

ภาคผนวก จ

เอกสารสอบเทียบความถูกต้องของเครื่องมือ

- จ-1 เอกสารสอบเทียบความถูกต้องของเครื่องมือตรวจวัดคุณภาพอากาศ
- จ-2 เอกสารสอบเทียบความถูกต้องของเครื่องมือตรวจวัดระดับเสียง
- จ-3 เอกสารสอบเทียบความถูกต้องของเครื่องมือวิเคราะห์คุณภาพน้ำ
- จ-4 เอกสารสอบเทียบความถูกต้องของเครื่องมือวิเคราะห์ตะกอน

ตารางสรุปเอกสารการสอบเทียบความถูกต้องของเครื่องมือตรวจวิเคราะห์

รายการตรวจวิเคราะห์	เครื่องมือเก็บตัวอย่าง	ชื่อเครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
1. คุณภาพอากาศ		
- TSP	- High Volume Air Sampler NO. B02, B08, B12, B13, B16, B18, B22, B25, B33, B34, B37, B43, R04	- Digital Balance
- PM-10	- High Volume Air PM-10 Sampler NO. B02, B03, B05, B07, B08, B09, B10, B13, B14, B15, B17, B20, B30	- Digital Balance
- PM-2.5	- PM 2.5 Air Sampler NO. B01, B02, B03, B04, B06, B07, B08, B09, B10, B12, B13, B14, B15	- Digital Balance
- SO ₂	- Gas Sampler Box NO. B01, B02, B05, B06, B07, B08, B09, B10, B11, B12, B13, B14, B15	- Spectrophotometer
- NO ₂	- NO ₂ Analyzer NO. B01, B03, B05, B09, B10, B11, B12, B14, B21, B22, R02, R07, R09	- NO ₂ Analyzer NO. B01, B03, B05, B09, B10, B11, B12, B14, B21, B22, R02, R07, R09
- CO	- Personal Pump SKC NO. B01, B03, B07, B08, B09, B21, B28, B41, B45, B49, B57, B60, B61, B63, B76, B84, B91	- CO Analyzer NO. B01, B02
- THC	- Personal Pump SKC NO. B02, B08, B10, B12, B33, B37, B45, B53, B55, B61, B62, B67, B70, B77, B81, B88, B90, B93	- THC Analyzer NO. B01, R01
	- Rotameter NO. H-B01, B02, L-B01, L-B02	
2. ระดับเสียง		
- Leq 1 hr, Leq 24 hr, L10, L50 และ L90	- Acoustic Calibrator Sound Level Meter No. ACO- B05, B09, B27, B28, B29, B38, B45, B46, R03, R07, R09, R10, R11, R19, R27, R29, R47	-
3. คุณภาพน้ำ		
- Temperature	-	- Thermometer
- Turbidity	-	- Turbidity Meter
- pH	-	- pH Meter
- Salinity	-	- Conductivity Meter
- Conductivity	-	- Conductivity Meter
- Settleable Solids	-	- Digital Balance
- Total Dissolved Solids	-	- Digital Balance
- Total Suspended Solids	-	- Digital Balance
- Dissolved Oxygen	-	- DO Meter
- BOD ₅	-	- DO Meter
- COD	-	- COD Reactor

ตารางสรุปเอกสารการสอบเทียบความถูกต้องของเครื่องมือตรวจวิเคราะห์ (ต่อ)

รายการตรวจวิเคราะห์	เครื่องมือเก็บตัวอย่าง	ชื่อเครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
3. คุณภาพน้ำ (ต่อ)		
- Total N	-	- Block Digestion
		- Spectrophotometer
- Total K	-	- Inductively Coupled Plasma
- Phosphate	-	- Spectrophotometer
- Mercury (Hg)	-	- Atomic Absorption Spectrophotometer
- Lead (Pb)	-	- Atomic Absorption Spectrophotometer
- Cadmium (Cd)	-	- Atomic Absorption Spectrophotometer
- Total Chromium (Cr)	-	- Inductively Coupled Plasma
- TKN	-	- Block Digestion
- Sulfide	-	- GC/PFPD
- Grease & Oil	-	- Digital Balance
- Petroleum HC	-	- Spectrophotometer
- PO ₄ -P	-	- Spectrophotometer
- Total Coliform Bacteria	-	- Incubator/Water Bath
- Fecal Coliform Bacteria	-	- Incubator/Water Bath
- PO ₄ -P	-	- Spectrophotometer
- NH ₃ -N	-	- Spectrophotometer
- NO ₃ -N	-	- Spectrophotometer
- Total Ammonia	-	- Spectrophotometer
- Cr ⁺⁶	-	- Atomic Absorption Spectrophotometer
- Cu	-	- Inductively Coupled Plasma
- Sn	-	- Inductively Coupled Plasma
- Mn	-	- Inductively Coupled Plasma
- Zn	-	- Inductively Coupled Plasma
4. คุณภาพตะกอนดิน		
- Mercury (Hg)	-	- Inductively Coupled Plasma
- Lead (Pb)	-	- Inductively Coupled Plasma
- Copper (Cu)	-	- Inductively Coupled Plasma
- Cadmium (Cd)	-	- Inductively Coupled Plasma
- Nickel (Ni)	-	- Inductively Coupled Plasma
- Chromium (Cr)	-	- Inductively Coupled Plasma
- Petroleum Hydrocarbon	-	- Spectrophotometer
- TOC	-	- TOC Analyzer

ภาคผนวก ฉ-1

เอกสารสอบเทียบความถูกต้องของเครื่องมือตรวจวัดคุณภาพอากาศ



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High Volume Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard Model : TE 5025A S/N : 3440

Calibration Data

High Volume Air Sampler Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²
B01	B01	01/08/2025	y = 1.099x-3.517	0.999
B02	B02	01/08/2025	y = 1.142x-3.995	0.999
B03	B03	01/08/2025	y = 1.127x-5.756	0.997
B04	B04	01/08/2025	y = 1.137x-4.695	0.999
B05	B05	01/08/2025	y = 1.128x-5.472	0.999
B06	B06	01/08/2025	y = 1.177x-5.925	0.996
B07	B07	01/08/2025	y = 1.147x-5.407	0.999
B08	B08	01/08/2025	y = 1.152x-6.011	0.997
B09	B09	01/08/2025	y = 1.132x-4.325	0.998
B10	B10	07/08/2025	y = 1.123x-5.255	0.998
B11	B11	01/08/2025	y = 1.131x-3.867	0.997
B12	B12	01/08/2025	y = 1.128x-2.501	0.997
B13	B13	01/08/2025	y = 1.162x-4.037	0.996
B14	B14	01/08/2025	y = 1.144x-4.295	0.997
B15	B15	01/08/2025	y = 1.101x-3.061	0.998
B16	B16	07/08/2025	y = 1.039x-1.195	0.999
B17	B17	01/08/2025	y = 1.056x+0.573	0.998
B18	B18	01/08/2025	y = 1.176x-6.349	0.998
B19	B19	01/08/2025	y = 1.150x-4.805	0.996
B20	B20	04/08/2025	y = 1.043x+2.427	0.999
B21	B21	01/08/2025	y = 1.064x+0.460	0.997
B22	B22	01/08/2025	y = 1.146x-4.084	0.998
B23	B23	01/08/2025	y = 1.118x-2.441	0.999
B24	B24	01/08/2025	y = 1.085x-1.292	0.999
B25	B25	01/08/2025	y = 1.074x+0.323	0.999
B26	B26	04/08/2025	y = 1.098x-3.782	0.997
B27	B27	01/08/2025	y = 1.173x-7.561	0.997
B28	B28	01/08/2025	y = 1.128x-5.410	0.998
B29	B29	01/08/2025	y = 1.134x-3.750	0.998
B30	B30	01/08/2025	y = 1.050x+1.266	0.999
B31	B31	04/08/2025	y = 1.166x-5.291	0.999
B32	B32	01/08/2025	y = 1.159x-4.739	0.996
B33	B33	01/08/2025	y = 1.173x-5.447	0.997
B34	B34	01/08/2025	y = 1.148x-4.099	0.999

Calibrated by :



Approved by :



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High Volume Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard Model : TE 5025A S/N : 3440

Calibration Data

High Volume Air Sampler Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²
B35	B35	01/08/2025	y = 1.126x-2.314	0.997
B36	B36	01/08/2025	y = 1.158x-3.625	0.999
B37	B37	01/08/2025	y = 1.071x-0.714	0.998
B38	B38	07/08/2025	y = 1.138x-6.470	0.999
B39	B39	07/08/2025	y = 1.074x-2.233	0.999
B40	B40	01/08/2025	y = 1.137x-4.281	0.998
B41	B41	01/08/2025	y = 1.124x-3.061	0.999
B42	B42	01/08/2025	y = 1.130x-3.831	0.998
B43	B43	04/08/2025	y = 1.098x-1.647	0.999
B44	B44	07/08/2025	y = 1.107x-2.029	0.997
R01	R01	01/08/2025	y = 1.027x+1.685	0.998
R02	R02	01/08/2025	y = 1.154x-5.444	0.998
R03	R03	01/08/2025	y = 1.174x-5.934	0.999
R04	R04	04/08/2025	y = 1.125x-3.465	0.997
R05	R05	01/08/2025	y = 1.097x+0.437	0.999
R06	R06	04/08/2025	y = 1.138x-2.560	0.997
R07	R07	01/08/2025	y = 1.046x-0.699	0.999
R08	R08	01/08/2025	y = 1.109x-3.582	0.997
R09	R09	01/08/2025	y = 1.088x-1.852	0.999
R10	R10	01/08/2025	y = 1.134x-4.535	0.996
R11	R11	01/08/2025	y = 1.170x-6.929	0.998
R12	R12	01/08/2025	y = 1.151x-4.183	0.999
R13	R13	01/08/2025	y = 1.117x-4.198	0.999
R14	R14	01/08/2025	y = 1.109x-2.662	0.998
R15	R15	01/08/2025	y = 1.126x-5.806	0.996
R16	R16	01/08/2025	y = 1.149x-7.086	0.996
R17	R17	01/08/2025	y = 1.120x-5.050	0.997
R18	R18	04/08/2025	y = 1.155x-5.737	0.997
R19	R19	04/08/2025	y = 1.131x-5.715	0.997
R20	R20	01/08/2025	y = 1.152x-5.912	0.996

Calibrated by :



Approved by :





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High Volume PM-10 Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard Model : TE 5025A S/N : 3440

Calibration Data

High Volume PM-10 Data

Calibration Data

Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²
B01	B01	01/08/2025	$y = 1.114x - 2.914$	0.997
B02	B02	07/08/2025	$y = 1.013x + 1.223$	0.998
B03	B03	01/08/2025	$y = 1.161x - 6.637$	0.997
B04	B04	01/08/2025	$y = 1.104x - 4.741$	0.999
B05	B05	01/08/2025	$y = 1.139x - 4.983$	0.999
B06	B06	07/08/2025	$y = 1.115x - 4.334$	0.997
B07	B07	01/08/2025	$y = 1.134x - 5.274$	0.999
B08	B08	07/08/2025	$y = 1.118x - 2.369$	0.999
B09	B09	01/08/2025	$y = 1.043x - 0.834$	0.999
B10	B10	01/08/2025	$y = 1.096x - 2.892$	0.998
B11	B11	01/08/2025	$y = 1.114x - 3.605$	0.997
B12	B12	06/08/2025	$y = 1.096x - 2.892$	0.998
B13	B13	04/08/2025	$y = 1.112x - 4.752$	0.996
B14	B14	01/08/2025	$y = 1.104x - 3.418$	0.997
B15	B15	01/08/2025	$y = 1.119x - 2.509$	0.996
B16	B16	01/08/2025	$y = 1.012x + 1.776$	0.996
B17	B17	04/08/2025	$y = 1.094x - 0.874$	0.999
B18	B18	07/08/2025	$y = 1.140x - 5.779$	0.997
B19	B19	04/08/2025	$y = 1.087x - 0.543$	0.999
B20	B20	01/08/2025	$y = 1.108x - 3.582$	0.997
B21	B21	01/08/2025	$y = 1.138x - 4.442$	0.996
B22	B22	01/08/2025	$y = 1.097x - 3.833$	0.999
B23	B23	01/08/2025	$y = 1.127x - 4.713$	0.999
B24	B24	01/08/2025	$y = 1.117x - 4.019$	0.999
B25	B25	01/08/2025	$y = 1.137x - 5.745$	0.996
B26	B26	01/08/2025	$y = 1.029x - 0.023$	0.998
B27	B27	01/08/2025	$y = 1.136x - 6.732$	0.996
B28	B28	01/08/2025	$y = 1.114x - 4.531$	0.999
B29	B29	01/08/2025	$y = 1.126x - 5.420$	0.999
B30	B30	01/08/2025	$y = 1.119x - 4.736$	0.998
B31	B31	01/08/2025	$y = 1.011x + 2.394$	0.998
B32	B32	01/08/2025	$y = 1.047x - 0.534$	0.999
B33	B33	01/08/2025	$y = 1.052x - 0.474$	0.998
B34	B34	07/08/2025	$y = 1.028x + 2.008$	0.997

Calibrated by :

Approved by :



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CALIBRATION REPORT

PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)

DATE : 30 September 2025 BRAND : BGI MODEL : PQ200
NO. : PM2.5-01 SERIAL NO. : 000927

CALIBRATING CONDITION

Pressure : 1011 mmbar Temp. : 24.6 °C % RH : 50

Calibration Method : Dry Cal Primary Model : Defender 510 H S/N : 136164

CALIBRATION SETTING

detaCal	PM2.5 AIR SAMPLER		
Flowrate Reading, L/min	Initial Flowrate Reading (Before Adj.), L/min	% Dif.	Final Flowrate Reading (After Adj.), L/min
16.70	16.65	0.299	16.70

Calibrated by :

Approved by :



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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	08 October 2025	BRAND :	BGI
MODEL :	PQ200	SERIAL NO. :	160810-47 (VSCC)
NO. :	PM2.5-02		
CALIBRATING CONDITION			
Pressure	1011	mmbar	Temp. 24.6 °C
% RH	50		
Calibration Method : Dry Cal Primary	Model : Defender 510 H	S/N : 136164	
CALIBRATION SETTING			
detaCal	PM2.5 AIR SAMPLER		
Flowrate Reading,L/min	Initial Flowrate Reading (Before Adj.),L/min	%Dif.	Final Flowrate Reading (After Adj.),L/min
16.70	16.65	0.299	16.70

Calibrated by :



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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	30 September 2025	BRAND :	BGI
MODEL :	PQ200	SERIAL NO. :	160810-49 (VSCC)
NO. :	PM2.5-03		
CALIBRATING CONDITION			
Pressure	1011	mmbar	Temp. 24.6 °C
% RH	50		
Calibration Method : Dry Cal Primary	Model : Defender 510 H	S/N : 136164	
CALIBRATION SETTING			
detaCal	PM2.5 AIR SAMPLER		
Flowrate Reading,L/min	Initial Flowrate Reading (Before Adj.),L/min	%Dif.	Final Flowrate Reading (After Adj.),L/min
16.70	16.69	0.060	16.70

Calibrated by :



Approved by :





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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	30 September 2025	BRAND :	BGI
MODEL :	PQ200	SERIAL NO. :	160810-4 (VSCC)
NO. :	PM2.5-04		
CALIBRATING CONDITION			
Pressure	1011	mmbar	Temp. 24.6 °C
% RH	50		
Calibration Method : Dry Cal Primary	Model : Defender 510 H	S/N : 136164	
CALIBRATION SETTING			
detaCal	PM2.5 AIR SAMPLER		
Flowrate Reading,L/min	Initial Flowrate Reading (Before Adj.),L/min	%Dif.	Final Flowrate Reading (After Adj.),L/min
16.70	16.68	0.120	16.70

Calibrated by :



Approved by :



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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	08 October 2025	BRAND :	BGI
MODEL :	PQ200	SERIAL NO. :	164589 (VSCC)
NO. :	PM2.5-06		
CALIBRATING CONDITION			
Pressure	1011	mmbar	Temp. 24.6 °C
% RH	50		
Calibration Method : Dry Cal Primary	Model : Defender 510 H	S/N : 136164	
CALIBRATION SETTING			
detaCal	PM2.5 AIR SAMPLER		
Flowrate Reading,L/min	Initial Flowrate Reading (Before Adj.),L/min	%Dif.	Final Flowrate Reading (After Adj.),L/min
16.70	16.66	0.240	16.70

Calibrated by :



Approved by :





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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	08 October 2025	BRAND :	BGI
MODEL :	PQ200	NO.	PM2.5-07
SERIAL NO.	152099 (VSCC)		
CALIBRATING CONDITION			
Pressure	1011	mmbar	Temp. 24.6 °C
% RH	50		
Calibration Method : Dry Cal Primary	Model : Defender 510 H	S/N : 136164	
CALIBRATION SETTING			
detaCal	PM2.5 AIR SAMPLER		
Flowrate Reading,L/min	Initial Flowrate Reading (Before Adj.),L/min	%Dif.	Final Flowrate Reading (After Adj.),L/min
16.70	16.65	0.299	16.70

Calibrated by :



Approved by :



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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	30 September 2025	BRAND :	BGI
MODEL :	PQ200	NO.	PM2.5-08
SERIAL NO.	159904 (VSCC)		
CALIBRATING CONDITION			
Pressure	1011	mmbar	Temp. 24.6 °C
% RH	50		
Calibration Method : Dry Cal Primary	Model : Defender 510 H	S/N : 136164	
CALIBRATION SETTING			
detaCal	PM2.5 AIR SAMPLER		
Flowrate Reading,L/min	Initial Flowrate Reading (Before Adj.),L/min	%Dif.	Final Flowrate Reading (After Adj.),L/min
16.70	16.66	0.240	16.70

Calibrated by :



Approved by :





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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	30 September 2025	BRAND :	BGI
MODEL :	PQ200	SERIAL NO. :	152125 (VSCC)
NO. :	PM2.5-09		
CALIBRATING CONDITION			
Pressure	1011	mmbar	Temp. 24.6 °C
% RH	50		
Calibration Method : Dry Cal Primary	Model : Defender 510 H	S/N : 136164	
CALIBRATION SETTING			
detaCal	PM2.5 AIR SAMPLER		
Flowrate Reading,L/min	Initial Flowrate Reading (Before Adj.),L/min	%Dif.	Final Flowrate Reading (After Adj.),L/min
16.70	16.64	0.359	16.70

Calibrated by :



Approved by :



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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	08 October 2025	BRAND :	BGI
MODEL :	PQ200	SERIAL NO. :	164598 (VSCC)
NO. :	PM2.5-10		
CALIBRATING CONDITION			
Pressure	1011	mmbar	Temp. 24.6 °C
% RH	50		
Calibration Method : Dry Cal Primary	Model : Defender 510 H	S/N : 136164	
CALIBRATION SETTING			
detaCal	PM2.5 AIR SAMPLER		
Flowrate Reading,L/min	Initial Flowrate Reading (Before Adj.),L/min	%Dif.	Final Flowrate Reading (After Adj.),L/min
16.70	16.65	0.299	16.70

Calibrated by :



Approved by :





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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	08 October 2025	MODEL :	CCZ-30
NO.	PM2.5-12	SERIAL NO.	2024EN0242003
CALIBRATING CONDITION			
Pressure	1011	mmbar	Temp. 24.6 °C % RH 50
Calibration Method : Dry Cal Primary		Model : Defender 510 H S/N : 136164	
CALIBRATION SETTING			
detaCal	PM2.5 AIR SAMPLER		
Flowrate Reading,L/min	Initial Flowrate Reading (Before Adj.),L/min	%Dif.	Final Flowrate Reading (After Adj.),L/min
16.70	16.68	0.120	16.70

Calibrated by :



Approved by :



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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	08 October 2025	MODEL :	CCZ-30
NO.	PM2.5-13	SERIAL NO.	2024EN0242004
CALIBRATING CONDITION			
Pressure	1011	mmbar	Temp. 24.6 °C % RH 50
Calibration Method : Dry Cal Primary		Model : Defender 510 H S/N : 136164	
CALIBRATION SETTING			
detaCal	PM2.5 AIR SAMPLER		
Flowrate Reading,L/min	Initial Flowrate Reading (Before Adj.),L/min	%Dif.	Final Flowrate Reading (After Adj.),L/min
16.70	16.66	0.240	16.70

