzer			
Test Values	Observed Value	Units	Nominal Range
Signal (CH ₄)	910.4	mV	800-1,350
Signal (THC)	915.6	mV	800-1,350
Detector	77.8	kPa	((Pressure Air/1013)x100)-20 ± 4 kPa
Purifier	19.0	kPa	8 - 25
NMC	258.9	°C	260 ± 10
Bypass	0.9	L / min	0.9 ± 0.3
Over Flow	0.8	L / Min	0.8



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

Calibration Report Total Hydrocarbon Analyzer			
Date :	03 October 2022	Brand :	HORIBA
No.	B01	Model :	APHA-360CE
		Serial No.	4211954001
Calibrator (Dilution System)			
Brand :	API	Model :	700
Last Cal. Date :	04 August 2022	Serial No. :	911
Reference Standard Gas			
Standard Gas :	Methane (CH ₄)	Cylinder No. :	D595075
Certified Date :	17 March 2015	Expired Date :	17 March 2023
		Cylinder Conc. :	456 ppm
Calibrating Condition			
Pressure	1011 mmbar	Temp.	24.6 °C
		% RH	48
		Start Time :	10:00 AM
Pre-Calibration Checks			
Change Particulate Filter	Yes	Station Temp :	25.0 °C
Leak Test	Yes		
Calibration Setting			
Span Set Point	Initial Reading (Before Adj)		Final Reading (After Adj)
	Expected Concentration (PPM)	Analyzer Response (PPM)	Analyzer Response (PPM)
Zero	0	0.10	0
Span	10	10.05	10
Calibration Setting (Final)			
Span Instrument Gain:	0.996	Finish Time:	11:00 AM
APHA-360 Total Hydrocarbon Analyzer			
Test Values	Observed Value	Units	Nominal Range
Signal (CH ₄)	911.2	mV	800-1,350
Signal (THC)	915.9	mV	800-1,350
Detector	78.0	kPa	((Pressure Air/1013)x100)-20 ± 4 kPa
Purifier	19.1	kPa	8 - 25
NMC	258.4	°C	260 ± 10
Bypass	0.9	L / min	0.9 ± 0.3
Over Flow	0.8	L / Min	0.8

Calibration Report Total Hydrocarbon Analyzer			
Date : 02 November 2022		Brand : HORIBA	Model : APHA-360CE
No. B01		Serial No. 4211954001	
Calibrator (Dilution System)			
Brand : API		Model : 700	
Last Cal. Date : 04 August 2022		Serial No. : 911	
Reference Standard Gas			
Standard Gas : Methane (CH ₄)		Cylinder No. : D595075	
Certified Date : 17 March 2015	Expired Date : 17 March 2023	Cylinder Conc. : 456 ppm	
Calibrating Condition			
Pressure : 1011 mmbar	Temp. : 24.6 °C	% RH : 48	
Start Time : 9:00 AM			
Pre-Calibration Checks			
Change Particulate Filter : Yes		Station Temp : 25.0 °C	
Leak Test : Yes			
Calibration Setting			
Span Set Point	Initial Reading (Before Adj)		Final Reading (After Adj)
	Expected Concentration (PPM)	Analyzer Response (PPM)	Analyzer Response (PPM)
Zero	0	-0.10	0
Span	10	10.03	10
Calibration Setting (Final)			
Span Instrument Gain: 0.997		Finish Time: 10:00 AM	
APHA-360 Total Hydrocarbon Analyzer			
Test Values	Observed Value	Units	Nominal Range
Signal (CH ₄)	912.3	mV	800-1,350
Signal (THC)	916.8	mV	800-1,350
Detector	77.9	kPa	((Pressure Air/1013)x100)-20 ± 4 kPa
Purifier	19.2	kPa	8 - 25
NMC	259.1	°C	260 ± 10
Bypass	0.9	L / min	0.9 ± 0.3
Over Flow	0.8	L / Min	0.8