Calibrated by :



Approved by :





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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	08 October 2025	MODEL :	CCZ-30
NO.	PM2.5-14	SERIAL NO.	2024EN0242001
CALIBRATING CONDITION			
Pressure	1011	mmbar	Temp. 24.6 °C % RH 50
Calibration Method : Dry Cal Primary		Model : Defender 510 H S/N : 136164	
CALIBRATION SETTING			
detaCal	PM2.5 AIR SAMPLER		
Flowrate Reading,L/min	Initial Flowrate Reading (Before Adj.),L/min	%Dif.	Final Flowrate Reading (After Adj.),L/min
16.70	16.69	0.060	16.70

Calibrated by :



Approved by :



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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	08 October 2025	MODEL :	CCZ-30
NO.	PM2.5-15	SERIAL NO.	2024EN0242002
CALIBRATING CONDITION			
Pressure	1011	mmbar	Temp. 24.6 °C % RH 50
Calibration Method : Dry Cal Primary		Model : Defender 510 H S/N : 136164	
CALIBRATION SETTING			
detaCal	PM2.5 AIR SAMPLER		
Flowrate Reading,L/min	Initial Flowrate Reading (Before Adj.),L/min	%Dif.	Final Flowrate Reading (After Adj.),L/min
16.70	16.65	0.299	16.70

Calibrated by :



Approved by :





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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		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)	01/09/2025	200	200.2	199.6	200.4	199.8
B02	2 (A&B)	02/09/2025	200	200.4	199.8	200.5	199.9
B03	2 (A&B)	02/09/2025	200	199.9	199.3	199.7	199.1
B04	2 (A&B)	03/09/2025	200	200.2	199.6	199.8	199.2
B05	2 (A&B)	02/09/2025	200	200.1	199.5	200.4	199.8
B06	2 (A&B)	01/09/2025	200	200.2	199.6	199.8	199.2
B07	2 (A&B)	03/09/2025	200	199.9	199.3	200.3	199.8
B08	2 (A&B)	01/09/2025	200	200.4	199.8	199.9	199.4
B09	2 (A&B)	01/09/2025	200	199.8	199.3	200.2	199.6
B10	2 (A&B)	01/09/2025	200	200.4	199.8	200.5	199.9
B11	2 (A&B)	02/09/2025	200	199.9	199.4	200.2	199.6
B12	2 (A&B)	02/09/2025	200	200.4	199.8	200.1	199.5
B13	2 (A&B)	01/09/2025	200	200.2	199.7	199.8	199.2
B14	2 (A&B)	01/09/2025	200	199.8	199.2	199.9	199.3
B15	2 (A&B)	03/09/2025	200	199.9	199.3	199.6	199.0
B16	2 (A&B)	03/09/2025	200	200.4	199.8	200.2	199.6
B17	2 (A&B)	01/09/2025	200	199.6	199.1	199.9	199.3

Calibrated by :

Approved by :



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CALIBRATION REPORT

CHEMILUMINESCENT NO / NO₂ / NO_x ANALYZER

DATE :	08 October 2025	BRAND :	API	MODEL :	200A
NO.	NOX-801	SERIAL NO.	2368		
Calibrator (Dilution System)					
Brand :	Teledyne	Model :	700		
Last Cal. Date :	29 October 2024	Serial No. :	421		
Reference Standard Gas					
Standard Gas :	Nitric Oxide (NO)	Cylinder No. :	A00726SV		
Certified Date :	05 January 2023	Expired Date :	05 January 2026	Cylinder Conc. :	48.8 ppm
CALIBRATING CONDITION					
Pressure :	1011 mmbar	Temp. :	24.6 °C	% RH :	50
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Df	Analyzer Response	Slope
Zero	0	0.11	-	0	-
NO Span	400	400.1	0.025	400.0	1.009
NO _x Span	400	400.2	0.050	400.0	1.013
API Model 200A NO _x Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	507	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.3	mV	-20 - 150		
AZERO	94.1	mV	-20 - 150		
HVPS	672	V	420 - 900 constant		
RCELL TEMP	50.0	°C	50 ± 1		
BOX TEMP	28.9	°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	28.5	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	1.009	-	1.0 ± 0.3		
NO _x Slope	1.013	-	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		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 October 2025	BRAND :	API	MODEL :	200A
NO.	NOX-B03	SERIAL NO.	2617		
Calibrator (Dilution System)					
Brand	: Teledyne		Model	: 700	
Last Cal. Date	: 29 October 2024		Serial No.	: 421	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: A007265V	
Certified Date	: 05 January 2023		Expired Date	: 05 January 2026	
			Cylinder Conc.	: 48.8 ppm	
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
			% RH	50	
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Df	Analyzer Response	Slope
Zero	0	0.10	-	0	-
NO Span	400	400.2	0.050	400.0	1.010
NO ₂ Span	400	400.3	0.075	400.0	1.013
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	506	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.0	mV	-20 - 150		
AZERO	93.7	mV	-20 - 150		
HVPS	670	V	420 - 900 constant		
RCCELL TEMP	50.1	°C	50 ± 1		
BOX TEMP	29.3	°C	8 - 48		
PMT TEMP	7.4	°C	7 ± 2		
MOLY TEMP	315.2	°C	315 ± 5		
RCCELL PRESS	8.4	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.6	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO ₂ Span Conc	400	PPB	20 - 20,000		
NO Slope	1.010	-	1.0 ± 0.3		
NO ₂ Slope	1.013	-	1.0 ± 0.3		
NO Offset	1.7	mV	-20 to +150		
NO ₂ Offset	1.1	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 October 2025	BRAND :	API	MODEL :	200E
NO.	NOX-B05	SERIAL NO.	2284		
Calibrator (Dilution System)					
Brand	: Teledyne		Model	: 700	
Last Cal. Date	: 29 October 2024		Serial No.	: 421	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: A007265V	
Certified Date	: 05 January 2023		Expired Date	: 05 January 2026	
			Cylinder Conc.	: 48.8 ppm	
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
			% RH	50	
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Df	Analyzer Response	Slope
Zero	0	0.11	-	0	-
NO Span	400	399.9	-0.025	400.0	1.008
NO ₂ Span	400	400.2	0.050	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	504	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.4	mV	-20 - 150		
AZERO	94.2	mV	-20 - 150		
HVPS	671	V	420 - 900 constant		
RCCELL TEMP	50.2	°C	50 ± 1		
BOX TEMP	29.1	°C	8 - 48		
PMT TEMP	7.5	°C	7 ± 2		
MOLY TEMP	315.1	°C	315 ± 5		
RCCELL PRESS	8.3	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.5	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO ₂ Span Conc	400	PPB	20 - 20,000		
NO Slope	1.008	-	1.0 ± 0.3		
NO ₂ Slope	1.011	-	1.0 ± 0.3		
NO Offset	1.4	mV	-20 to +150		
NO ₂ 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		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 October 2025	BRAND :	API	MODEL :	200E
NO.	NOX-809	SERIAL NO.	4412		
Calibrator (Dilution System)					
Brand :	Teledyne	Model :	700		
Last Cal. Date :	29 October 2024	Serial No. :	421		
Reference Standard Gas					
Standard Gas :	Nitric Oxide (NO)	Cylinder No. :	A00726SV		
Certified Date :	05 January 2023	Expired Date :	05 January 2026	Cylinder Conc. :	48.8 ppm
CALIBRATING CONDITION					
Pressure	1011 mmbar	Temp.	24.6 °C	% RH	50
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Diff	Analyzer Response	Slope
Zero	0	0.11	-	0	-
NO Span	400	400.1	0.025	400.0	1.010
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	513	cc/min	500 ± 50		
OZONE FLOW	79	cc/min	80 ± 15		
PMT	103.1	mV	-20 - 150		
AZERO	93.8	mV	-20 - 150		
HVPS	672	V	420 - 900 constant		
RCCELL TEMP	50.3	°C	50 ± 1		
BOX TEMP	29.5	°C	8 - 48		
PMT TEMP	7.2	°C	7 ± 2		
MOLY TEMP	314.7	°C	315 ± 5		
RCCELL PRESS	8.2	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.4	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO _x Span Conc	400	PPB	20 - 20,000		
NO Slope	1.010	-	1.0 ± 0.3		
NO _x Slope	1.014	-	1.0 ± 0.3		
NO Offset	1.8	mV	-20 to +150		
NO _x Offset	1.1	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 October 2025	BRAND :	API	MODEL :	200E
NO.	NOX-810	SERIAL NO.	4465		
Calibrator (Dilution System)					
Brand :	Teledyne	Model :	700		
Last Cal. Date :	29 October 2024	Serial No. :	421		
Reference Standard Gas					
Standard Gas :	Nitric Oxide (NO)	Cylinder No. :	A00726SV		
Certified Date :	05 January 2023	Expired Date :	05 January 2026	Cylinder Conc. :	48.8 ppm
CALIBRATING CONDITION					
Pressure	1011 mmbar	Temp.	24.6 °C	% RH	50
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Diff	Analyzer Response	Slope
Zero	0	0.10	-	0	-
NO Span	400	399.7	-0.075	400.0	1.008
NO _x Span	400	400.2	0.050	400.0	1.012
API Model 200E NO _x Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	505	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	102.9	mV	-20 - 150		
AZERO	93.7	mV	-20 - 150		
HVPS	669	V	420 - 900 constant		
RCCELL TEMP	50.1	°C	50 ± 1		
BOX TEMP	29.4	°C	8 - 48		
PMT TEMP	7.0	°C	7 ± 2		
MOLY TEMP	314.9	°C	315 ± 5		
RCCELL PRESS	8.3	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.6	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO _x Span Conc	400	PPB	20 - 20,000		
NO Slope	1.008	-	1.0 ± 0.3		
NO _x Slope	1.012	-	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		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 October 2025	BRAND :	API	MODEL :	200E
NO.	NOX-B11	SERIAL NO.	4467		
Calibrator (Dilution System)					
Brand	: Teledyne		Model	: 700	
Last Cal. Date	: 29 October 2024		Serial No.	: 421	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: A007265V	
Certified Date	: 05 January 2023		Expired Date	: 05 January 2026	
			Cylinder Conc.	: 48.8 ppm	
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
			% RH	50	
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	0.11	-	0	-
NO Span	400	399.8	-0.050	400.0	1.007
NO _x Span	400	400.1	0.025	400.0	1.010
API Model 200E NO _x Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	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		
RCCELL TEMP	50.4	°C	50 ± 1		
BOX TEMP	29.5	°C	8 - 48		
PMT TEMP	7.3	°C	7 ± 2		
MOLY TEMP	314.8	°C	315 ± 5		
RCCELL PRESS	8.4	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.7	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO _x Span Conc	400	PPB	20 - 20,000		
NO Slope	1.007	-	1.0 ± 0.3		
NO ₂ Slope	1.010	-	1.0 ± 0.3		
NO Offset	1.5	mV	-20 to +150		
NO ₂ 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		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 October 2025	BRAND :	API	MODEL :	200A
NO.	NOX-B12	SERIAL NO.	2675		
Calibrator (Dilution System)					
Brand	: Teledyne		Model	: 700	
Last Cal. Date	: 29 October 2024		Serial No.	: 421	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: A007265V	
Certified Date	: 05 January 2023		Expired Date	: 05 January 2026	
			Cylinder Conc.	: 48.8 ppm	
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
			% RH	50	
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	-0.10	-	0	-
NO Span	400	400.1	0.025	400.0	1.009
NO _x Span	400	400.3	0.075	400.0	1.012
API Model 200A NO _x Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	509	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	102.9	mV	-20 - 150		
AZERO	93.6	mV	-20 - 150		
HVPS	674	V	420 - 900 constant		
RCCELL TEMP	50.1	°C	50 ± 1		
BOX TEMP	28.8	°C	8 - 48		
PMT TEMP	7.0	°C	7 ± 2		
MOLY TEMP	314.7	°C	315 ± 5		
RCCELL PRESS	8.2	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.4	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO _x Span Conc	400	PPB	20 - 20,000		
NO Slope	1.009	-	1.0 ± 0.3		
NO ₂ Slope	1.012	-	1.0 ± 0.3		
NO Offset	1.7	mV	-20 to +150		
NO ₂ Offset	1.1	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 October 2025	BRAND :	API	MODEL :	200A
NO.	NOX-B14	SERIAL NO.	212		
Calibrator (Dilution System)					
Brand :	Teledyne	Model :	700		
Last Cal. Date :	29 October 2024	Serial No. :	421		
Reference Standard Gas					
Standard Gas :	Nitric Oxide (NO)	Cylinder No. :	A007265V		
Certified Date :	05 January 2023	Expired Date :	05 January 2026	Cylinder Conc. :	48.8 ppm
CALIBRATING CONDITION					
Pressure	1011 mmbar	Temp.	24.6 °C	% RH	50
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Df	Analyzer Response	Slope
Zero	0	0.10	-	0	-
NO Span	400	399.6	-0.100	400.0	1.004
NO ₂ Span	400	399.8	-0.050	400.0	1.007
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	103.2	mV	-20 - 150		
AZERO	93.9	mV	-20 - 150		
HVPS	669	V	420 - 900 constant		
RCCELL TEMP	50.2	°C	50 ± 1		
BOX TEMP	29.5	°C	8 - 48		
PMT TEMP	7.3	°C	7 ± 2		
MOLY TEMP	315.4	°C	315 ± 5		
RCCELL PRESS	8.4	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.7	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO ₂ Span Conc	400	PPB	20 - 20,000		
NO Slope	1.004	-	1.0 ± 0.3		
NO ₂ Slope	1.007	-	1.0 ± 0.3		
NO Offset	0.9	mV	-20 to +150		
NO ₂ Offset	0.5	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 October 2025	BRAND :	API	MODEL :	TML-41M
NO.	NOX-B21	SERIAL NO.	N02374		
Calibrator (Dilution System)					
Brand :	Teledyne	Model :	700		
Last Cal. Date :	29 October 2024	Serial No. :	421		
Reference Standard Gas					
Standard Gas :	Nitric Oxide (NO)	Cylinder No. :	A007265V		
Certified Date :	05 January 2023	Expired Date :	05 January 2026	Cylinder Conc. :	48.8 ppm
CALIBRATING CONDITION					
Pressure	1011 mmbar	Temp.	24.6 °C	% RH	50
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Df	Analyzer Response	Slope
Zero	0	0.10	-	0	-
NO Span	400	399.7	-0.075	400.0	1.006
NO ₂ Span	400	400.1	0.025	400.0	1.010
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	503	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.0	mV	-20 - 150		
AZERO	93.8	mV	-20 - 150		
HVPS	673	V	420 - 900 constant		
RCCELL TEMP	50.1	°C	50 ± 1		
BOX TEMP	29.4	°C	8 - 48		
PMT TEMP	7.5	°C	7 ± 2		
MOLY TEMP	315.3	°C	315 ± 5		
RCCELL PRESS	8.3	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.6	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO ₂ Span Conc	400	PPB	20 - 20,000		
NO Slope	1.006	-	1.0 ± 0.3		
NO ₂ Slope	1.010	-	1.0 ± 0.3		
NO Offset	1.3	mV	-20 to +150		
NO ₂ 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		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 October 2025	BRAND :	API	MODEL :	TML-41M
NO.	NOX-822	SERIAL NO.	NO1618		
Calibrator (Dilution System)					
Brand :	Teledyne	Model :	700		
Last Cal. Date :	29 October 2024	Serial No. :	421		
Reference Standard Gas					
Standard Gas :	Nitric Oxide (NO)	Cylinder No. :	A007265V		
Certified Date :	05 January 2023	Expired Date :	05 January 2026	Cylinder Conc. :	48.8 ppm
CALIBRATING CONDITION					
Pressure	1011 mmbar	Temp.	24.6 °C	% RH	50
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Df	Analyzer Response	Slope
Zero	0	-0.10	-	0	-
NO Span	400	399.8	-0.050	400.0	1.007
NO ₂ 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	507	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.1	mV	-20 - 150		
AZERO	93.9	mV	-20 - 150		
HVPS	674	V	420 - 900 constant		
RCCELL TEMP	50.0	°C	50 ± 1		
BOX TEMP	28.8	°C	8 - 48		
PMT TEMP	7.1	°C	7 ± 2		
MOLY TEMP	314.8	°C	315 ± 5		
RCCELL PRESS	8.4	#H-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.7	#H-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO ₂ Span Conc	400	PPB	20 - 20,000		
NO Slope	1.007	-	1.0 ± 0.3		
NO ₂ Slope	1.011	-	1.0 ± 0.3		
NO Offset	1.4	mV	-20 to +150		
NO ₂ 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		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 October 2025	BRAND :	API	MODEL :	200E
NO.	NOX-R02	SERIAL NO.	2285		
Calibrator (Dilution System)					
Brand :	Teledyne	Model :	700		
Last Cal. Date :	29 October 2024	Serial No. :	421		
Reference Standard Gas					
Standard Gas :	Nitric Oxide (NO)	Cylinder No. :	A007265V		
Certified Date :	05 January 2023	Expired Date :	05 January 2026	Cylinder Conc. :	48.8 ppm
CALIBRATING CONDITION					
Pressure	1011 mmbar	Temp.	24.6 °C	% RH	50
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Df	Analyzer Response	Slope
Zero	0	-0.10	-	0	-
NO Span	400	399.6	-0.100	400.0	1.005
NO ₂ Span	400	399.9	-0.025	400.0	1.009
API Model 200E NO _x Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	510	cc/min	500 ± 50		
OZONE FLOW	79	cc/min	80 ± 15		
PMT	103.5	mV	-20 - 150		
AZERO	94.2	mV	-20 - 150		
HVPS	671	V	420 - 900 constant		
RCCELL TEMP	50.2	°C	50 ± 1		
BOX TEMP	29.3	°C	8 - 48		
PMT TEMP	7.0	°C	7 ± 2		
MOLY TEMP	315.1	°C	315 ± 5		
RCCELL PRESS	8.2	#H-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.4	#H-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO ₂ Span Conc	400	PPB	20 - 20,000		
NO Slope	1.005	-	1.0 ± 0.3		
NO ₂ Slope	1.009	-	1.0 ± 0.3		
NO Offset	1.1	mV	-20 to +150		
NO ₂ Offset	0.6	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 October 2025	BRAND :	API	MODEL :	200E
NO.	NOX-R07	SERIAL NO.	4468		
Calibrator (Dilution System)					
Brand	: Teledyne		Model	: 700	
Last Cal. Date	: 29 October 2024		Serial No.	: 421	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: A007265V	
Certified Date	: 05 January 2023		Expired Date	: 05 January 2026	
			Cylinder Conc.	: 48.8 ppm	
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
			% RH	50	
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Df	Analyzer Response	Slope
Zero	0	0.10	-	0	-
NO Span	400	399.7	-0.075	400.0	1.005
NO ₂ Span	400	399.9	-0.025	400.0	1.008
API Model 200E NO _x Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	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	674	V	420 - 900 constant		
RCCELL TEMP	50.3	°C	50 ± 1		
BOX TEMP	29.0	°C	8 - 48		
PMT TEMP	7.2	°C	7 ± 2		
MOLY TEMP	314.7	°C	315 ± 5		
RCCELL PRESS	8.4	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.6	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO ₂ Span Conc	400	PPB	20 - 20,000		
NO Slope	1.005	-	1.0 ± 0.3		
NO ₂ Slope	1.008	-	1.0 ± 0.3		
NO Offset	1.1	mV	-20 to +150		
NO ₂ Offset	0.8	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		

Calibrated by :

Approved by :



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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO ₂ / NO _x ANALYZER					
DATE :	08 October 2025	BRAND :	API	MODEL :	200E
NO.	NOX-R09	SERIAL NO.	252		
Calibrator (Dilution System)					
Brand	: Teledyne		Model	: 700	
Last Cal. Date	: 29 October 2024		Serial No.	: 421	
Reference Standard Gas					
Standard Gas	: Nitric Oxide (NO)		Cylinder No.	: A007265V	
Certified Date	: 05 January 2023		Expired Date	: 05 January 2026	
			Cylinder Conc.	: 48.8 ppm	
CALIBRATING CONDITION					
Pressure	1011	mmbar	Temp.	24.6	°C
			% RH	50	
CALIBRATION SETTING					
Span	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
Set Point	Expected Concentration	Analyzer Response	%Df	Analyzer Response	Slope
Zero	0	0.11	-	0	-
NO Span	400	400.2	0.050	400.0	1.010
NO ₂ 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	513	cc/min	500 ± 50		
OZONE FLOW	79	cc/min	80 ± 15		
PMT	103.5	mV	-20 - 150		
AZERO	94.1	mV	-20 - 150		
HVPS	670	V	420 - 900 constant		
RCCELL TEMP	50.2	°C	50 ± 1		
BOX TEMP	28.9	°C	8 - 48		
PMT TEMP	7.1	°C	7 ± 2		
MOLY TEMP	315.4	°C	315 ± 5		
RCCELL PRESS	8.5	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.7	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO ₂ Span Conc	400	PPB	20 - 20,000		
NO Slope	1.010	-	1.0 ± 0.3		
NO ₂ Slope	1.015	-	1.0 ± 0.3		
NO Offset	1.8	mV	-20 to +150		
NO ₂ Offset	1.1	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		

Calibrated by :

Approved by :



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

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

Personal Pump Data					Calibration Data							
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)				Value From Calibration Curve			
					Setting		Actual (Q std.)		y		R ²	
					1	2	3	1	2	3	y	R ²
B01	SKC	224-PCXR4	262101	05/10/2025	1.000	1.500	2.000	998	1.490	1.997	1.000x - 7.191	1.000
B02	SKC	224-PCXR4	626166	05/10/2025	1.000	1.500	2.000	1.007	1.500	2.008	0.999x + 2.537	1.000
B03	SKC	224-PCXR4	612968	05/10/2025	1.000	1.500	2.000	1.003	1.503	2.001	0.997x + 0.810	0.999
B04	SKC	224-PCXR4	602804	02/10/2025	1.000	1.500	2.000	998	1.494	1.993	1.001x - 6.035	1.000
B05	SKC	224-PCXR4	612993	02/10/2025	1.000	1.500	2.000	999	1.495	2.001	0.999x - 2.481	1.000
B06	SKC	224-PCXR4	262188	02/10/2025	1.000	1.500	2.000	997	1.510	2.000	0.998x + 0.064	0.999
B07	SKC	224-PCXR4	626262	01/10/2025	1.000	1.500	2.000	1.004	1.492	2.007	1.002x - 4.778	1.000
B08	SKC	224-PCXR4	626100	02/10/2025	1.000	1.500	2.000	1.005	1.500	2.005	1.004x - 7.223	1.000
B09	SKC	224-PCXR4	626479	01/10/2025	1.000	1.500	2.000	1.001	1.501	1.986	0.996x + 3.462	0.999
B10	SKC	224-PCXR4	091950	01/10/2025	1.000	1.500	2.000	997	1.504	2.000	1.003x - 8.822	1.000
B11	SKC	224-PCXR8	564315	03/10/2025	1.000	1.500	2.000	1.001	1.503	1.995	0.995x + 2.449	1.000
B12	SKC	224-PCXR4	034656	03/10/2025	1.000	1.500	2.000	997	1.506	2.003	1.003x - 9.062	0.999
B13	SKC	224-PCXR4	602073	03/10/2025	1.000	1.500	2.000	1.003	1.497	2.006	1.002x - 5.013	1.000
B14	SKC	224-PCXR4	626313	03/10/2025	1.000	1.500	2.000	998	1.501	1.992	1.005x - 11.702	0.999
B15	SKC	224-PCXR4	626474	03/10/2025	1.000	1.500	2.000	1.001	1.502	2.004	1.006x - 11.694	1.000
B16	SKC	224-PCXR4	626477	03/10/2025	1.000	1.500	2.000	996	1.498	1.992	1.007x - 16.329	0.999
B17	SKC	224-PCXR4	626860	02/10/2025	1.000	1.500	2.000	1.001	1.503	1.998	1.001x - 4.838	1.000
B18	SKC	224-PCXR4	691484	01/10/2025	1.000	1.500	2.000	997	1.514	1.996	0.996x + 5.360	1.000
B19	SKC	224-PCXR4	691599	01/10/2025	1.000	1.500	2.000	998	1.499	2.003	0.998x + 0.399	1.000
B20	SKC	224-PCXR4	691587	01/10/2025	1.000	1.500	2.000	1.001	1.501	1.999	0.995x + 1.520	0.999
B21	SKC	224-PCXR4	691531	03/10/2025	1.000	1.500	2.000	996	1.502	2.001	1.003x - 7.151	1.000
B22	SKC	224-PCXR4	691654	03/10/2025	1.000	1.500	2.000	1.001	1.500	1.998	0.997x - 0.666	1.000
B23	SKC	224-PCXR4	798393	03/10/2025	1.000	1.500	2.000	993	1.507	1.999	1.007x - 17.505	0.999
B24	SKC	224-PCXR4	626363	03/10/2025	1.000	1.500	2.000	994	1.498	1.995	1.000x - 3.941	1.000
B25	SKC	224-PCXR4	798469	01/10/2025	1.000	1.500	2.000	1.003	1.490	2.001	0.997x + 1.703	1.000
B26	SKC	224-PCXR4	798479	01/10/2025	1.000	1.500	2.000	1.001	1.509	1.995	1.002x - 8.057	0.999
B27	SKC	224-PCXR4	691473	01/10/2025	1.000	1.500	2.000	998	1.510	2.002	1.005x - 9.656	1.000
B28	SKC	224-PCXR4	691570	01/10/2025	1.000	1.500	2.000	1.011	1.508	2.009	0.999x + 3.729	0.999
B29	SKC	224-PCXR4	626472	01/10/2025	1.000	1.500	2.000	1.002	1.503	1.998	1.002x - 6.066	1.000
B30	SKC	224-PCXR4	691489	01/10/2025	1.000	1.500	2.000	997	1.506	2.001	1.006x - 8.049	1.000
B31	SKC	224-PCXR4	691509	02/10/2025	1.000	1.500	2.000	995	1.497	1.992	0.998x - 2.293	1.000
B32	SKC	224-PCXR4	091567	01/10/2025	1.000	1.500	2.000	1.002	1.500	2.003	1.008x - 15.778	0.999
B33	SKC	224-PCXR4	091756	02/10/2025	1.000	1.500	2.000	1.003	1.501	1.997	1.003x - 6.509	1.000
B34	SKC	224-PCXR4	612962	01/10/2025	1.000	1.500	2.000	996	1.512	1.996	1.001x - 5.867	0.999
B35	SKC	224-PCXR4	602682	01/10/2025	1.000	1.500	2.000	1.008	1.494	1.999	0.993x + 6.992	1.000
B36	SKC	224-PCXR4	626164	01/10/2025	1.000	1.500	2.000	997	1.502	1.992	0.999x - 3.235	1.000
B37	SKC	224-PCXR4	626256	01/10/2025	1.000	1.500	2.000	1.003	1.490	1.997	0.994x + 5.093	1.000
B38	SKC	224-PCXR4	626167	02/10/2025	1.000	1.500	2.000	998	1.513	1.995	1.000x - 5.277	0.999
B39	SKC	224-PCXR4	034637	03/10/2025	1.000	1.500	2.000	1.007	1.504	2.004	0.996x + 8.240	1.000
B40	SKC	224-PCXR4	798389	03/10/2025	1.000	1.500	2.000	998	1.510	2.002	0.998x + 3.905	1.000

Calibrated by :

Approved by :



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

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

Personal Pump Data					Calibration Data							
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)				Value From Calibration Curve			
					Setting		Actual (Q std.)		y		R ²	
					1	2	3	1	2	3	y	R ²
B41	SKC	224-PCXR4	612669	01/10/2025	1.000	1.500	2.000	1.010	1.508	2.009	1.000x + 2.612	0.999
B42	SKC	224-PCXR4	626041	02/10/2025	1.000	1.500	2.000	1.004	1.494	1.994	0.997x + 1.344	1.000
B43	SKC	224-PCXR4	034636	01/10/2025	1.000	1.500	2.000	998	1.505	2.002	1.001x - 5.177	1.000
B44	SKC	224-PCXR8	529341	01/10/2025	1.000	1.500	2.000	999	1.496	1.998	0.996x + 0.909	1.000
B45	SKC	224-PCXR8	529594	01/10/2025	1.000	1.500	2.000	996	1.510	1.992	1.005x - 11.543	1.000
B46	SKC	224-PCXR8	566743	01/10/2025	1.000	1.500	2.000	1.003	1.488	1.997	0.996x + 3.717	1.000
B47	SKC	224-PCXR8	566747	01/10/2025	1.000	1.500	2.000	1.004	1.504	1.993	0.996x + 2.230	1.000
B48	SKC	224-PCXR8	566753	01/10/2025	1.000	1.500	2.000	1.002	1.501	1.991	1.000x - 4.116	0.999
B49	SKC	224-PCXR8	566780	01/10/2025	1.000	1.500	2.000	995	1.502	1.990	0.997x - 1.978	1.000
B50	SKC	224-PCXR8	500400	02/10/2025	1.000	1.500	2.000	997	1.503	2.001	1.004x - 10.178	1.000
B51	SKC	224-PCXR8	500363	01/10/2025	1.000	1.500	2.000	1.001	1.502	1.993	0.995x + 2.848	1.000
B52	SKC	224-PCXR8	093186	03/10/2025	1.000	1.500	2.000	996	1.510	1.999	1.005x - 12.252	0.999
B53	SKC	224-PCXR8	707670	03/10/2025	1.000	1.500	2.000	1.002	1.496	2.004	1.003x - 8.791	1.000
B54	SKC	224-PCXR3	509821	03/10/2025	1.000	1.500	2.000	999	1.501	1.995	0.999x - 2.040	1.000
B55	SKC	224-PCXR3	510710	02/10/2025	1.000	1.500	2.000	1.002	1.503	2.006	1.007x - 13.250	0.999
B56	SKC	224-PCXR3	511450	01/10/2025	1.000	1.500	2.000	995	1.505	1.997	1.002x - 7.394	1.000
B57	SKC	224-PCXR3	510798	02/10/2025	1.000	1.500	2.000	998	1.500	1.994	0.999x - 7.163	0.999
B58	SKC	224-PCXR3	509852	03/10/2025	1.000	1.500	2.000	1.002	1.494	1.996	0.993x + 6.485	1.000
B59	SKC	224-PCXR3	509862	01/10/2025	1.000	1.500	2.000	1.006	1.505	1.998	0.996x + 5.117	1.000
B60	SKC	224-PCXR3	512655	02/10/2025	1.000	1.500	2.000	1.004	1.501	2.003	1.010x - 14.223	0.999
B61	SKC	224-PCXR3	503915	03/10/2025	1.000	1.500	2.000	993	1.495	1.994	0.999x - 4.942	1.000
B62	SKC	224-PCXR3	505975	03/10/2025	1.000	1.500	2.000	995	1.500	2.005	1.009x - 16.396	1.000
B63	SKC	224-PCXR3	511432	03/10/2025	1.000	1.500	2.000	996	1.497	1.991	0.998x - 3.171	1.000
B64	SKC	224-PCXR3	508302	03/10/2025	1.000	1.500	2.000	1.008	1.506	1.998	0.992x + 8.667	0.999
B65	SKC	224-PCXR3	508310	03/10/2025	1.000	1.500	2.000	1.006	1.492	2.005	1.000x - 4.355	1.000
B66	SKC	224-PCXR3	509861	03/10/2025	1.000	1.500	2.000	994	1.496	1.994	0.997x - 0.275	1.000
B67	SKC	224-PCXR3	506295	01/10/2025	1.000	1.500	2.000	997	1.505	2.001	1.004x - 10.258	1.000
B68	SKC	224-PCXR3	505872	03/10/2025	1.000	1.500	2.000	998	1.512	1.992	0.999x - 3.554	0.999
B69	SKC	224-PCXR3	508375	01/10/2025	1.000	1.500	2.000	997	1.489	1.996	0.997x - 2.309	1.000
B70	SKC	224-PCXR3	510623	03/10/2025	1.000	1.500	2.000	1.001	1.496	1.991	0.992x + 7.131	1.000
B71	SKC	224-PCXR3	508367	03/10/2025	1.000	1.500	2.000	999	1.498	1.995	0.994x + 6.433	1.000



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

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

Personal Pump Data				Calibration Data								
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3		y
B80	SKC	Z24-PCXR3	504549	01/10/2025	1,000	1,500	2,000	1,004	1,510	2,004	0.999x - 0.786	0.999
B81	SKC	Z24-PCXR3	503480	01/10/2025	1,000	1,500	2,000	1,004	1,509	2,002	1.000x - 1.340	0.999
B82	SKC	Z24-PCXR3	505673	01/10/2025	1,000	1,500	2,000	1,007	1,502	2,003	0.994x + 9.425	1.000
B83	SKC	Z24-PCXR3	510785	01/10/2025	1,000	1,500	2,000	997	1,494	1,994	0.999x - 1.727	0.999
B84	SKC	Z24-PCXR3	508333	01/10/2025	1,000	1,500	2,000	1,000	1,505	2,005	1.002x - 5.217	1.000
B85	SKC	Z24-PCXR3	505757	03/10/2025	1,000	1,500	2,000	996	1,507	1,998	1.001x - 4.459	1.000
B86	SKC	Z24-PCXR3	512625	03/10/2025	1,000	1,500	2,000	998	1,506	1,993	0.997x - 4.180	0.999
B87	SKC	Z24-PCXR3	504324	03/10/2025	1,000	1,500	2,000	1,003	1,510	2,004	1.000x + 1.037	1.000
B88	SKC	Z24-PCXR3	508307	03/10/2025	1,000	1,500	2,000	995	1,505	1,999	1.007x - 17.485	0.999
B89	SKC	Z24-PCXR3	509860	03/10/2025	1,000	1,500	2,000	999	1,500	2,001	1.002x - 6.218	1.000
B90	SKC	Z24-PCXR3	508366	02/11/2025	1,000	1,500	2,000	996	1,505	2,004	1.008x - 15.379	1.000
B91	SKC	Z24-PCXR3	510919	01/10/2025	1,000	1,500	2,000	1,004	1,504	2,003	0.998x + 1.328	1.000
B92	SKC	Z24-PCXR3	510987	03/10/2025	1,000	1,500	2,000	997	1,505	2,005	1.009x - 17.601	0.999
B93	SKC	Z24-PCXR3	509845	03/10/2025	1,000	1,500	2,000	1,006	1,511	2,001	0.998x + 2.138	0.999

Calibrated by :

Approved by :



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Rotameter Calibration Report (For Personal Pump High Flow Adjust)

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Rotameter Data				Calibration Data							
No.	Brand	Model	Date	Flow Rate (ml/min)						Value From Calibration Curve	
				Flow Rate (Reading)			Actual (Q std.)			y	R ²
				1	2	3	1	2	3		
H-B01	Dwyer	VFB-65	02/07/2025	500	1,000	2,000	498.8	1001.4	2005.7	0.996x + 4.876	1.000
H-B02	Dwyer	VFB-65	02/07/2025	500	1,000	2,000	501.6	1001.3	1997.6	0.997x + 5.643	1.000
H-B03	Dwyer	VFB-65	03/07/2025	500	1,000	2,000	499.3	1001.9	1990.3	0.998x + 3.307	0.999
H-B04	Dwyer	VFB-65	04/07/2025	500	1,000	2,000	501.3	997.3	2005.9	1.000x + 1.652	1.000
H-B05	Dwyer	VFB-65	02/07/2025	500	1,000	2,000	501.6	998.8	2005.5	1.003x - 1.210	1.000
H-B06	Dwyer	VFB-65	03/07/2025	500	1,000	2,000	500.9	1001.3	1990.6	0.997x + 5.814	0.999
H-B07	Dwyer	VFB-65	04/07/2025	500	1,000	2,000	501.9	1001.7	2009.2	0.999x - 1.217	1.000
H-B08	Dwyer	VFB-65	04/07/2025	500	1,000	2,000	499.0	998.4	2006.7	1.002x - 9.084	0.999
H-B09	Dwyer	VFB-65	02/07/2025	500	1,000	2,000	498.8	1000.5	1998.8	1.001x - 1.402	1.000
H-B10	Dwyer	VFB-65	02/07/2025	500	1,000	2,000	500.2	1000.6	2001.7	0.999x + 3.178	1.000

Calibrated by :

Approved by :



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

Rotameter Calibration Report (For Personal Pump Low Flow Adjust)

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Calibration Data

Rotameter Data			Calibration Data								
No.	Brand	Model	Date	Flow Rate (ml/min)						Value From Calibration Curve	
				Flow Rate (Reading)			Actual (Q std.)				
				1	2	3	1	2	3	y	R ²
L-801	Dwyer	VFA-21	01/10/2025	50	100	200	50.7	99.8	199.6	1.000x + 0.067	1.000
L-802	Dwyer	VFA-21	01/10/2025	50	100	200	50.2	99.4	198.7	1.001x - 1.181	0.999
L-803	Dwyer	VFA-21	01/10/2025	50	100	200	50.8	99.2	201.5	1.002x + 0.053	1.000
L-804	Dwyer	VFA-21	01/10/2025	50	100	200	49.7	101.6	200.8	1.001x + 0.344	1.000
L-805	Dwyer	VFA-21	01/10/2025	50	100	200	50.5	100.4	201.6	0.998x + 0.225	0.999
L-806	Dwyer	VFA-21	01/10/2025	50	100	200	50.1	100.5	201.8	1.003x - 0.103	1.000
L-807	Dwyer	VFA-21	02/10/2025	50	100	200	50.6	100.8	201.3	0.998x + 0.877	1.000
L-808	Dwyer	VFA-21	01/10/2025	50	100	200	49.8	101.3	198.9	1.000x - 0.165	1.000
L-809	Dwyer	VFA-21	02/10/2025	50	100	200	50.1	99.6	200.7	1.002x - 0.766	0.999
L-810	Dwyer	VFA-21	03/10/2025	50	100	200	50.9	100.8	201.2	1.003x + 0.694	1.000

Calibrated by :

Approved by :



QUALITY CALIBRATION CO.,LTD.
235 Petchkasem 63/2 Road, Laksong, Bangkoe, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584
www.qcalibration.com



CERTIFICATE No : 25M2254

REFERENCE No : 76365-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE

MANUFACTURER : METTLER TOLEDO

MODEL : XS105DU

SERIAL No : 1126422905

ID No : BA05/50

CONDITION AS RECEIVED : USED ITEM

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

CALIBRATED BY : ATSAWIN Y.