Calibration Report Total Hydrocarbon Analyzer			
Date : 02 December 2022		Brand : HORIBA	Model : APHA-360CE
No. B01		Serial No. 4211954001	
Calibrator (Dilution System)			
Brand : API		Model : 700	
Last Cal. Date : 04 August 2022		Serial No. : 911	
Reference Standard Gas			
Standard Gas : Methane (CH ₄)		Cylinder No. : D595075	
Certified Date : 17 March 2015	Expired Date : 17 March 2023	Cylinder Conc. : 456 ppm	
Calibrating Condition			
Pressure : 1011 mmbar	Temp. : 24.5 °C	% RH : 49	
Start Time : 10:00 AM			
Pre-Calibration Checks			
Change Particulate Filter : Yes		Station Temp : 25.0 °C	
Leak Test : Yes			
Calibration Setting			
Span Set Point	Initial Reading (Before Adj)		Final Reading (After Adj)
	Expected Concentration (PPM)	Analyzer Response (PPM)	Analyzer Response (PPM)
Zero	0	0.11	0
Span	10	10.02	10
Calibration Setting (Final)			
Span Instrument Gain: 0.997		Finish Time: 11:00 AM	
APHA-360 Total Hydrocarbon Analyzer			
Test Values	Observed Value	Units	Nominal Range
Signal (CH ₄)	912.5	mV	800-1,350
Signal (THC)	917.1	mV	800-1,350
Detector	77.8	kPa	((Pressure Air/1013)x100)-20 ± 4 kPa
Purifier	19.0	kPa	8 - 25
NMC	259.5	°C	260 ± 10
Bypass	0.9	L / min	0.9 ± 0.3
Over Flow	0.8	L / Min	0.8

เอกสารที่ 5-2

เอกสารสอบเทียบเครื่องมือการตรวจวัดระดับเสียง



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 Bruel&Kjaer 2636 S/N 1537484.

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

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

5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.

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

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

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.



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 Bruel&Kjaer 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 Bruel&Kjaer 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 Bruel&Kjaer 4180	1.44	± 0.50	± 3.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

Approved by :

Date of Calibration : 28 Apr. 2022

Date of Issue : 28 Apr. 2022

Electric
Industrial Metrology and Testing Service Centre

Ref : 2011265042601787001

2 / 2

End of Certificate

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.



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

Noise B_422/22

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				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-B24	ACO	6236	00182005	19 July 2022	93.9	94.0
ACO-B31	ACO	6236	00182013	19 July 2022	93.9	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.93 ± 0.10 dB	



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S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompoi, Chatsuchak, Bangkok 10900
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sales@spscon.com, www.spscon.com

Noise B_478/22

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				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-B14	ACO	6236	00172034	15 August 2022	93.9	94.0
ACO-B31	ACO	6236	00182013	15 August 2022	94.0	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.93 ± 0.10 dB	

Noise B_537/22

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				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-B14	ACO	6236	00172034	21 September 2022	93.9	94.0
ACO-B24	ACO	6236	00182005	21 September 2022	94.0	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.93 ± 0.10 dB	

Noise B_560/22

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				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-B14	ACO	6236	00172034	04 October 2022	93.9	94.0
ACO-B24	ACO	6236	00182005	04 October 2022	93.9	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.93 ± 0.10 dB	

Noise B_607/22

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				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-B14	ACO	6236	00172034	08 November 2022	93.9	94.0
ACO-B24	ACO	6236	00182005	08 November 2022	94.0	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.93 ± 0.10 dB	

Noise B_672/22

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				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-B14	ACO	6236	00172034	18 December 2022	93.9	94.0
ACO-B31	ACO	6236	00182013	18 December 2022	93.9	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.93 ± 0.10 dB	

เอกสารที่ 5-3

เอกสารสอบเทียบเครื่องมือการตรวจวิเคราะห์คุณภาพน้ำ



CALIBRATION LABORATORY Co., LTD.

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



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : pH METER
MANUFACTURER : WTW
MODEL / TYPE : INOLAB pH LEVEL1
SERIAL NO. : 01510033/B211901089[PH 03/45]
CLID. NO. : 272201870
JOB CONTROL NO. : 220620061975

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

DATE OF RECEIVED : 20 June 2022

DATE OF ISSUED : 24 June 2022

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

Calibrated By :



Approved By :



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. Q22061975

F3-011-04/01-12

page 1 of 4



@clccalibration



CALIBRATION LABORATORY Co., LTD.