CALIBRATION DATE : 07-Mar-25

APPROVED BY :

ISSUED DATE : 13-Mar-25

RECEIVED DATE : 07-Mar-25

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



**QUALITY CALIBRATION CO.,LTD.**

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

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

www.qcalibration.com

CERTIFICATE No : 25M2254

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : METTLER TOLEDO
ID No : BA05/50
AIR PRESSURE : 1009mbar \pm 1mbar
AMBIENT TEMPERATURE : 24° C \pm 1° C
MODEL : XS105DU
S/N : 1126422905
RECEIVED DATE : 07-Mar-25
CALIBRATION DATE : 07-Mar-25
RELATIVE HUMIDITY : 54 %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	C02250116	28-Jan-27
2) STANDARD WEIGHT	E2	15843	C02250117	29-Jan-27

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

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

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

- NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 120 g WAS 0.000055 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.00	0.00000	0.00000	0.000065
0.02	0.01999	0.00001	0.000065
0.10	0.10001	-0.00001	0.000066
0.20	0.20001	-0.00001	0.000066
0.50	0.50002	-0.00002	0.000065
1.00	1.00003	-0.00003	0.000066
2.00	2.00001	-0.00001	0.000067
5.00	5.00002	-0.00002	0.000068
10.00	10.00000	0.00000	0.000070
20.00	20.00004	-0.00004	0.000078
50.00	50.00000	0.00000	0.00013
100.00	100.0001	-0.0001	0.00019
120.00	120.0002	-0.0002	0.00022

5. OFF CENTER LOADING ERROR

POINT	READING (g)
1	50.0000
2	50.0000
3	50.0000
4	50.0000
5	50.0000
OFF-CENTER LOADING	0.0000

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

END OF CALIBRATION REPORT

**SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY**

451-451/1 Sirinthon Road, Bangbumru, Bangplud, Bangkok, 10700 Thailand

Tel. +66 2433 8331

Email : calibration@sithiporn.com**SITHIPORN**
associates

Cert. No. : SP25026

Pages : 1 of 4

Calibration Certificate

Equipment : UV-VIS SPECTROPHOTOMETER
Manufacturer : PERKINELMER
Model : LAMBDA 25
Serial No.: 501S14123010
ID No.: SP03/58
Calibration Mode : WAVELENGTH ACCURACY
PHOTOMETRIC ACCURACY
STRAY LIGHT

Condition As Found : GOOD

Customer : S.P.S CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN ROAD,
CHOMPHON SUB-DISTRICT, CHATUCHAK DISTRICT,
BANGKOK PROVINCE 10900 THAILAND.

Location : ORGANIC LABORATORY IV

Ambient Temperature : (22.9 \pm 5) °C

Relative Humidity : (53.7 \pm 25) %

Received Date : 22 AUGUST 2025

Calibration Date : 22 AUGUST 2025

Date of Issue : 25 AUGUST 2025

Calibrated by :

Approved by :

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

Cert. No. : SP25026
Job No. : VC68SP0019
Pages : 2 of 4

Calibration Method :

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

Condition of this result of calibration :

1. Certified reference materials

Material	Ref. type	Cell serial No.	Cert. No.	Due Date
Holmium liquid	RM-HL	29706	126461	24/10/2026
Didymium liquid	RM-DL	28912	126462	24/10/2026
Neutral density filter	RM-1N2N3N	13877	126457	24/10/2026
Potassium dichromate solutions	RM-0204060810	14204	126497	25/10/2026
Potassium Iodide solution	-	KI-0701-001	CI-0185-24	14/05/2026

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

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

3.1 The UK National Physical Laboratory (NPL)

Result of calibration : Wavelength Accuracy

(Without adjustment)

Material	Certified Values of Reference Material (nm)	UUC* Reading (nm)	Error (nm)	Uncertainty ± (nm)	k Factor
RM-HL	278.13	278.21	0.08	0.16	2.00
	361.25	361.39	0.14	0.16	2.00
	467.82	467.71	-0.11	0.16	2.00
	536.56	536.50	-0.06	0.16	2.00
	640.50	640.36	-0.14	0.16	2.00
RM-DL	740.09	739.85	-0.24	0.16	2.00
	864.94	865.12	0.18	0.16	2.00

UUC* = Unit Under Calibration

Michael B.

Cert. No. : SP25026
Job No. : VC68SP0019
Pages : 3 of 4

Result of calibration : Photometric Accuracy

Material	Wavelength (nm)	Filter S/N	Nominal Absorbance (A)	Certified Absorbance (A)	UUC* Reading Absorbance (A)	Error (A)	Uncertainty ± (A)	k Factor
Neutral Density glass filter	440.0	29381	0.5	0.5443	0.5413	-0.0030	0.0043	2.00
		29914	0.7	0.7484	0.7455	-0.0029	0.0054	2.00
		29360	1.0	1.0527	1.0535	0.0008	0.0032	2.00
	465.0	29381	0.5	0.4948	0.4922	-0.0026	0.0041	2.00
		29914	0.7	0.6906	0.6877	-0.0029	0.0050	2.00
		29360	1.0	0.9695	0.9709	0.0014	0.0031	2.00
	546.1	29381	0.5	0.5090	0.5068	-0.0022	0.0036	2.00
		29914	0.7	0.6985	0.6960	-0.0025	0.0041	2.00
		29360	1.0	0.9814	0.9825	0.0011	0.0031	2.00
	590.0	29381	0.5	0.5375	0.5353	-0.0022	0.0034	2.00
		29914	0.7	0.7256	0.7231	-0.0025	0.0037	2.00
		29360	1.0	1.0213	1.0219	0.0006	0.0032	2.00
	635.0	29381	0.5	0.5223	0.5202	-0.0021	0.0033	2.00
		29914	0.7	0.6927	0.6901	-0.0026	0.0036	2.00
		29360	1.0	0.9744	0.9750	0.0006	0.0032	2.00

UUC* = Unit Under Calibration

Michael B.

Cert. No. : SP25026
Job No. : VC68SP0019
Pages : 4 of 4

Result of calibration : Photometric Accuracy

(Without adjustment)

Material	Wavelength (nm)	Solution (mg/l)	Certified Absorbance (A)	UUC* Reading Absorbance (A)	Error (A)	Uncertainty ± (A)	k Factor
Potassium dichromate solutions	235.0	20	0.2415	0.2443	0.0028	0.0101	2.00
		40	0.4866	0.4871	0.0005	0.0115	2.00
		60	0.7415	0.7295	-0.0120	0.0067	2.00
		80	0.9854	0.9844	-0.0010	0.0071	2.00
		100	1.2444	1.2425	-0.0019	0.0073	2.00

UUC* = Unit Under Calibration

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

Resolution of Wavelength Mode 0.1 nm
Resolution of Photometric Mode 0.001 A

Parameter Setting

Measurement Mode Wavelength, Absorbance
Wavelength Scan 190 nm - 1100 nm
Scanning Speed 7.5 nm/min
Band width(Wavelength) 1.0
Band width(Vis) 1.0
Band width(Uv) 1.0

Stray Light** UUC* Reading at 220.0 nm	
Transmission T(%)	Absorbance(A)
0.020	3.7032

**Specific Acceptance :
Transmission ≤ 1.0 T(%), Absorbance ≥ 2.0 A
**Stray light not TISI Accredited

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor *k*,
providing a level of confidence of approximately 95%

End of Calibration Certificate



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

Calibration Report			
Non-Dispersive Infrared CO Analyzer			
Date :	01 October 2025	Brand :	API
No.	CO-801	Model :	300E
		Serial No.	782
Calibrator (Dilution System)			
Brand :	Teledyne	Model :	700E
Last Cal. Date :	28 October 2024	Serial No. :	201-S
Reference Standard Gas			
Standard Gas :	Carbon Monoxide (CO)	Cylinder No. :	D711839
Certified Date :	14 March 2024	Expired Date :	14 March 2032
		Cylinder Conc. :	4,580 ppm
Calibrating Condition			
Pressure	1011 mmbar	Temp.	24.6 °C
		% RH	50
Calibration Setting			
Span	Initial Reading (Before Adj.), PPM		Final Reading (After Adj.), PPM
Set Point	Expected Concentration	Analyzer Response	%Diff
Zero	0	0.11	-
CO Span	40.00	40.04	0.100
API Model 300E CO Analyzer Check List			
Parameter	Observed Value	Units	Nominal Range
Range	50	PPM	0-1000 ppm
Stability	0.10	PPM	< 1 ppm With Zero Air
CO Measure	4014.1	mV	2500-4800 mV
CO Reference	3948.4	mV	2500-4800 mV
Measure/Reference Ratio	1.179	-	1.1-1.3 W/Zero Air
Sample Pressure	28.7	In-Hg-A	~2" < Ambient Absolute Pressure
Sample Flow	809	CC/Min	800 ± 10%
Sample Temperature	48.3	°C	48 ± 4
Bench Temperature	48.0	°C	48 ± 2
Wheel Temperature	68.3	°C	68 ± 2
Box Temperature	30.6	°C	Ambient Temp + 7 ± 10
Photo-Drive	3036.3	mV	250 mV to 4750 mV
Slope	1.017	-	1.0 ± 0.3
Offset	0.2	-	0 ± 0.3

Calibrated by :

Approved by :



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

Calibration Report			
Non-Dispersive Infrared CO Analyzer			
Date :	01 October 2025	Brand :	API
No.	CO-802	Model :	300E
		Serial No.	965
Calibrator (Dilution System)			
Brand :	Teledyne	Model :	700E
Last Cal. Date :	28 October 2024	Serial No.	201-5
Reference Standard Gas			
Standard Gas :	Carbon Monoxide (CO)	Cylinder No.	DT11839
Certified Date :	14 March 2024	Expired Date :	14 March 2032
		Cylinder Conc.	4,580 ppm
Calibrating Condition			
Pressure	1011 mmbar	Temp.	24.6 °C
		% RH	50
Calibration Setting			
Span	Initial Reading (Before Adj.), PPM		Final Reading (After Adj.), PPM
Set Point	Expected Concentration	Analyzer Response	%Df
Zero	0	-0.10	-
CO Span	40.00	40.03	0.075
API Model 300E CO Analyzer Check List			
Parameter	Observed Value	Units	Nominal Range
Range	50	PPM	0-1000 ppm
Stability	0.10	PPM	< 1 ppm With Zero Air
CO Measure	4015.7	mV	2500-4800 mV
CO Reference	3947.9	mV	2500-4800 mV
Measure/Reference Ratio	1.180	-	1.1-1.3 W/Zero Air
Sample Pressure	28.6	In-Hg-A	~2" < Ambient Absolute Pressure
Sample Flow	808	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	3037.5	mV	250 mV to 4750 mV
Slope	1.017	-	1.0 ± 0.3
Offset	0.2	-	0 ± 0.3

Calibrated by :

Approved by :



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

Calibration Report			
Total Hydrocarbon Analyzer			
Date :	01 October 2025	Brand :	HORIBA
No.	B01	Model :	APHA-360CE
		Serial No.	4211954001
Calibrator (Dilution System)			
Brand :	Teledyne	Model :	700
Last Cal. Date :	29 October 2024	Serial No.	421
Reference Standard Gas			
Standard Gas :	Methane (CH ₄)	Cylinder No.	D612165
Certified Date :	25 February 2023	Expired Date :	25 February 2031
		Cylinder Conc.	453 ppm
Calibrating Condition			
Pressure	1011 mmbar	Temp.	24.6 °C
		% RH	50
		Start Time :	1000 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	10.05	10
Calibration Setting (Final)			
Span Instrument Gain:	0.995	Finish Time:	11:00 AM
APHA-360 Total Hydrocarbon Analyzer			
Test Values	Observed Value	Units	Nominal Range
Signal (CH ₄)	912.1	mV	800-1,350
Signal (THC)	917.3	mV	800-1,350
Detector	78.2	kPa	(IPressure Air/1013h100)-20 ± 4 kPa
Purifier	19.0	kPa	8 - 25
NMC	259.4	°C	260 ± 10
Bypass	0.9	L / min	0.9 ± 0.3
Over Flow	0.8	L / Min	0.8

Calibrated by :

Approved by :



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอย พหลโยธิน 24, พหลโยธิน Rd., Jungtze, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sales@spscn.com, www.spscn.com

Calibration Report			
Total Hydrocarbon Analyzer			
Date :	01 October 2025	Brand :	HORIBA
		Model :	APHA-370
No.	R01	Serial No.	WDDCN38N
Calibrator (Dilution System)			
Brand :	Teledyne	Model :	700
Last Cal. Date :	29 October 2024	Serial No.	421
Reference Standard Gas			
Standard Gas :	Methane (CH ₄)	Cylinder No. :	D612165
Certified Date :	25 February 2023	Expired Date :	25 February 2031
		Cylinder Conc. :	453 ppm
Calibrating Condition			
Pressure	1011 mmbar	Temp.	24.6 °C
		% RH	50
		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 (Befored Adj)		Final Reading (After Adj)
	Expected Concentration (PPM)	Analyzer Response (PPM)	Analyzer Response (PPM)
Zero	0	0.10	0
Span	10	10.04	10
Calibration Setting (Final)			
Span Instrument Gain:	0.996	Finish Time:	10:00 AM
APHA-360 Total Hydrocarbon Analyzer			
Test Values	Observed Value	Units	Nominal Range
Signal (CH ₄)	911.4	mV	800-1,350
Signal (THC)	916.2	mV	800-1,350
Detector	78.0	kPa	(Pressure Air/101.3)(100)± 4 kPa
Purifier	19.1	kPa	8 ± 25
NMC	258.6	°C	260 ± 10
Bypass	0.9	L / min	0.9 ± 0.3
Over Flow	0.8	L / Min	0.8

Calibrated by :



Approved by :



ภาคผนวก ฉ-2

เอกสารสอบเทียบความถูกต้องของเครื่องมือตรวจวัดระดับเสียง



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0220

MTC No. EEL. BP. 44/0268

CALIBRATION CERTIFICATE

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

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

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Calibrator

Manufacturer : ACO

Model : 2127

Serial No. : 130006

Ambient Environment

Temperature : (23 ± 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 Panasonic VP-7722A S/N 041477D122.

7. Condenser Microphone B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 19 Feb. 2025

Date of Calibration : 21 Feb. 2025

1/2

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

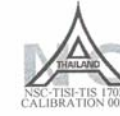
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BL.MTC.002 Rev.5

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

Office/Laboratory
668 Mu 2 Tambon Bangpoomai, Amphoe Muang Samutprakan,
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9440
E-mail : mtc@tistr.or.th Website : www.tistr.or.th

Office
196 Phahonyothin Road, Ladyao, Chatuchak,
Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
(66) 08 1889 6827



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0220

MTC No. EEL. BP. 44/0268

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 94 dB re 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	93.81	-0.19	± 0.10	±0.40 dB

2. Frequency

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

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	0.95	± 0.50	±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 : 21 Feb. 2025

Date of Issue : 24 Feb. 2025

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Ref : 2011268021900739001

End of Certificate

2 / 2

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

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FM.BL.MTC.002 Rev.5

Head Office
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Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9440
E-mail : mtc@tistr.or.th Website : www.tistr.or.th

Office
196 Phahonyothin Road, Ladyao, Chatuchak,
Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
(66) 08 1889 6827

Noise B_467/25

Sound Level Meter Calibration Report

Acoustic Calibrator Data

Brand	ACO	Number	AC 03/56
Model	2127	Serial No.	130006
Calibration Range	94 dB, 1000 Hz	Last Calibration	21 February 2025
		Due Date	21 February 2026

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-B27	ACO	6236	00182008	30 September 2025	93.7	93.9
ACO-B28	ACO	6236	00182009	30 September 2025	93.7	93.9
ACO-B29	ACO	6236	00182011	30 September 2025	93.9	93.9
ACO-R03	ACO	6236	00142023	30 September 2025	93.9	93.9
ACO-R19	ACO	6236	00182001	30 September 2025	93.8	93.9
ACO-R47	ACO	6236	00192059	30 September 2025	93.9	93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.81 ± 0.10 dB	

Calibrated by :

Approved by :

Noise B_476/25

Sound Level Meter Calibration Report

Acoustic Calibrator Data

Brand	ACO	Number	AC 03/56
Model	2127	Serial No.	130006
Calibration Range	94 dB, 1000 Hz	Last Calibration	21 February 2025
		Due Date	21 February 2026

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-B05	ACO	6236	00222311	08 October 2025	93.9	93.9
ACO-B09	ACO	6236	00152004	08 October 2025	93.8	93.9
ACO-B27	ACO	6236	00182008	08 October 2025	93.8	93.9
ACO-B28	ACO	6236	00182009	08 October 2025	93.9	93.9
ACO-B38	ACO	6236	00192029	08 October 2025	93.7	93.9
ACO-B45	ACO	6236	00222304	08 October 2025	93.7	93.9
ACO-B46	ACO	6236	00222305	08 October 2025	93.9	93.9
ACO-R03	ACO	6236	00142023	08 October 2025	93.9	93.9
ACO-R07	ACO	6236	00172033	08 October 2025	93.9	93.9
ACO-R09	ACO	6236	00172035	08 October 2025	93.7	93.9
ACO-R10	ACO	6236	00172037	08 October 2025	93.9	93.9
ACO-R11	ACO	6236	00192048	08 October 2025	93.9	93.9
ACO-R29	ACO	6236	00192041	08 October 2025	93.9	93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.81 ± 0.10 dB	

Calibrated by :

Approved by :

ภาคผนวก ฉ-3

เอกสารสอบเทียบความถูกต้องของเครื่องมือวิเคราะห์คุณภาพน้ำ

Certificate of Calibration

Certificate No. : 67-400463-1

Page : 1 of 2

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

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

Equipment : Liquid in Glass Thermometer

Manufacturer : Brannan

Model : N/A

Range : -10 °C to 110 °C

Resolution : 0.5 °C

Serial No. : N/A

Immersion : Partial

ID No. : 61-400580-1

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

Relative Humidity : (50 ± 15) %

Line Voltage : (220 ± 22) VAC

Date of Received : 25 July 2024

Date of Calibration : 27 July to 30 July 2024

Date of Issue : 30 July 2024

Calibrated by : Chortip Samchusri

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

The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
400001	TT-0023-24	16 Feb 2026	National Institute of Metrology Thailand (NIMT)
400016	TT-0053-23	15 May 2025	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

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

Approved by

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-400463-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Ice point check : UUC* reading 0 °C Standard reading -0.3431 °C

Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)	Temp. of Emergent Column (°C)
9.7062	10.0	-0.29	0.17	22
19.6112	20.0	-0.39	0.17	23
29.4069	30.0	-0.59	0.17	23
39.3260	40.0	-0.67	0.17	23
49.4304	50.0	-0.57	0.17	24

Remark

UUC : Unit Under Calibration

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

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



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Certificate of Calibration

Cert.No.: 25CH217
Page.: 1 of 3

Equipment : Turbidity Meter
Manufacturer : Eutech
Model : CyberScan WLTB1000
Serial No. : 201802206
ID. No. : TB 02/50
Condition As-Received: Used Item
Received Date : 17 February 2025
Calibration Date : 18 February 2025
Reference : 2502-0500WN-1
Submitted by : S.P.S. Consulting Service Co.,Ltd.
7 Phaholyothin 24, Phaholyothin Road.,
Jompol, Chatuchak, Bangkok 10900
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 20) %
Calibration Procedure : In - house method : CP-CH11
Direct measurement by
using Formazin standard solution
Calibrated by : 
Approved by : 
() Chakrit Waewwanjua
() Ponpan Paipim
(✓) Saithip Meangmai
Issue Date : 21 February 2025

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Calibration and Testing Equipment Services.



Cert.No. : 25CH217
Page. : 2 of 3

Condition of this calibration result

1. Reference Standard Instruments :

Instruments	Serial No.	ID No.	Certificate No.	Due date
1) Thermo-Hygrograph	1103328	130EC010	24H1372	12 July 2025
2) Electronic Balance	14233821	110RC001	24MM131	04 July 2025

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

2. Standard Material : The Formazin suspension has been prepared gravimetric from

Material	Manufacturer	Lot No.	Assay
1) Hexamethylenetetramine	HIMEDIA	0000493947	99.65%
2) Hydrazinium Sulfate	HIMEDIA	0000522014	99.40%

3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration result

Performing three - Formazin suspension standard curve by using 0,10,1000 NTU
Turbidity Meter Serial Number : 201802206

Standard Formazine suspension (NTU)	UUC* Reading (NTU)	Error (NTU)	Uncertainty of Measurement (± NTU)	Coverage Factor k	Tolerance Limit (± NTU)	Judgement
20	19.4	-0.6	0.38	2.00	2.0	Pass
40	39.9	-0.1	0.40	2.00	2.0	Pass
100	98.9	-1.1	0.70	2.00	2.0	Pass
400	391	-9	1.5	2.05	20.0	Pass

Remark - UUC* = Unit Under Calibration
- NTU = Nephelometric Turbidity Units

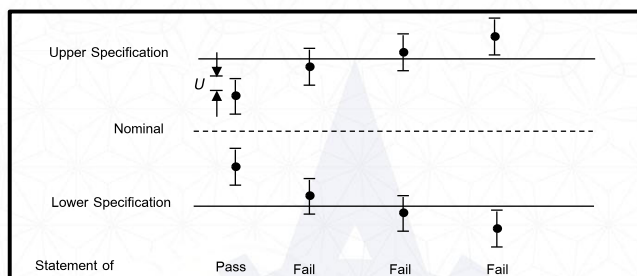


Cert.No. : 25CH217
Page. : 3 of 3

Decision Rule : The decision rule is prescribed by customer (Error \pm Uncertainty < Specification)

Statement of conformity are reported as :

- Pass - the measured value included the measurement uncertainty is below the acceptance limit.
- Fail - the measured value included the measurement uncertainty is above the acceptance limit.



U=95% expanded measurement uncertainty

Tolerance Limit (Specification Limit) provided by customer

Tolerance Limit (TL) (Specification Limit) : specified upper or lower bound of permissible values of property.

Acceptance Limit (AL) : specified upper or lower bound of permissible measured quantity values.

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

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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 : HANNA
MODEL / TYPE : HI3512/HI1332/HI7662-T
SERIAL NO. : 08685754/11250B7M/092806BN[PH04/56]
CLID. NO. : 272501562
JOB CONTROL NO. : 250617070523
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

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

DATE OF RECEIVED : 17 June 2025

DATE OF ISSUED : 20 June 2025

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

Calibrated By :



Approved By :

Authorized Signatory
20 June 2025



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. Q25070523

F3-011-05/12-23

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@clccalibration



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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 : HANNA
MODEL / TYPE : HI3512/HI1332/HI7662-T
SERIAL NO. : 08685754/11250B7M/092806BN[PH04/56]
DATE OF CALIBRATION : 18 June 2025

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 [pH Meter]. The calibration was performed by direct measurement with Certified Reference Material (CRM).

This instrument was calibrated under procedure No. CLC-CPH-04 [Temperature] based on ASTM E 644-04 as calibration guidelines. The calibration was performed by using 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 06664260,11754256, Lot Number CC787362.
3. Calibration Bath, Kambic Model OB-22/2 ULT S/N. 17115653.
4. Precision Thermometer, ASL Model F250 S/N. 1334023800.
5. IPRT, Wika Model CTP5000-250-D S/N. PO00043543-1-10-1.

Certificate No. Q25070523

F3-011-05/12-23

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@clccalibration



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TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).
Lot Number. 080124, 120124. Due Date 23 January 2026.
2. The measurements are traceable to International System of Units (SI), through Control Company.
Certificate No. 4281-14495731, Due Date 27 September 2025.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No. Q24120999, Due Date 26 November 2025.
4. The measurements are traceable to International System of Units (SI), through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 1042/67, Due Date 16 October 2025.
5. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).
Certificate No. TT-0146-24, Due Date 28 October 2025.

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:2022)"

Certificate No. Q25070523

F3-011-05/12-23

page 3 of 4



@clccalibration



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CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

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

CALIBRATION DATA

1. pH METER RESULT @ 25 °C

Standard pH Buffer Solution (pH)	pH Meter Reading (pH)	pH Meter Reading (mV)	Correction (pH)	Uncertainty of pH Measurement (\pm pH)	k Factor
4.003	4.005	168.2	-0.002	0.010	2,00
7.005	7.010	-8.1	-0.005	0.013	2,00
10.015	10.010	-177.7	+0.005	0.014	2,00

Technical Note. Setting function CAL 3 point (4,7,10).

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 4 of 68

2. TEMPERATURE RESULT

Immersion depth (mm)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty \pm (°C)
100	25.00	25.0	0.00	0.07

Technical Note. Type of sensor : Thermistor

Probe \varnothing 3 mm

Materials : Metal Sheath.

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

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 56 of 68

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

End of Certificate

Certificate No. Q25070523

F3-011-05/12-23

page 4 of 4



@clccalibration



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CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : CONDUCTIVITY METER
 MANUFACTURER : METTLER TOLEDO
 MODEL / TYPE : SEVEN COMPACT S230
 SERIAL NO. : C141708983/5821320179[CD 05/65]
 CLID. NO. : 272300452
 JOB CONTROL NO. : 250204013412
 CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

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

DATE OF RECEIVED : 04 February 2025

DATE OF ISSUED : 06 February 2025

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

Calibrated By :



Authorized Signatory

06 February 2025

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. Q25013412

F3-011-05/12-23

page 1 of 4



@clccalibration



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



REPORT OF CALIBRATION

FOR

NOMENCLATURE : CONDUCTIVITY METER
MANUFACTURER : METTLER TOLEDO
MODEL / TYPE : SEVEN COMPACT S230
SERIAL NO. : C141708983/5821320179[CD 05/65]
DATE OF CALIBRATION : 05 February 2025

ENVIRONMENT CONDITIONS :

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

PROCEDURE USED :

This instrument [Conductivity Meter] was calibrated under procedure No. **WI-305-130**.

The calibration was performed by direct measurement with Certified Reference Material (CRM) and Reference Material (RM) .

This instrument [Temperature] was calibrated by comparison with Calibration Bath, Precision Thermometer and IPRT
which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Conductivity Solution , Hanna Product Code HI 7033L Lot Number 7830.
2. Potassium Chloride Solution (nominal 1.41 mS/cm)
3. Potassium Chloride Solution (nominal 12.8 mS/cm)
4. Calibration Bath, Kambic Model OB-22/2 ULT S/N. 17115653.
5. Precision Thermometer, ASL Model F201 S/N. 016168/09.
6. IPRT, ASL Model T100-250-1D S/N. PO106346-1-13.

Certificate No. Q25013412

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TRACEABILITY :

1. The measurements are traceable to International System of Units (SI) , through Hanna instruments.
Certificate No. 20F21 , Due Date June 2025 .
2. The measurements are traceable to International System of Units (SI) , through Sigma-Aldrich Canada Co.
Certificate No. HC30595403 , Due Date 31 January 2026 .
3. The measurements are traceable to International System of Units (SI) , through Sigma-Aldrich Canada Co.
Certificate No. HC20111554 , Due Date 30 September 2025.
4. The measurements are traceable to International System of Units (SI) , through Calibration Laboratory Co , Ltd.
Certificate No. Q24120999, Due Date 26 November 2025.
5. The measurements are traceable to International System of Units (SI) , through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 0424/67, Due Date 21 February 2025.
6. The measurements are traceable to International System of Units (SI) , through National Institute of Metrology (Thailand).
Certificate No. TT-0035-24, Due Date 01 March 2025.

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:2022)"

Certificate No. Q25013412

F3-011-05/12-23

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CALIBRATION LABORATORY Co.,LTD.

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



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of Conductivity Meter.

CALIBRATION DATA

1. Conductivity Solution Test @ 25°C

Standard Conductivity Solution	DUC Reading	Uncertainty of Measurement	k Factor
*84.00 µS/cm	84.02 µS/cm [Cell Constant 0.548589]	± 1.00 µS/cm	2,00
1414.0 µS/cm	1414 µS/cm [Cell Constant 0.548589]	± 21.0 µS/cm	2,00
12.83 mS/cm	12.84 mS/cm [Cell Constant 0.548589]	± 0.19 mS/cm	2,00

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 91 of 138

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

*2. TEMPERATURE RESULT

Immersion depth (mm)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty ± (°C)
100	25.01	24.9	+0.11	0.07

Technical Note. Type of sensor : Conductivity Probe

Probe Ø 12 mm

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

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

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

End of Certificate

Certificate No. Q25013412

F3-011-05/12-23

page 4 of 4



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



PAGE : 1 OF 2

CERTIFICATE No : 25M2256
REFERENCE No : 76365-3

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : SARTORIUS
MODEL : BSA224S-CW
SERIAL No : 36591843
ID No : BA09/61
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : ATSAWIN Y.
CALIBRATION DATE : 07-Mar-25

APPROVED BY :
ISSUED DATE : 13-Mar-25
RECEIVED DATE : 07-Mar-25

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



F-G010 REV 03



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CERTIFICATE No : 25M2256

PAGE : 2 OF 2

Calibration Report

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

CONDITION OF THIS RESULTS OF CALIBRATION

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

2. REFERENCE STANDARD INSTRUMENTS :-

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

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

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

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

- NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 200 g WAS 0.000071 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

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

5. OFF CENTER LOADING ERROR



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

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

END OF CALIBRATION REPORT



บริษัท ไทยยูนิค จำกัด

THAI UNIQUE CO., LTD.

80-82 ถนนประชาธิปไตย แขวงบางขุนพรหม เขตพระนคร กรุงเทพฯ 10200

80-82 Prachathipatai Rd., Bangkhunphrom, Pranakorn, Bangkok 10200

Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawatt@thaiunique.com, Website : www.thaiunique.com

GAS CHROMATOGRAPH TEST CERTIFICATION

Certificate No. : SV0825/23032

Instrument Type : Gas Chromatography

Model : 3800

Serial Number : 00734

Organization : S.P.S. Consulting Service Co., Ltd.

Address : 7 Phahonyothin Soi 24 Phahonyothin Rd. Ladyao Chatuchak Bangkok 10900

Date : 02/08/2025

ELECTRONIC TEST

CPU	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
DISPLAY & LED TEST	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
VENT TEST	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
KEY ECHO TEST	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
DESTRUCTION RAM TEST	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RUN CHROMATOGRAM TEST

DETECTOR : Flame Ionization Detectors (FID Channel-Front)

INJECTOR : 1079 Injector

GC CONDITION:

Column	80 °C hold 1 min., rate 20 °C/min. to 200 °C hold 1min.
Injector	220 °C
Detector	300 °C
Column flow	5 mL/min
Makeup flow	25 mL/min
Air flow	300 mL/min
Hydrogen flow	30 mL/min

Column:Capillary Column CP sil 5 CB 0.25 ID x 15 M

Sample: 1 μ L Injection FID Test Sample 0.218g/L C14,C15,C16 in hexane (diluted to 30ppm)

SENSITIVITY TEST: C15. (Area count) = 515,940 Counts.



VARIAN

1/2

SERVICE DEPARTMENT

FR-SV-029 Rev. 04



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80-82 Prachathipatai Rd., Bangkhunphrom, Pranakorn, Bangkok 10200

Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawatt@thaiunique.com, Website : www.thaiunique.com

Detector Sensitivity (FID)

Detector Response	Result	Specification
Baseline Noise (μ V)	2.40	≤ 50
Baseline Drift (%)	0.18	≤ 1
Sensitivity (S/N for C15)	19,716	$\geq 1,024$

Temperature Specification

Temperature	Set	Result	Specification
Column Oven ($^{\circ}$ C)	80	79	± 5
Injector ($^{\circ}$ C)	220	218	± 5
Detector ($^{\circ}$ C)	300	298	± 5
Incubator ($^{\circ}$ C)	60	N/A	± 5

Relative Standard Deviation % (%RSD)

Checkout Procedure	Result	Specification
Area C15 (%)	1.48	≤ 5
Retention Time C15 (%)	0.08	≤ 0.5

APPRO

Signature

Engineer

Date : 02/08/2025



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THAI UNIQUE CO., LTD.

80-82 ถนนประชาธิปไตย แขวงบางขุนพรหม เขตพระนคร กรุงเทพฯ 10200

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Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawatt@thaiunique.com, Website : www.thaiunique.com

Results Integrated System Testing

Checkout Procedure	FID
Detector Position	Front
Inlet Type	1079 Injector
C15 Area 1	506,043
C15 Area 2	520,497
C15 Area 3	522,154
C15 Area 4	521,664
C15 Area 5	509,340
C15 Area Average	515,940
* % RSD (< 5 %)	1.48

* The precision specification should be less than 2.0 % RSD ** (Relative Standard Deviation) for an Auto sampler injection and less than 5 % for Manual injections. To calculate the %RSD, select the C15 peak area for each of the five (5) samples.

** (Relative Standard Deviation is determined by dividing the standard deviation by the average and multiplying by 100.)

$$\% \text{ RSD} = (\text{std.dev} / \text{avg}) * 100$$

Compliance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
Performance by		
Date	02/08/2025	



Comments			
Reviewed by		Date	02/08/2025



VARIAN

2/2

SERVICE DEPARTMENT

FR-SV-029 Rev. 04



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1/1

SERVICE DEPARTMENT



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80-82 ถนนประชาธิปไตย แขวงบางขุนพรหม เขตพระนคร กรุงเทพฯ 10200
80-82 Prachathipatai Rd., Bangkhunphrom, Pranakorn, Bangkok 10200
Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawatt@thaiunique.com, Website : www.thaiunique.com

Results Integrated System Testing

Checkout Procedure	FID
Detector Position	Front
Inlet Type	1079 Injector
C15 RT 1	3.874
C15 RT 2	3.880
C15 RT 3	3.875
C15 RT 4	3.872
C15 RT 5	3.878
C15 RT Average	3.876
* % RSD (< 0.5 %)	0.08

* The precision specification should be less than 0.5 % RSD ** (Relative Standard Deviation) for an Auto sampler injection and less than 0.5 % for Manual injections. To calculate the %RSD, select the RT C15 peak for each of the five (5) samples.

** (Relative Standard Deviation is determined by dividing the standard deviation by the average and multiplying by 100.)

$$\% \text{ RSD} = (\text{std.dev} / \text{avg}) * 100$$

Compliance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
Performance by		
Date	02/08/2025	



Comments			
Reviewed by		Date	02/08/2025

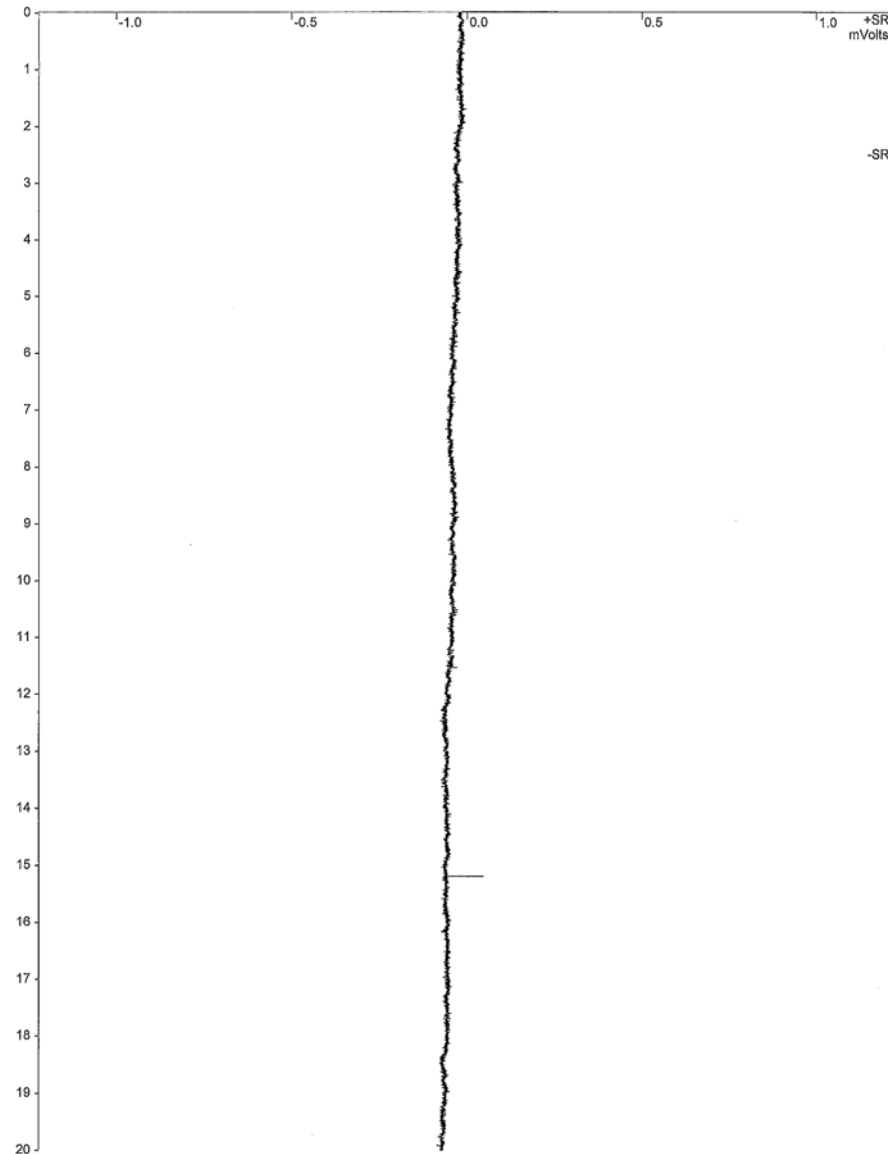
Title :
Run File : e:\sps2025\blk001.run
Method File : c:\star\data\tu\2025\cal fid.mth
Sample ID : blk

Injection Date: 2/8/2568 12:01 Calculation Date: 2/8/2568 12:33

Operator : watsamon Detector Type: 3800 (10 Volts)
Workstation: GC-LAB Bus Address : 44
Instrument : Sample Rate : 10.00 Hz
Channel : Front = FID Run Time : 20.005 min

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

Chart Speed = 1.13 cm/min Attenuation = 1 Zero Offset = 50%
Start Time = 0.000 min End Time = 20.005 min Min / Tick = 1.00



Title :
Run File : e:\sps2025\blk001.run
Method File : c:\star\data\tu\2025\cal fid.mth
Sample ID : blk

Injection Date: 2/8/2568 12:01 Calculation Date: 2/8/2568 12:33

Operator : watsamon Detector Type: 3800 (10 Volts)
Workstation: GC-LAB Bus Address : 44
Instrument : Sample Rate : 10.00 Hz
Channel : Front = FID Run Time : 20.005 min

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

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

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

Total Unidentified Counts : 0 counts

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

Multiplier: 1 Divisor: 1 Unidentified Peak Factor: 0

Baseline Offset: -14 microVolts LSB: 1 microVolts

Noise (used): 24 microVolts - monitored before this run

Manual injection

Data Handling: No peaks

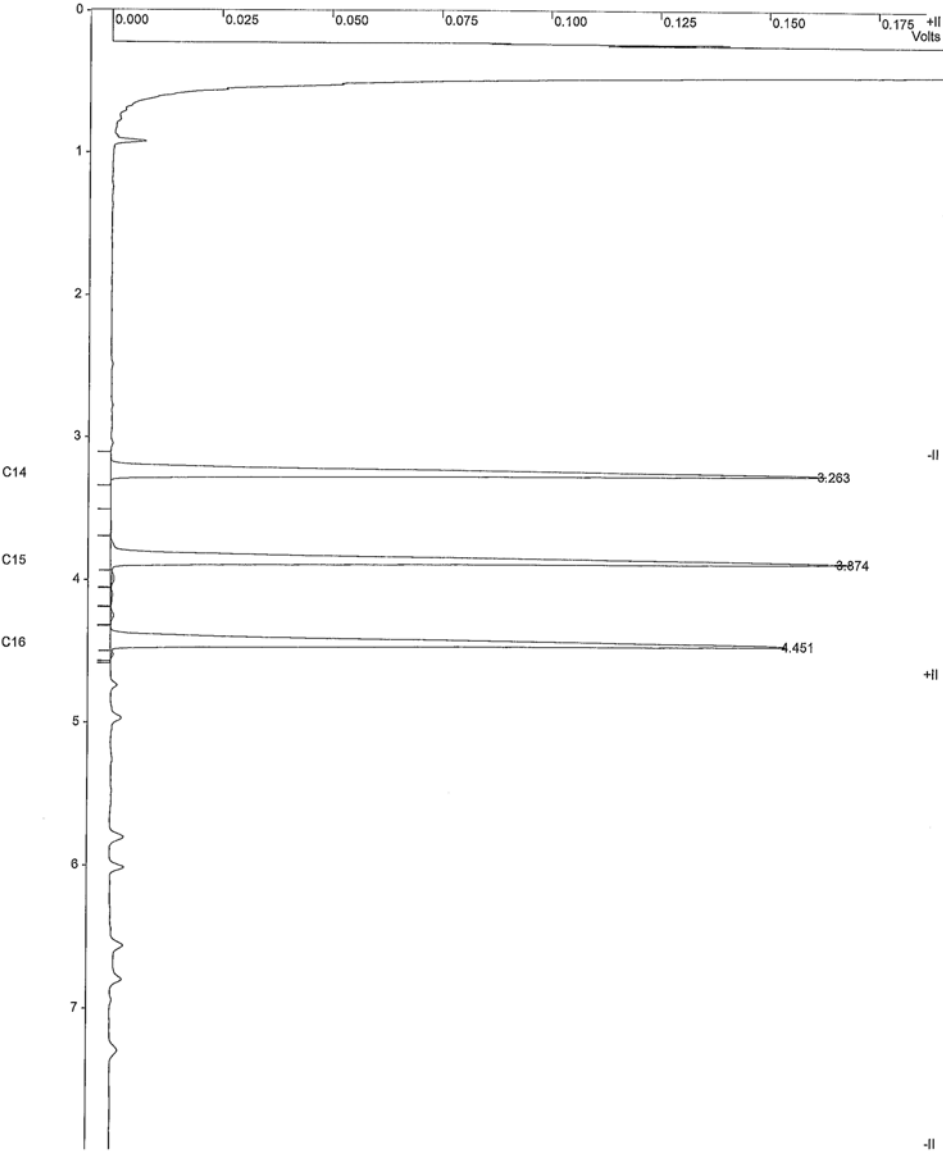
Title :
Run File : e:\sps2025\fidstd001.run
Method File : c:\star\data\tu\2025\cal fid.mth
Sample ID : fidstd

Injection Date: 2/8/2568 12:34 Calculation Date: 2/8/2568 13:26

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

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

Chart Speed = 2.83 cm/min Attenuation = 79 Zero Offset = 2%
Start Time = 0.000 min End Time = 7.993 min Min / Tick = 1.00



Title :
Run File : e:\sps2025\fidstd001.run
Method File : c:\star\data\tu\2025\cal fid.mth
Sample ID : fidstd

Injection Date: 2/8/2568 12:34 Calculation Date: 2/8/2568 13:26

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

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

Run Mode : Calibration
Peak Measurement: Peak Area
Calculation Type: External Standard
Level : 1

Peak No.	Peak Name	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	C14	3.263	0.002	458627	BB	2.7	
2	C15	3.874	0.002	506043	VV	2.8	
3	C16	4.451	0.001	460610	VB	2.8	
Totals:		0.005		1425280			

Total Unidentified Counts : 0 counts

Detected Peaks: 8 Rejected Peaks: 5 Identified Peaks: 3

Multiplier: N/A Divisor: N/A Unidentified Peak Factor: 0

Baseline Offset: 6 microVolts LSB: 1 microVolts

Noise (used): 2 microVolts - monitored before this run

Manual injection

S.P.S Consulting Service Co.,Ltd.