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



REPORT OF CALIBRATION

FOR

NOMENCLATURE : pH METER
MANUFACTURER : WTW
MODEL / TYPE : INOLAB pH LEVEL1
SERIAL NO. : 01510033/B211901089[PH 03/45]
DATE OF CALIBRATION : 21 June 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. 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, NIMT TRM CODE TRM-S-2003, TRM CODE TRM-S-2007.
2. pH Standard Solution, Control Company Catalog Number 06-664-260,11754256, Lot Number CC728484.
3. Calibration Bath, Kambic Model OB-22/2 ULT S/N. 17115653.
4. Precision Thermometer, ASL Model F201 S/N. 016168/09.
5. IPRT, ASL Model T100-250-1D S/N. L0193A-1-1.

Certificate No. Q22061975

F3-011-04/01-12

page 2 of 4



@clccalibration



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Accredited
ISO/IEC 17025

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



TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).
Lot Number. 160221, 180121. Due Date 05 May 2023.

2. The measurements are traceable to International System of Units (SI), through Control Company.

Certificate No. 4281-12405788, Due Date 30 June 2023.

3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.

Certificate No. Q22007520, Due Date 22 January 2023.

4. The measurements are traceable to International System of Units (SI), through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 1094/64, Due Date 04 November 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 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:2021)"

Certificate No. Q22061975

F3-011-04/01-12

page 3 of 4



@clccalibration



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

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



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The 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
4.000	4.008	160.7	-0.008	0.010	2,00
6.996	7.021	0.1	-0.025	0.012	2,00
10.007	10.011	-161.9	-0.004	0.012	2,00

Technical Note. DUC slow reading.

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 \pm (°C)
100	24.93	24.9	+0.03	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. Q22061975

F3-011-04/01-12

page 4 of 4



@clccalibration



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 :

Approved by :

Issue Date :

25 April 2022

B 0286555



Cert.No.: 22TW98

Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

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

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

2. Standard Material :-

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

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: 14J100195

Titration Method (Azide Modification Method) (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

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**QUALITY CALIBRATION CO.,LTD.**

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

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

www.qcalibration.comCERTIFICATE 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 :

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.

F-G010 REV 02

**QUALITY CALIBRATION CO.,LTD.**

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

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

www.qcalibration.com

CERTIFICATE No : 22M2568

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : BSA224S-CW

MANUFACTURER : SARTORIUS S/N : 36591842

ID No : BA 08/61 RECEIVED DATE : 11-Mar-22

AIR PRESSURE : 1008mbar ± 1mbar CALIBRATION DATE : 11-Mar-22

AMBIENT TEMPERATURE : 22° C ± 1° C RELATIVE HUMIDITY : 51 %RH ± 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-I-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

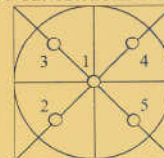
1. ZERO SETTING FUNCTION : NORMAL

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

5. OFF CENTER LOADING ERROR

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

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

END OF CALIBRATION REPORT



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

214 Bangwack Rd. Bangpai Bangkai Bangkok 10160

Tel.: 0-2865-4647-8 Fax: 0-2865-4649 http://www.mit.in.th

CALIBRATION CERTIFICATE

Certificate No. : AD2108-008-0001

Date Issued : 16-Aug-21

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

Equipment : Block Digestion (Gerhardt, TR)

Manufacturer : Gerhardt

Model : -

Serial No. : 4061832

ID No./Tag No. : KJ 01/43

Date Received : 06-Aug-21

Date Calibrated : 15-Aug-21

Calibrated by :

Calibration Method or Calibration Procedure Used

In-house method : CP-49 base on TLAS G-20 by comparing against Standard Thermometer.