Sample ID: fid std



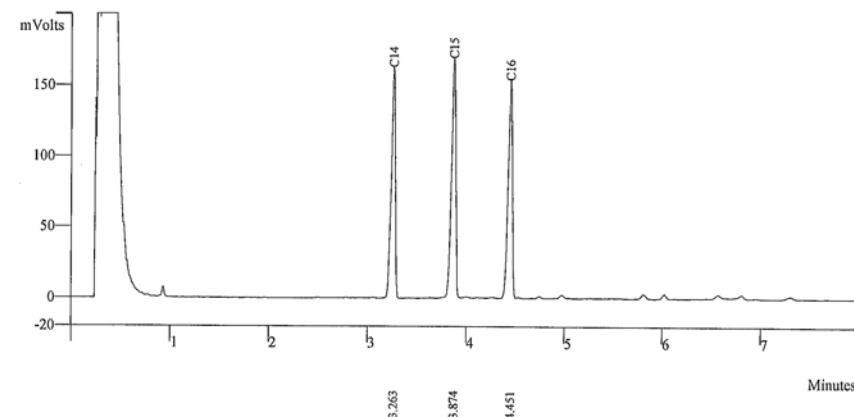
VARIAN

Operator (Inj):
Injection Date: 02/08/2025
Calc Date: 02/08/2025
Run Time (min): 7.993
Workstation: GC-LAB
Instrument (Ini):

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

c:\sps2025\fidstd001.run

A = FID 10 V RESULTS



Peak No	Peak Name	Result ()	Ret Time (min)	Peak Area (counts)	Sep. Code	Width 1/2 (sec)
1	C14	0.0000	3.263	458627	BB	2.7
2	C15	0.0000	3.874	506043	VV	2.8
3	C16	0.0000	4.451	460610	VB	2.8
Totals		0.0000		1425280		



THAI UNIQUE CO.,LTD.

Sample ID: fid std

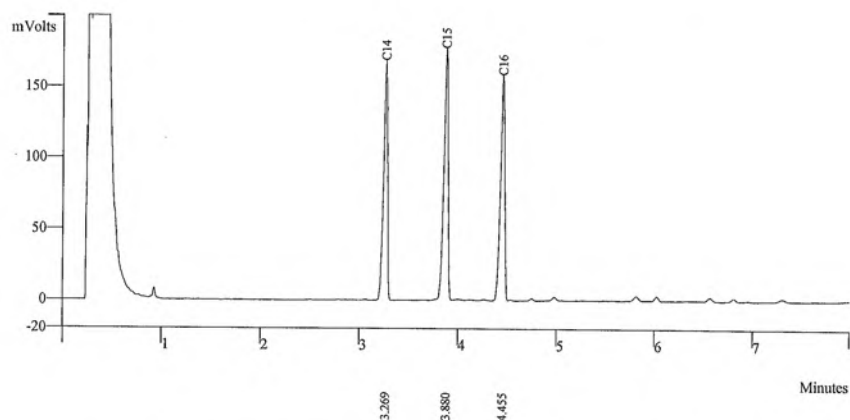
Operator (Inj):
Injection Date: 02/08/2025
Calc Date: 02/08/2025
Run Time (min): 7.993
Workstation: GC-LAB
Instrument (Inj):

**VARIAN**

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

e:\sps2025\fidstd002.run

A = FID 10 V RESULTS



Peak No	Peak Name	Result ()	Ret Time (min)	Peak Area (counts)	Sep. Code	Width 1/2 (sec)
1	C14	0.0000	3.269	472338	BB	2.6
2	C15	0.0000	3.880	520497	VV	2.7
3	C16	0.0000	4.455	471916	VB	2.8
Totals		0.0000		1464751		

Sample ID: fid std

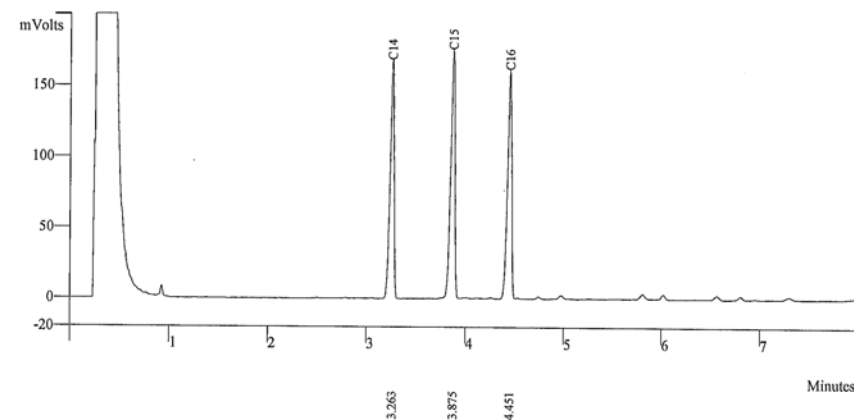
Operator (Inj):
Injection Date: 02/08/2025
Calc Date: 02/08/2025
Run Time (min): 7.993
Workstation: GC-LAB
Instrument (Inj):

**VARIAN**

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

e:\sps2025\fidstd003.run

A = FID 10 V RESULTS



Peak No	Peak Name	Result ()	Ret Time (min)	Peak Area (counts)	Sep. Code	Width 1/2 (sec)
1	C14	0.0000	3.263	469265	BB	2.6
2	C15	0.0000	3.875	522154	VV	2.8
3	C16	0.0000	4.451	478526	VB	2.8
Totals		0.0000		1469945		



Sample ID: **fid std**

Operator (Inj):

Injection Date: 02/08/2025

Calc Date: 02/08/2025

Run Time (min): 7.993

Workstation: GC-LAB

Instrument (Inj):

**VARIAN**

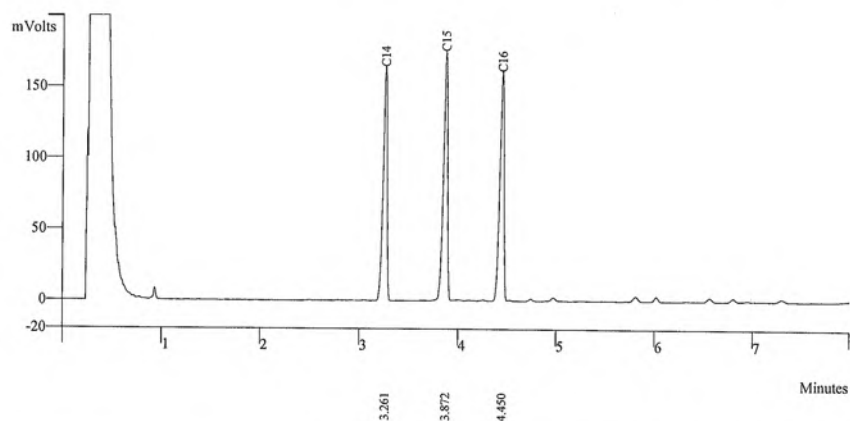
Run Mode: Calibration

Peak Measurement: Peak Area

Calculation Type: External Std.

e:\sps2025\fidstd004.run

A = FID 10 V RESULTS



Peak No	Peak Name	Result ()	Ret Time (min)	Peak Area (counts)	Sep. Code	Width 1/2 (sec)
1	C14	0.0000	3.261	468907	BB	2.7
2	C15	0.0000	3.872	521664	VV	2.8
3	C16	0.0000	4.450	478772	VB	2.8
Totals		0.0000		1469343		

Sample ID: **fid std**

Operator (Inj):

Injection Date: 02/08/2025

Calc Date: 02/08/2025

Run Time (min): 7.993

Workstation: GC-LAB

Instrument (Inj):

**VARIAN**

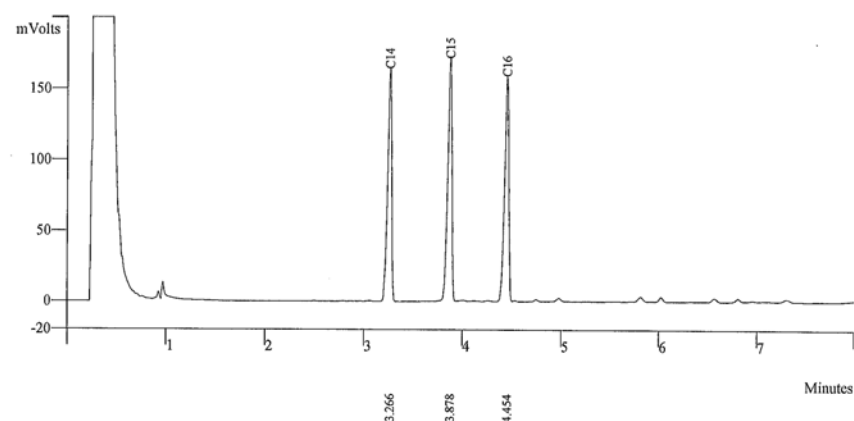
Run Mode: Calibration

Peak Measurement: Peak Area

Calculation Type: External Std.

e:\sps2025\fidstd005.run

A = FID 10 V RESULTS



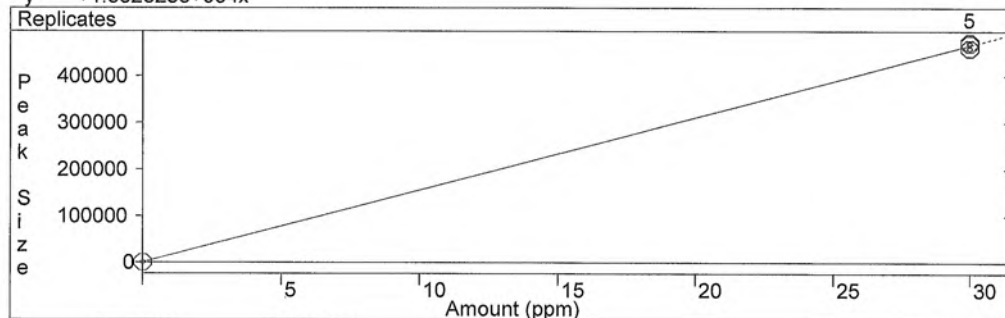
Peak No	Peak Name	Result ()	Ret Time (min)	Peak Area (counts)	Sep. Code	Width 1/2 (sec)
1	C14	0.0000	3.266	459351	BB	2.6
2	C15	0.0000	3.878	509340	VV	2.8
3	C16	0.0000	4.454	468353	VB	2.8
Totals		0.0000		1437044		



C14

External Standard Analysis
 Curve Type: Linear
 Origin: Force
 $y = +1.552325e+004x$

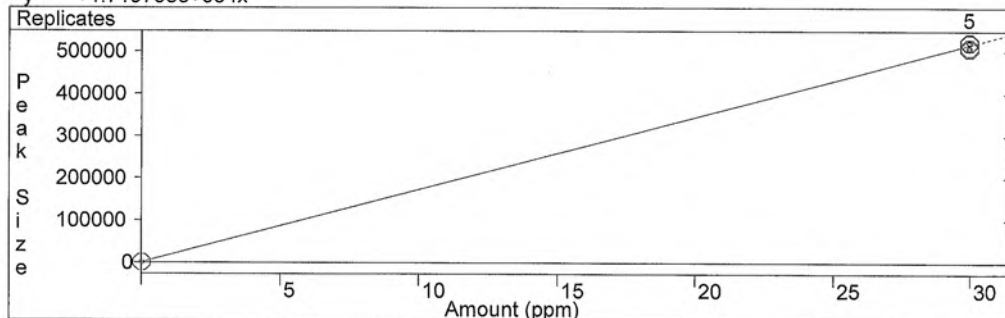
Resp. Fact. RSD: 1.347%
 Coeff. Det.(r^2): 0.999130



C15

External Standard Analysis
 Curve Type: Linear
 Origin: Force
 $y = +1.719798e+004x$

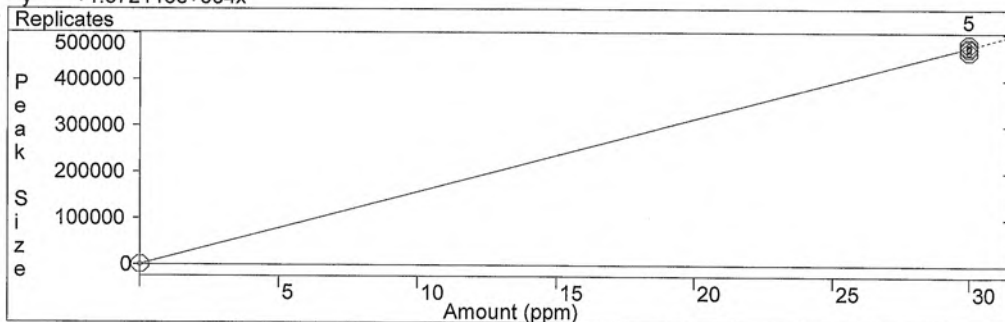
Resp. Fact. RSD: 1.481%
 Coeff. Det.(r^2): 0.998948



C16

External Standard Analysis
 Curve Type: Linear
 Origin: Force
 $y = +1.572118e+004x$

Resp. Fact. RSD: 1.611%
 Coeff. Det.(r^2): 0.998756



CERTIFICATE

This is to certify, that

Somchai Pohthongkham

has participated the course

Basic GC and Sampler training

Date: **24 – 27 May 2004**

Location: **Middelburg**

Instructor:

Signature instructor:



Varian Analytical Instruments
 Varian Chrompack International BV
 Herculesweg 8
 P.O. Box 8033
 4330 EA Middelburg
 The Netherlands
 Tel.: +31 118 671000
 Fax: +31 118 633118
 www.varianinc.com



WK Electric Co.,Ltd.

68/242 Moo 5, Sawaipracharaj Rd., Tumbol Ladsawai, Amphur Lamlukka, Pathumthani 12150

Tel. +66 2993 4773, +66 2153 7132-3 Fax. +66 2994 5509 E-mail : wk.calibrations@gmail.com www.wk-etc.com



Certificate of Calibration

Certificate No.: WK2412-053-1

Page 1 of 2

Customer : THAI UNIQUE CO., LTD.
80-82 Prachathipatai Rd., Bangkhunphrom,
Pranakorn, Bangkok 10200

Instrument : AMD Flow Meter	Ambient Temperature : (23 ± 2) °C
Manufacturer : Agilent Technologies	Humidity : (50 ± 15) %RH
Model : G6691A	Received Date : 4-Dec-24
Serial No. : MY16470347	Calibrated Date : 11-Dec-24
Identity No. : SV-DF-001	Issued Date : 13-Dec-24
Range : 0 ml/min to 750 ml/min	Calibrated Location : In Lab
Resolution : See to Data	
Calibration Method : CP-WK-M10	

Reference standard instruments :

Instrument	Serial No.	Certificate No.	Due Date	Traceability to
Flow Calibrator	140215-134	L202304114-001	18-Apr-25	MIT
Primary Flow Calibrator	1107-S	WK2405-049-5	22-May-25	WK Electric Co.,Ltd.

MIT : Miracle International Technology Co.,Ltd.

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

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

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

Calibrated by :

Approved by :

Authorized Signatory

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



Measuretronix Limited

2425/2 Lat Phrao Road, Saphan Song
Wangthonglang, Bangkok 10310, Thailand

Phone : 0-2514-1000, 0-2514-1234

Fax : 0-2514-0001, 0-2514-0003

Website : www.measuretronix.com



Certificate of Calibration

Certificate Number : LF25-0305

Equipment : Thermometer

Manufacturer : Fluke

Model : 51

Serial Number : 5910857

Asset Number : 5910857

Customer : Thai Unique Co., Ltd.

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

Date of Calibrate : 6-Jun-2025

Date of Issue : 6-Jun-2025

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

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

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

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

Calibrated by

Approved by

Metrology Technician

Cal-Lab Manager

Certificate No. : LF25-0305

Model : 51

Serial No. : 5910857

Page 1 of 3



Agilent Technologies

Certificate of Analysis

FID-TCD Performance Evaluation Sample Kit

Agilent Part

Number: 5080-8842, 18710-60170

Sample Lot

Number: 0006750304

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

Concentrations:

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

Solvent: hexane

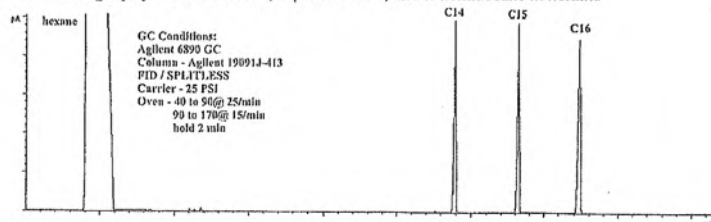
Calibrated Class A glassware and clean bottles were used in the manufacture of this standard. Balances used in the manufacture of this standard are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001.

Purities:

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

Typical Analytical Spectrum or Chromatography

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



Date of release: 30 June 2023

Date of expiration: 31 July 2025

QMS Representative



CERT.No.: HS-W015C

Harikul Science Co.,Ltd.

694 Soi Ratchadanivet 24, Pracharatbamphen,
Samsaennok, Huaikhwang, Bangkok 10310

Tel: 0-2274-2456 Fax: 0-2274-2443

Email: info@harikul.com www.harikul.com

Certificate of Calibration

Calibration Date : 18 Mar 25

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

7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol,

Chatuchak, Bangkok, Thailand 10900

Model : YSI 5000

S/N : 15B100751

Probe : YSI 5010

S/N : 22D100097

ID NO. : -

Air Temp ref : S/N. F8065C26

Barometric ref : S/N. F8065C26

Water Temp ref : -

ID NO. HS001

Technician : Kittipong M.

Calibration Details

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

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

Overall Status (PASS)

Manufacturer Specification

Accuracy = +/- 0.02 mg/l

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



QUALITY CALIBRATION CO., LTD.

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

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

www.qcalibration.com

CERTIFICATE No : 25T0520
REFERENCE No : 75853-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : COD REACTOR
MANUFACTURER : HACH
MODEL : DRB 200
SERIAL No : 15110C0497
ID No : DRB 05/59
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : CHAICHARN CH.
CALIBRATION DATE : 27-Jan-25

APPROVED BY :

ISSUED DATE : 27-Jan-25

RECEIVED DATE : 15-Jan-25

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



F-G010 REV : 03



QUALITY CALIBRATION CO., LTD.

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

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

CERTIFICATE No : 25T0520

PAGE : 2 OF 2

Calibration Report

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

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASUREMENT METHOD WITH CALIBRATED THERMOCOUPLE TYPE K UNDER NO LOAD CONDITION. THE THERMOCOUPLES WERE PLACED ON POINTS AND LOCATED AS THE PICTURE.
2. REFERENCE STANDARD INSTRUMENTS :-
INSTRUMENT MODEL SERIAL No CERTIFICATE No DUE DATE
1) DATA LOGGER WITH TC TYPE K HYDRA 2635A 6623300 24T0468 26-Jun-25
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

13	14	15
10	11	12
7	8	9
4	5	6
1	2	3
BLOCK No.1 FRONT		

13	14	15
10	11	12
7	8	9
4	5	6
1	2	3
BLOCK No.2 FRONT		

Block No.	1	2
Calibration Point (°C)	150	150
Controller temperature (°C)	144	144
Indicating Temperature	144	144
Measured Temperature (°C) at Spread Locations	1	150.01
	2	149.57
	3	150.69
	4	150.40
	5	150.22
	6	150.27
	7	150.51
	8	150.24
	9	150.20
	10	150.14
	11	149.70
	12	149.58
	13	149.46
	14	148.77
	15	148.99
Uncertainty of Measurement(± °C)		0.87

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER
NOTE 2 : LOCATION 10 WAS REFERENCE LOCATION.
NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.
THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MU
COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.
END OF CALIBRATION REPORT



F-G

Cert. No. : SP25026

Pages : 1 of 4

Calibration Certificate

Equipment : UV-VIS SPECTROPHOTOMETER
Manufacturer : PERKINELMER
Model : LAMBDA 25
Serial No.: 501S14123010
ID No.: SP03/58
Calibration Mode : WAVELENGTH ACCURACY
PHOTOMETRIC ACCURACY
STRAY LIGHT

Condition As Found : GOOD

Customer : S.P.S CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN ROAD,
CHOMPHON SUB-DISTRICT, CHATUCHAK DISTRICT,
BANGKOK PROVINCE 10900 THAILAND.

Location : ORGANIC LABORATORY IV

Ambient Temperature : (22.9 ± 5) °C

Relative Humidity : (53.7 ± 25) %

Received Date : 22 AUGUST 2025

Calibration Date : 22 AUGUST 2025

Date of Issue : 25 AUGUST 2025

Calibrated by :

Approved by :

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

Cert. No. : SP25026

Job No. : VC68SP0019

Pages : 2 of 4

Calibration Method :

This instrument was calibrated by using on-site calibration procedure In-house method : CP-SP-01

The calibration procedure to direct measurement wavelength accuracy by using wavelength standard solution, Photometric accuracy by using absorbance standard filter and absorbance standard solution

The calibration procedure used was based on ASTM E275-01, ASTM E925-02

Condition of this result of calibration :

1. Certified reference materials

Material	Ref. type	Cell serial No.	Cert. No.	Due Date
Holmium liquid	RM-HL	29706	126461	24/10/2026
Didymium liquid	RM-DL	28912	126462	24/10/2026
Neutral density filter	RM-1N2N3N	13877	126457	24/10/2026
Potassium dichromate solutions	RM-0204060810	14204	126497	25/10/2026
Potassium Iodide solution	-	KI-0701-001	CI-0185-24	14/05/2026

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

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

3.1 The UK National Physical Laboratory (NPL)

Result of calibration : Wavelength Accuracy

(Without adjustment)

Material	Certified Values of Reference Material (nm)	UUC* Reading (nm)	Error (nm)	Uncertainty ± (nm)	k Factor
RM-HL	278.13	278.21	0.08	0.16	2.00
	361.25	361.39	0.14	0.16	2.00
	467.82	467.71	-0.11	0.16	2.00
	536.56	536.50	-0.06	0.16	2.00
	640.50	640.36	-0.14	0.16	2.00
RM-DL	740.09	739.85	-0.24	0.16	2.00
	864.94	865.12	0.18	0.16	2.00

UUC* = Unit Under Calibration

Cert. No. : SP25026
Job No. : VC68SP0019
Pages : 3 of 4

Result of calibration : Photometric Accuracy

Material	Wavelength (nm)	Filter S/N	Nominal Absorbance (A)	Certified Absorbance (A)	UUC* Reading Absorbance (A)	Error (A)	Uncertainty ± (A)	k Factor
Neutral Density glass filter	440.0	29381	0.5	0.5443	0.5413	-0.0030	0.0043	2.00
		29914	0.7	0.7484	0.7455	-0.0029	0.0054	2.00
		29360	1.0	1.0527	1.0535	0.0008	0.0032	2.00
	465.0	29381	0.5	0.4948	0.4922	-0.0026	0.0041	2.00
		29914	0.7	0.6906	0.6877	-0.0029	0.0050	2.00
		29360	1.0	0.9695	0.9709	0.0014	0.0031	2.00
	546.1	29381	0.5	0.5090	0.5068	-0.0022	0.0036	2.00
		29914	0.7	0.6985	0.6960	-0.0025	0.0041	2.00
		29360	1.0	0.9814	0.9825	0.0011	0.0031	2.00
	590.0	29381	0.5	0.5375	0.5353	-0.0022	0.0034	2.00
		29914	0.7	0.7256	0.7231	-0.0025	0.0037	2.00
		29360	1.0	1.0213	1.0219	0.0006	0.0032	2.00
	635.0	29381	0.5	0.5223	0.5202	-0.0021	0.0033	2.00
		29914	0.7	0.6927	0.6901	-0.0026	0.0036	2.00
		29360	1.0	0.9744	0.9750	0.0006	0.0032	2.00

UUC* = Unit Under Calibration

Wichou B.

Cert. No. : SP25026
Job No. : VC68SP0019
Pages : 4 of 4

Result of calibration : Photometric Accuracy

(Without adjustment)

Material	Wavelength (nm)	Solution (mg/l)	Certified Absorbance (A)	UUC* Reading Absorbance (A)	Error (A)	Uncertainty ± (A)	k Factor
Potassium dichromate solutions	235.0	20	0.2415	0.2443	0.0028	0.0101	2.00
		40	0.4866	0.4871	0.0005	0.0115	2.00
		60	0.7415	0.7295	-0.0120	0.0067	2.00
		80	0.9854	0.9844	-0.0010	0.0071	2.00
		100	1.2444	1.2425	-0.0019	0.0073	2.00

UUC* = Unit Under Calibration

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

Resolution of Wavelength Mode 0.1 nm

Resolution of Photometric Mode 0.001 A

Parameter Setting

Measurement Mode Wavelength, Absorbance

Wavelength Scan 190 nm - 1100 nm

Scanning Speed 7.5 nm/min

Band width(Wavelength) 1.0

Band width(Vis) 1.0

Band width(Uv) 1.0

Stray Light** UUC* Reading at 220.0 nm	
Transimission T(%)	Absorbance(A)
0.020	3.7032

**Specific Acceptance :

Transmission ≤ 1.0 T(%), Absorbance ≥ 2.0 A

**Stray light not TISI Accredited

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95%

End of Calibration Certificate



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

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



CALIBRATION CERTIFICATE

Page 1 of 2

Certificate No. : S2025070410-0004

Date Issued : 24-Jul-25

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 : 22-Jul-25

Date Calibrated : 22-Jul-25

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:



Certificate No. : S2025070410-0004

Environment : Ambient Temperature : Start record 25.5 °C, Stop record 25.5 °C
Relative Humidity : Start record 50.4 %RH, Stop record 50.1 %RH

Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
380	380	380	1.03	1.73	2.57

Calibration Temperature (°C)	Standard Reading (°C), Probe No. 10 is Reference Probe					Uncertainty ⁴ (±°C)
380	No. 1	No. 2	No. 3	No. 4	No. 5	1.9
	380.49	380.79	380.68	380.85	380.56	
	No. 6	No. 7	No. 8	No. 9	No. 10	
	380.60	379.85	380.28	379.65	380.55	
	No. 11	No. 12	No. 13	No. 14	No. 15	
	380.38	380.54	380.49	380.75	380.37	
380	No. 16	No. 17	No. 18	No. 19	No. 20	1.9
	380.25	379.64	379.73	380.52	380.79	

Without adjustment

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

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. L202502406-0002 for Digital Thermometer with Probe (Agilent) Module 2 (172) Type K Serial No. US37011 Due 10-Oct-25

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

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

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

4. The uncertainty of measurement is included temperature stability.

End of Certificate



WO-11540198/2025

MAINTENANCE AND TEST CERTIFICATE MODEL
OPTIMA 5300DV

Customer :	<u>S.P.S.Consulting Service Co.,Ltd</u>	Date Tested:	<u>July 1, 2025</u>
Address :	<u>7 Soi Phaholyothin 24</u>	Recommendation Recertification	<u>Period</u> <u>6</u> <u>Months</u>
	<u>Paholyothin Road</u>	Recertification Due:	<u>January 1, 2026</u>
	<u>Jompol Chatuchak, Bangkok 1090</u>	Date Last Certified:	<u>January 6, 2025</u>
User Name:	<u></u>	Visit Number:	<u>1 of 2</u>
Phone:	<u></u>	PerkinElmer Phone:	<u>02-719-6420 ext 206</u>
Fax:	<u></u>	PerkinElmer Fax:	<u>02-318-5597</u>

CONFIGURATION TESTED		ACCESSORIES/COMPONENT NOT INCLUDED
MODEL	SERIAL NUMBER	
<u>OPTIMA 5300DV</u>	<u>077C7042401</u>	<u></u>
TESTED EQUIPMENT	CALIBRATION NUMBER	EXPIRATION
<u>IPV Methods</u>	<u></u>	<u></u>
TEST STANDARD USED	PART NUMBER	EXPIRATION DATE
<u>Multielement Standard</u>	<u>N069-1579</u>	<u>December 30, 2024</u>
<u>Wavecal Solution</u>	<u>N058-2152</u>	<u>March 30, 2024</u>
<u>VIS Wavecal solution</u>	<u>N930-2946</u>	<u>February 28, 2024</u>
<u>Instrument Cal. STD4</u>	<u>N930-0221</u>	<u>November 30, 2024</u>
CUSTOMER SUPPLIED	COMMENTS	CUSTOMER INITIALS
<u>2 % HNO3</u>	<u></u>	<u></u>
<u>10 % HNO3</u>	<u></u>	<u></u>

Page 1 of 4



WO-11540198/2025

MAINTENANCE AND TEST CERTIFICATE MODEL
OPTIMA 5300DV

SERIAL NUMBER	<u>077C7042401</u>	DATE TESTED	<u>July 1, 2025</u>
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- MECHANICAL CHECKS**

A. Inspect and clean all fans and filters.	<input type="checkbox"/>
B. Inspect and replace as necessary, all torch components including the RF coil.	<input type="checkbox"/>
C. Inspect all tubing for sign of clacking or leaking.	<input type="checkbox"/>
D. Adjust water and gas pressure regulator settings.	<input type="checkbox"/>
E. Inspect and leak check pneumatics drawers.	<input type="checkbox"/>
F. Clean the exterior of the instrument.	<input type="checkbox"/>
- OPTICAL CHECKS**

A. Inspect and clean all optical components.	<input type="checkbox"/>
B. As required, check and replace all purgefilters.	<input type="checkbox"/>
C. Recheck optical alignment.	<input type="checkbox"/>
- COOLING SYSTEM CHECKS**

A. Perform preventive maintenance on chiller.	<input type="checkbox"/>
B. Flush out the chiller every year.	<input type="checkbox"/>
- PERFORMANCE CHECKS**

A. Torch View Alignment.	<input type="checkbox"/>
B. Wavelength Calibration.	<input type="checkbox"/>

Page 2 of 4



MAINTENANCE AND TEST CERTIFICATE MODEL

OPTIMA 5300DV

SERIAL NUMBER : 077C7042401		DATE TESTED : July 1, 2025	
PARAMETER	SPECIFICATION	FINAL VALUE	
Spectral Resolution : UV	As 193.696 nm	≤ 0.007	0.00570
	Ni 231.604 nm	≤ 0.008	0.00734
	Ni 341.476 nm	≤ 0.012	0.00763
Spectral Resolution : VIS	La 408.672 nm	≤ 0.020	0.01627
	Ba 455.403 nm	≤ 0.025	0.02428
Precision	As 193.656 nm	% RSD < 1.0	0.82 %
	Zn 213.856 nm	% RSD < 1.0	0.83 %
	Mn 257.610 nm	% RSD < 1.0	0.20 %
	La 379.478 nm	% RSD < 1.0	0.89 %
	Ba 455.403 nm	% RSD < 1.0	0.92 %
	Ba 493.408 nm	% RSD < 1.0	0.75 %
Detection Limits : Axial	Tl 190.080 nm	3(sd)	10.65 ppb
	As 193.696 nm	3(sd)	2.48 ppb
	Pb 220.353 nm	3(sd)	3.09 ppb
Detection Limits : Radial	As 193.696 nm	3(sd)	331.50 ppb
	Zn 213.856 nm	3(sd)	0.98 ppb
	Mn 257.610 nm	3(sd)	0.34 ppb
	La 379.478 nm	3(sd)	2.54 ppb
	Ba 455.403 nm	3(sd)	2.19 ppb
	Ba 493.408 nm	3(sd)	4.32 ppb
BEC : Axial (IB X 500)/(IS-IB)	Cd 226.502 nm	≤ 150 ppb	140.03
BEC : Radial (IB X 1000)/(IS-IB)	Mn 257.610 nm	≤ 45 ppb	24.17



MAINTENANCE AND TEST CERTIFICATE MODEL

OPTIMA 5300DV

SERIAL NUMBER	077C7042401	DATE TESTED	July 1, 2025
Remarks :			
Commissioning follow as commissioning performance sheets.			
This is to certify that the above tests have been performed and the configuration tested			
<input checked="" type="checkbox"/> meets			
<input type="checkbox"/> does not meet			
the PerkinElmer Specifications listed on this certificate.			
This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.			
Service Department PerkinElmer Ltd.			
Authorized Representative:			
<div style="background-color: #cccccc; height: 40px; width: 100%;"></div>			
Service Engineer			

MAINTENANCE REPORT AND CALIBRATION CERTIFICATE

FLOW INJECTION MERCURY SYSTEMS MODEL

FIAS 100

Customer : S.P.S.Consulting Service Co.,Ltd Date Tested: July 1, 2025
 Recommendation Recertification
 Address : 7 Soi Phaholyothin 24 Period 6 Months
Paholyothin Road Recertification Due: January 1, 2026
Jompol Chatuchak, Bangkok 10900 Date Last Certified: January 6, 2025
 User Name: [REDACTED] Visit Number: 1 of 2
 Phone: [REDACTED] PerkinElmer Phone: 02-719-6420 ext 8
 Fax: [REDACTED] PerkinElmer Fax: 02-318-5597

CONFIGURATION TESTED

MODEL	SERIAL NUMBER	SOFTWARE
FIAS 100	100S14090404	Syngistix version 7.3

TEST STANDARD USED	PART NUMBER	EXPIRATION DATE
Mercury (Hg) Std	N9300174	JUN 30, 2026

MAINTENANCE REPORT AND CALIBRATION CERTIFICATE

FLOW INJECTION MERCURY SYSTEMS MODEL

FIAS 100

SERIAL NUMBER 100S14090404 DATE TESTED July 1, 2025

1. INSTRUMENT CHECKS

- A. The light part, quartz windows and detector. Clean if necessary. ☐
- B. Inspect the mercury lamp. Alignment if necessary. ☐
- C. Inspect the mercury filter. Replace if necessary. ☐
- D. Inspect and clean or replace the dust filter. ☐
- E. Inspect peristaltic pump tubes. Replace if necessary. ☐

2. ELECTRONICS CHECKS

- A. Electronic power supplies
 - + 5 Volts (± 0.3) + 4.98 Volts
 - + 15 Volts (± 1.0) + 15.03 Volts
 - 15 Volts (± 1.0) - 15.07 Volts
 - + 40 Volts (± 1.0) + 40.02 Volts

3. GAS SYSTEM CHECK

- A. Leak test all internal and external gas box joints. ☐
- B. Inspect solenoid valve and pressure switch. ☐
- C. Inspect non return valve. Replace sleeve if necessary. ☐
- D. Inspect flow meter and needle valve. Clean if necessary. ☐

4. MECHANICAL CHECKS

- A. Inspect pump motor and pump roller. ☐
- B. Inspect and clean switching valve. ☐
- C. Inspect, clean and lubricant autosample. ☐



O-11540406/2025

MAINTENANCE REPORT AND CALIBRATION CERTIFICATE

FLOW INJECTION MERCURY SYSTEMS MODEL

FIAS 100

SERIAL NUMBER	100S14090404	DATE TESTED	July 1, 2025
PARAMETER		SPECIFICATION	ACTUAL VALUE
5. PERFORMANCE TEST			
A. Baseline Noise Test			
(measure peak area at 10 replicates without any sample)			
	SD	≤ 0.0015 A*s	0.0025 A*s
B. Sensitivity Check			
(10 ppb Hg Standard at 11 replicates)			
	Mean Absorbance	≥ 0.0800 Abs.	0.1201 Abs.
C. Characteristic mass(m_0)			
(10 ppb Hg Standard at 11 replicates)			
	m_0	≤ 314 pg	183.2 pg/0.0044A
D. Precision Check (%RSD)			
(10 ppb Hg Standard at 11 replicates)			
	%RSD	≤ 2.5 %	1.65 %

Page 3 of 4




O-11540406/2025

MAINTENANCE REPORT AND CALIBRATION CERTIFICATE

FLOW INJECTION MERCURY SYSTEMS MODEL

FIAS 100

SERIAL NUMBER	100S14090404	DATE TESTED	July 1, 2025
Remarks :			
<hr/>			
<hr/>			
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<hr/>			
<hr/>			
<hr/>			
This is to certify that the above tests have been performed and the configuration tested			
<input checked="" type="checkbox"/> meets			
<input type="checkbox"/> does not meet			
the PerkinElmer Specifications listed on this certificate.			
This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.			
Service Department PerkinElmer Ltd.			
Customer Service Engineer			
	Service Engineer		

Page 4 of 4



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



CALIBRATION CERTIFICATE

Page 1 of 2

Certificate No. : S2025070410-0003

Date Issued : 24-Jul-25

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

Equipment : Incubator

Manufacturer : BINDER

Model : BD 115

Serial No. : 12-16967

ID No./Tag No. : IN 05/56

Date Received : 22-Jul-25

Date Calibrated : 22-Jul-25

Calibrated by :

Calibration Method or Calibration Procedure Used

Standard method : CP-05 TLAS G-20.