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

Result of Calibration

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

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

Approved by :



Page 1 of 2

Certificate No. : AD2108-008-0001

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

Calibration Temperature ($^{\circ}\text{C}$)	Setting Temperature ($^{\circ}\text{C}$)	Indicating Temperature ($^{\circ}\text{C}$)	Measured Stability ¹ ($^{\circ}\text{C}$)	Measured Uniformity ² ($^{\circ}\text{C}$)	Overall Variation ³ ($^{\circ}\text{C}$)
380	380	380	1.03	1.51	2.60

Calibration Temperature ($^{\circ}\text{C}$)	Standard Reading ($^{\circ}\text{C}$), Probe No. 8 is Reference Probe					Uncertainty ⁴ ($\pm^{\circ}\text{C}$)
380	No. 1	No. 2	No. 3	No. 4	No. 5	1.9
	380.46	380.79	380.65	380.83	380.53	
	No. 6	No. 7	No. 8	No. 9	No. 10	
	380.57	379.82	380.26	379.62	380.52	
	No. 11	No. 12	No. 13	No. 14	No. 15	
380	380.36	380.53	380.47	380.73	380.35	1.9
	No. 16	No. 17	No. 18	No. 19	No. 20	
	380.23	379.61	379.71	380.50	380.77	

Without adjustment

No. 1	No. 6	No. 11	No. 16
No. 2	No. 7	No. 12	No. 17
No. 3	No. 8	No. 13	No. 18
No. 4	No. 9	No. 14	No. 19
No. 5	No. 10	No. 15	No. 20

Top view position

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. AD2108-085-0002 for Digital Thermometer with Probe (Agilent) Module 2 (172) Type K Serial No. US37011204, Due 02-Feb-22

- Notes :
1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
 2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.
 3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
 4. The uncertainty of measurement is included temperature stability.

End of Certificate

Page 2 of 2



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

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



CALIBRATION CERTIFICATE

Certificate No. : L202207235-001

Date Issued : 03-Aug-22

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

Equipment : Block Digestion (Gerhardt, TR)

Manufacturer : Gerhardt

Model : -

Serial No. : 4061832

ID No./Tag No. : KJ 01/43

Date Received : 02-Aug-22

Date Calibrated : 03-Aug-22

Calibrated by

Calibration Method or Calibration Procedure Used

In-house method : CP-49 base on TLAS G-20 by comparing against Standard Thermometer.

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

Result of Calibration

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

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

Approved by:



Page 1 of 3

Certificate No. : L202207235-001

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

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

ด้านซ้าย

Calibration Temperature ($^{\circ}\text{C}$)	Setting Temperature ($^{\circ}\text{C}$)	Indicating Temperature ($^{\circ}\text{C}$)	Measured Stability ¹ ($^{\circ}\text{C}$)	Measured Uniformity ² ($^{\circ}\text{C}$)	Overall Variation ³ ($^{\circ}\text{C}$)
380	380	380	1.45	0.57	4.01

Calibration Temperature ($^{\circ}\text{C}$)	Standard Reading ($^{\circ}\text{C}$), Probe No. 9 is Reference Probe					Uncertainty ⁴ ($\pm^{\circ}\text{C}$)
	No. 1	No. 2	No. 3	No. 4	No. 5	
	377.86	378.11	378.69	378.54	378.72	
380	No. 6	No. 7	No. 8	No. 9	No. 10	2.2
	378.09	378.07	377.93	378.17	377.61	

Without adjustment

No. 1	No. 2		
No. 3	No. 4		
No. 5	No. 6		
No. 7	No. 8		
No. 9	No. 10		

Top view position

Condition As-Received : Used Item

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

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. AD2202-055-0002 for Digital Thermometer with Probe (Agilent) Module 2 (172) Type K Serial No. US37011204, Due 11-Aug-22

Notes : 1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.

2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.

3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.

4. The uncertainty of measurement is included temperature stability.

Certificate No. : L202207235-001

Environment : Ambient Temperature : (25 ± 2)°C
Relative Humidity : (50 ± 15)%RH

ด้านขวา

Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
380	380	380	1.45	0.94	4.40

Calibration Temperature (°C)	Standard Reading (°C), Probe No. 9 is Reference Probe					Uncertainty ⁴ (±°C)
380	No. 1	No. 2	No. 3	No. 4	No. 5	2.2
	378.91	379.16	378.76	378.60	378.78	
	No. 6	No. 7	No. 8	No. 9	No. 10	
	378.15	378.13	378.00	378.23	377.67	

Without adjustment

		No. 1	No. 2
		No. 3	No. 4
		No. 5	No. 6
		No. 7	No. 8
		No. 9	No. 10

Top view position

Condition As-Received : Used Item
The measurment results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through
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 - 4. The uncertainty of measurement is included temperature stability.

End of Certificate