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

Result of Calibration

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

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

Approved by



Certificate No. : S2025070410-0003

Environment : Ambient Temperature : Start record 25.1 °C, Stop record 25.1 °C
Relative Humidity : Start record 48.9 %RH, Stop record 49.3 %RH

Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
35	35.0	35.0	0.13	0.37	0.57
41.5	41.5	41.5	0.10	0.35	0.49

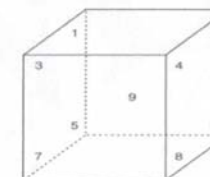
Without adjustment

Calibration Temperature (°C)	STD No. 1 (°C)	STD No. 2 (°C)	STD No. 3 (°C)	STD No. 4 (°C)	STD No. 5 (°C)	STD No. 6 (°C)	STD No. 7 (°C)	STD No. 8 (°C)	STD No. 9 (°C)	Uncertainty ⁴ (±°C)
35	34.97	34.91	34.96	34.82	34.81	34.86	34.83	35.11	34.95	0.23
41.5	41.51	41.37	41.40	41.26	41.27	41.42	41.43	41.53	41.50	0.23

STD = Standard

Note : Probe No. 9 is Reference Probe

Setting Air Fresh No. OFF



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. L202412300-0027 for Temperature Indicator with Sensor Serial No. US37020317, Due 09-Sep-25

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

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

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

4. The uncertainty of measurement is included temperature stability.

5. The temperature uniformity, stability, overall variation and indicating temperature is applicable to all air or gas filled temperature controlled enclosures at atmospheric pressure.

End of Certificate



CERTIFICATE No : 25T2261
REFERENCE No : 76365-8

PAGE : 1 OF 2

Certificate of Calibration

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

CALIBRATED BY : SUCHART S.

CALIBRATION DATE : 07-Mar-25

APPROVED BY :

ISSUED DATE : 13-Mar-25

RECEIVED DATE : 07-Mar-25

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



CERTIFICATE No : 25T2261

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
ID NUMBER : WB 05/58
RECEIVED DATE : 07-Mar-25
AMBIENT TEMPERATURE : 24 °C ± 1 °C
MODEL : WNB29
SERIAL NUMBER : L614.0123
CALIBRATION DATE : 07-Mar-25
RELATIVE HUMIDITY : 51 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

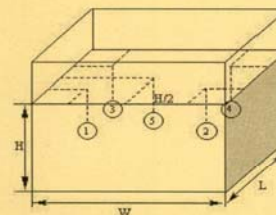
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO ASTM E715-80 (REAPPROVED 2001) BY COMPARISON WITH CALIBRATED RTD. THE PROBES WERE PLACED ON FIVE POINTS AND LOCATED ONE PROBE IN EACH OF THE FOUR CORNERS OF THE BATH AND PLACED THE FIFTH RTD WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE WATER VOLUME (REFERENCE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

2. REFERENCE STANDARD INSTRUMENTS :-

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

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

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



PROBE INSTALLATION
POSITION IN THE BATH

GENERAL INFORMATION

Overall Variation of Ambient Temperature around the Bath (°C) : 0.6

Overall Variation of Line Voltage (V) : 12

Instrument Condition : Normal

Bath Inner Size (W*L*H) : 60*40*10 cm

BATH PERFORMANCE

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

TEMPERATURE MEASUREMENT ACCURACY TEST

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

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

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

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

END OF CALIBRATION REPORT



ภาคผนวก ฉ-4

เอกสารสอบเทียบความถูกต้องของเครื่องมือวิเคราะห์ตะกอน



MAINTENANCE AND TEST CERTIFICATE MODEL
OPTIMA 5300DV

Customer :	S.P.S.Consulting Service Co.,Ltd	Date Tested:	July 1, 2025
Address :	7 Soi Phaholyothin 24 Phaholyothin Road Jompol Chatuchak, Bangkok 1090	Recommendation Recertification Period	6 Months
User Name		Recertification Due:	January 1, 2026
Phone:		Date Last Certified:	January 6, 2025
Fax:		Visit Number:	1 of 2
		PerkinElmer Phone:	02-719-6420 ext 206
		PerkinElmer Fax:	02-318-5597

CONFIGURATION TESTED		ACCESSORIES/COMPONENT NOT INCLUDED	
MODEL	SERIAL NUMBER		
OPTIMA 5300DV	077C7042401		
TESTED EQUIPMENT	CALIBRATION NUMBER	EXPIRATION	
IPV Methods			
TEST STANDARD USED	PART NUMBER	EXPIRATION DATE	
Multielement Standard	N069-1579	December 30, 2024	
Wavecal Solution	N058-2152	March 30, 2024	
VIS Wavecal solution	N930-2946	February 28, 2024	
Instrument Cal. STD4	N930-0221	November 30, 2024	
CUSTOMER SUPPLIED	COMMENTS	CUSTOMER INITIALS	
2 % HNO3			
10 % HNO3			



MAINTENANCE AND TEST CERTIFICATE MODEL
OPTIMA 5300DV

SERIAL NUMBER	077C7042401	DATE TESTED	July 1, 2025
1. MECHANICAL CHECKS			
A. Inspect and clean all fans and filters.			OK
B. Inspect and replace as necessary, all torch components including the RF coil.			OK
C. Inspect all tubing for sign of clacking or leaking.			OK
D. Adjust water and gas pressure regulator settings.			OK
E. Inspect and leak check pneumatics drawers.			OK
F. Clean the exterior of the instrument.			OK
2. OPTICAL CHECKS			
A. Inspect and clean all optical components.			OK
B. As required, check and replace all purgefilters.			OK
C. Recheck optical alignment.			OK
3. COOLING SYSTEM CHECKS			
A. Perform preventive maintenance on chiller.			OK
B. Flush out the chiller every year.			N/A
4. PERFORMANCE CHECKS			
A. Torch View Alignment.			OK
B. Wavelength Calibration.			OK



MAINTENANCE AND TEST CERTIFICATE MODEL
OPTIMA 5300DV

SERIAL NUMBER : 077C7042401		DATE TESTED : July 1, 2025	
PARAMETER	SPECIFICATION	FINAL VALUE	
Spectral Resolution : UV	As 193.696 nm	≤ 0.007	0.00570
	Ni 231.604 nm	≤ 0.008	0.00734
	Ni 341.476 nm	≤ 0.012	0.00763
Spectral Resolution : VIS	La 408.672 nm	≤ 0.020	0.01627
	Ba 455.403 nm	≤ 0.025	0.02428
Precision	As 193.696 nm	% RSD < 1.0	0.82 %
	Zn 213.856 nm	% RSD < 1.0	0.83 %
	Mn 257.610 nm	% RSD < 1.0	0.20 %
	La 379.478 nm	% RSD < 1.0	0.89 %
	Ba 455.403 nm	% RSD < 1.0	0.92 %
	Ba 493.408 nm	% RSD < 1.0	0.75 %
Detection Limits : Axial	Tl 190.080 nm	3(sd)	10.65 ppb
	As 193.696 nm	3(sd)	2.48 ppb
	Pb 220.353 nm	3(sd)	3.09 ppb
Detection Limits : Radial	As 193.696 nm	3(sd)	331.50 ppb
	Zn 213.856 nm	3(sd)	0.98 ppb
	Mn 257.610 nm	3(sd)	0.34 ppb
	La 379.478 nm	3(sd)	2.54 ppb
	Ba 455.403 nm	3(sd)	2.19 ppb
	Ba 493.408 nm	3(sd)	4.32 ppb
BEC : Axial (IB X 500)/(IS-IB)	Cd 226.502 nm	≤ 150 ppb	140.03
BEC : Radial (IB X 1000)/(IS-IB)	Mn 257.610 nm	≤ 45 ppb	24.17



MAINTENANCE AND TEST CERTIFICATE MODEL
OPTIMA 5300DV

SERIAL NUMBER	077C7042401	DATE TESTED	July 1, 2025
Remarks :	Commissioning follow as commissioning performance sheets.		
This is to certify that the above tests have been performed and the configuration tested			
<div><input checked="" type="checkbox"/> meets</div> <div><input type="checkbox"/> does not meet</div>			
the PerkinElmer Specifications listed on this certificate.			
This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.			
Service Department PerkinElmer Ltd.			
Authorized Representative: <div></div>			
Service Engineer			

Calibration Certificate

Equipment : UV-VIS SPECTROPHOTOMETER
Manufacturer : PERKINELMER
Model : LAMBDA 25
Serial No.: 501S14123010
ID No.: SP03/58
Calibration Mode : WAVELENGTH ACCURACY
PHOTOMETRIC ACCURACY
STRAY LIGHT
Condition As Found : GOOD
Customer : S.P.S CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN ROAD,
CHOMPON SUB-DISTRICT, CHATUCHAK DISTRICT,
BANGKOK PROVINCE 10900 THAILAND.

Location : ORGANIC LABORATORY IV
Ambient Temperature : (22.9 ± 5) °C
Relative Humidity : (53.7 ± 25) %
Received Date : 22 AUGUST 2025
Calibration Date : 22 AUGUST 2025
Date of Issue : 25 AUGUST 2025

Calibrated by :

Approved by :

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

Calibration Method :

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

Condition of this result of calibration :

1. Certified reference materials

Material	Ref. type	Cell serial No.	Cert. No.	Due Date
Holmium liquid	RM-HL	29706	126461	24/10/2026
Didymium liquid	RM-DL	28912	126462	24/10/2026
Neutral density filter	RM-IN2N3N	13877	126457	24/10/2026
Potassium dichromate solutions	RM-0204060810	14204	126497	25/10/2026
Potassium Iodide solution	-	KI-0701-001	CI-0185-24	14/05/2026

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

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

3.1 The UK National Physical Laboratory (NPL)

Result of calibration : Wavelength Accuracy

(Without adjustment)

Material	Certified Values of Reference Material (nm)	UUC* Reading (nm)	Error (nm)	Uncertainty ± (nm)	k Factor
RM-HL	278.13	278.21	0.08	0.16	2.00
	361.25	361.39	0.14	0.16	2.00
	467.82	467.71	-0.11	0.16	2.00
	536.56	536.50	-0.06	0.16	2.00
RM-DL	640.50	640.36	-0.14	0.16	2.00
	740.09	739.85	-0.24	0.16	2.00
	864.94	865.12	0.18	0.16	2.00

UUC* = Unit Under Calibration

Cert. No. : SP25026
Job No. : VC68SP0019
Pages : 3 of 4

Result of calibration : Photometric Accuracy

Material	Wavelength (nm)	Filter S/N	Nominal Absorbance (A)	Certified Absorbance (A)	UUC* Reading Absorbance (A)	Error (A)	Uncertainty ± (A)	k Factor
	440.0	29381	0.5	0.5443	0.5413	-0.0030	0.0043	2.00
		29914	0.7	0.7484	0.7455	-0.0029	0.0054	2.00
		29360	1.0	1.0527	1.0535	0.0008	0.0032	2.00
	465.0	29381	0.5	0.4948	0.4922	-0.0026	0.0041	2.00
		29914	0.7	0.6906	0.6877	-0.0029	0.0050	2.00
		29360	1.0	0.9695	0.9709	0.0014	0.0031	2.00
	546.1	29381	0.5	0.5090	0.5068	-0.0022	0.0036	2.00
		29914	0.7	0.6985	0.6960	-0.0025	0.0041	2.00
		29360	1.0	0.9814	0.9825	0.0011	0.0031	2.00
	590.0	29381	0.5	0.5375	0.5353	-0.0022	0.0034	2.00
		29914	0.7	0.7256	0.7231	-0.0025	0.0037	2.00
		29360	1.0	1.0213	1.0219	0.0006	0.0032	2.00
	635.0	29381	0.5	0.5223	0.5202	-0.0021	0.0033	2.00
		29914	0.7	0.6927	0.6901	-0.0026	0.0036	2.00
		29360	1.0	0.9744	0.9750	0.0006	0.0032	2.00

UUC* = Unit Under Calibration

Neutral Density glass filter

Cert. No. : SP25026
Job No. : VC68SP0019
Pages : 4 of 4

Result of calibration : Photometric Accuracy

(Without adjustment)

Material	Wavelength (nm)	Solution (mg/l)	Certified Absorbance (A)	UUC* Reading Absorbance (A)	Error (A)	Uncertainty ± (A)	k Factor
Potassium dichromate solutions	235.0	20	0.2415	0.2443	0.0028	0.0101	2.00
		40	0.4866	0.4871	0.0005	0.0115	2.00
		60	0.7415	0.7295	-0.0120	0.0067	2.00
		80	0.9854	0.9844	-0.0010	0.0071	2.00
		100	1.2444	1.2425	-0.0019	0.0073	2.00

UUC* = Unit Under Calibration

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

Resolution of Wavelength Mode 0.1 nm
Resolution of Photometric Mode 0.001 A
Parameter Setting
Measurement Mode Wavelength, Absorbance
Wavelength Scan 190 nm - 1100 nm
Scanning Speed 7.5 nm/min
Band width(Wavelength) 1.0
Band width(Vis) 1.0
Band width(Uv) 1.0

Stray Light** UUC* Reading at 220.0 nm	
Transmission T(%)	Absorbance(A)
0.020	3.7032

**Specific Acceptance :

Transmission ≤ 1.0 T(%), Absorbance ≥ 2.0 A

**Stray light not TISI Accredited

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor k , providing a level of confidence of approximately 95%

End of Calibration Certificate



Head Office : 929/929/1 Soi Pattanakarn 30,
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www.automation.co.th

Sales & Service Center
Rayong : 1/15 Huaypong Rd., Muang, Rayong [T. 038-692-152]
Lamphun : 122/5 M.4, Ban Klang, Muang, Lamphun [T. 053-581-876]
Prachinburi : 688 M.10, Thatum, Srirachaphote, Prachinburi [T. 037-208-890]

MTOC : L-0106/2025

Report No. : SPS-190

TOC-V Maintenance Report

Instrument : Total Organic Carbon Analyzer Measuring : TC 0 ~ 30000 mg/L
Model : TOC-VCPH Place of Installation : LABORATORY
Serial No. : H51314800190 Department : LABORATORY
Manufacture : Shimadzu
Customer : S.P.S. CONSULTING SERVICE., LTD
7 Phaholyothin 24, Jompol, Chatuchak,
Bangkok 10900

Date of Maintenance : 03 / 01 / 2025

Ambient Condition : Temperature $26 \pm 5^{\circ}\text{C}$
: Humidifier $60 \pm 15\% \text{ RH}$

Maintenance By :

Approved By :

User Name :



Head Office : 929/929/1 Soi Pattanakarn 30,
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Prachinburi : 688 M.10, Thatum, Srirachaphote, Prachinburi [T. 037-208-890]

MTOC : L-0106/2025

Report No. : SPS-190

Maintenance Sheet

Customer : S.P.S. CONSULTING SERVICE., LTD Date : 03 / 01 / 2025
Model : TOC-VCPH Serial No. H51314800190

Item	Carry out maintenance work	Result	Exchange	Comment
1.	Check functionality of the device	O.K.		
	Check furnace temperature (Standard cat. 680°C for TN cat. 720°C)	O.K.		
	Check dehumidifier temperature (1°C)	O.K.		
	Check the entire flow line related to leakage	O.K.		
	Check baseline status (OK)	O.K.		
	Check carrier gas pressure ($200 \pm 10 \text{ kPa}$)	O.K.		
2.	Check carrier gas flow rate (150 mL/min)	O.K.		
	Tubes			
3.	Check all tubing for contamination, if necessary clean them	O.K.		
	Check all tubing for tight connection	O.K.		
	Container and Drainage	O.K.		
	Fill up humidifier with pure water to max. level	O.K.		
4.	Check filling of dilution water and acid container	O.K.		
	Rinse Drain Pot, after wards refill again with pure water	O.K.		
	Check if outlet flow is in proper conditions	O.K.		
	TC and IC Injection	O.K.		
	Clean injector Block	O.K.		
5.	Check injector Block for wear	O.K.		
	Check injection tube adjustment	O.K.		
	Check injection for leakage	O.K.		
	Check injection for clogging	O.K.		
6.	IC Measurement (N-type)			
	Check acidification in syringe			
	Check sparging in syringe			
7.	Eye check of 8-Port valve, for sample residues or moist spots that indicate possible leakage	O.K.		
	Check and if necessary exchange consumable, Maintenance parts	O.K.	✓	See list of consumable, maintenance parts

Inspection by :



Automation Service Co.,Ltd.

Head Office : 929/93/1 Soi Pattanakarn 30,
Pattanakarn Road, Suanluang, Bangkok
Tel: 02-319-9994 Fax: 02-319-9596
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Prachinburi : 689 M.10, Thatum, Srimahaphote, Prachinburi [T. 037-208-890]

MTOC : L-0106/2025

Report No. : SPS-190

Item	Carry out maintenance work	Result	Exchange	Comment
8.	Due to instrument condition, clean the instrument inside and outside.	O.K.		
9.	After checking the system and exchanging of consumable and maintenance parts a new 1-5 point calibration have to be done.	O.K.		Addition test 1.
10.	After wards the calibration perform check sample measurement.	O.K.		Addition test 2.
11.	Sensitivity and Repeatability test	N/A		Addition test 3.

Addition test

Test no.	Test conditions	Meas. value	Result
1.	Calibration TC standard solution at 0, 100, 250, 500, 1,000 µg/L Injection volume 400 µL No. of measurement 2 times (Max.3)		Attachment : Refer file 2024_02_13_001_ PM.+32 TC_0-1000 ug/L cal
	Criteria : R ² = 0.995 or more	0.9966	Pass
	Calibration IC standard solution at 0, 250, 500, 1,000 mg/L Injection volume 32 µL No. of measurement 2 times (Max.3)		
2.	Criteria : R ² = 0.995 or more	N/A	
	Measurement of reagent water and TC standard solution at 500 µg/L Injection volume 408 µL No. of measurement 2 times (Max.3) and calculate accuracy by Meas. of TC standard - Meas. of Reagent water		
	Criteria : Accuracy 500 ± 10% µg/L or less	766.9-245.2 521.7	Pass
3.	Sensitivity test use standard TC at 30 mg/L inj 50 µl No. of 5 item (Max. 6)		
	Criteria : Area average is at least 66 Peak height is 70 mV at the most	N/A	N/A

Inspection by :

SHIMADZU ANALYZER
3/4



Automation Service Co.,Ltd.

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Prachinburi : 689 M.10, Thatum, Srimahaphote, Prachinburi [T. 037-208-890]

MTOC : L-0106/2025

Report No. : SPS-190

List of Consumable, Maintenance parts

Pos.	Part Number	Part Name	Result	Exchange	Recommended Interval
1.	036-11209-84	O-ring, 4D P10A (Viton , for TC,IC Slider)	O.K.	✓	1 time per year, Depending on condition
2.	036-11219-84	O-ring, 4D P20 (for sealing TC-Combustion tube)	O.K.		1 time per year, Depending on condition
3.	036-11408-84	O-ring, Teflon P10 (for TC,IC-Slider)	O.K.	✓	1 time per year, Depending on condition
4.	630-00105-01	Platinum net, (2pcs-set) (to support catalyst)	O.K.		6 month same time as catalyst exchange
5.	630-00557	Silica Wool (to support catalyst)	O.K.		6 month same time as catalyst exchange
6.	630-00992	Halogen Scrubber	O.K.		6 month
7.	630-00996	High Sensitivity TC Catalyst (When installed)	O.K.		Depending on condition
8.	638-60116	Regular Catalyst (33g) (When installed)	O.K.		6 month
9.	631-20265	8-Port valve rotor	O.K.		1 time per year
10.	638-41323	TC-Combustion Tube	O.K.		6 month same time as catalyst exchange
11.	631-43404-01	Packing, gasket slider (for TC-Injection tube)	O.K.		1 time per year, Depending on condition
12.	638-59296	Syringe 5mL	O.K.		Depending on condition
13.	638-59296-01	Plunger Tip (for syringe 5mL)	O.K.		6 month
14.	042-00405-11	IC reagent supply pump head	O.K.		1 time per year
15.	630-00999	CO2-Absorber (for cell space purge)	O.K.		1 time per year
16.	046-00044-12	Membrane filter	O.K.		1 time per year
17.	630-00964	Molecular Sieves	O.K.		1 time per year
18.	035-62994-04	Sleeve Set 6F-T	O.K.		1 time per year

Note. Table indicates the guidelines replacement periods when NPOC measurement is performed on sample that are comparatively as clean as tap water ,use standard catalyst and at a rate of about 500 sample per month (operating five days a week)

Inspector By

SHIMADZU ANALYZER
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