

# ภาคผนวกที่ 5

## เอกสารการสอบเทียบเครื่องมือ

- |        |     |   |
|--------|-----|---|
| เอกสาร | 5-1 | เอกสารสอบเทียบเครื่องมือการตรวจวัดคุณภาพอากาศในบรรยากาศ |
| เอกสาร | 5-2 | เอกสารสอบเทียบเครื่องมือการตรวจวัดคุณภาพน้ำ             |

**ตารางสรุปรายการเอกสารการสอบเทียบความถูกต้องของเครื่องมือเก็บตัวอย่าง  
และเครื่องมือตรวจวิเคราะห์คุณภาพสิ่งแวดล้อม**

รายการตรวจวัด	เครื่องมือเก็บตัวอย่าง	เครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
<b>คุณภาพอากาศ</b>		
- TSP	- High Volume Air Sampler No. B23 B27, B33 B38, B41	- Digital Balance
- PM <sub>10</sub>	- High Volume Air PM-10 Sampler No. B02, B06, B08, B18, B21	- Digital Balance
- PM <sub>2.5</sub>	- High Volume Air PM-2.5 Sampler No. PM2.5-02, PM2.5-11, PM2.5-13, PM2.5-14, PM2.5-15	- Digital Balance
- NO <sub>2</sub>	- NO <sub>2</sub> Analyzer No. B05, B07, B08, R06, R09	- NO <sub>2</sub> Analyzer No. B05, B07, B08, R06, R09
- SO <sub>2</sub>	- SO <sub>2</sub> Analyzer No. B01, B03, B06, B09, R05	- SO <sub>2</sub> Analyzer No. B01, B03, B06, B09, R05
- CO	- CO Analyzer No. B01, B05, B06, B08, B10	- CO Analyzer No. B01, B05, B06, B08, B10
<b>คุณภาพน้ำ</b>		
- Temperature	-	- Thermometer
- pH	-	- pH Meter
- Conductivity	-	- Conductivity Meter
- SS	-	- Digital Balance
- TDS	-	- Digital Balance
- DO	-	- ICP
- BOD <sub>5</sub>	-	- Digital Balance
- Grease & Oil	-	- Digital Balance

## เอกสารที่ 5-1

เอกสารสอบเทียบเครื่องมือการตรวจวัดคุณภาพอากาศในบรรยากาศ



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด

S.P.S. CONSULTING SERVICE CO., LTD.

7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900

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

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

## High Volume Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard

Model : TE 5025A

S/N : 3611

### Calibration Data

High Volume Air Sampler Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft <sup>3</sup> /min)	R <sup>2</sup>
B01	B01	02/05/2025	y = 1.180x-4.939	0.999
B02	B02	02/05/2025	y = 1.156x-3.058	0.999
B03	B03	02/05/2025	y = 1.139x-4.505	0.998
B04	B04	05/05/2025	y = 1.168x-4.342	0.997
B05	B05	05/05/2025	y = 1.181x-7.8.13	0.997
B06	B06	01/05/2025	y = 1.185x-4.081	0.998
B07	B07	01/05/2025	y = 1.173x-5.069	0.997
B08	B08	01/05/2025	y = 1.141x-3.533	0.996
B09	B09	01/05/2025	y = 1.163x-3.805	0.999
B10	B10	01/05/2025	y = 1.079x-2.229	0.997
B11	B11	02/05/2025	y = 1.169x-3.130	0.999
B12	B12	02/05/2025	y = 1.173x-3.515	0.998
B13	B13	02/05/2025	y = 1.187x-4.231	0.996
B14	B14	02/05/2025	y = 1.157x-4.001	0.999
B15	B15	02/05/2025	y = 1.093x-2.530	0.999
B16	B16	01/05/2025	y = 1.168x-5.027	0.997
B17	B17	01/05/2025	y = 1.149x-3.125	0.997
B18	B18	01/05/2025	y = 1.120x-1.685	0.998
B19	B19	02/05/2025	y = 1.166x-4.175	0.997
B20	B20	02/05/2025	y = 1.107x-0.981	0.999
B21	B21	01/05/2025	y = 1.184x-6.199	0.998
B22	B22	01/05/2025	y = 1.162x-2.993	0.996
B23	B23	05/05/2025	y = 1.155x-2.556	0.997
B24	B24	05/05/2025	y = 1.158x-4.429	0.999
B25	B25	05/05/2025	Y = 1.127x-1.558	0.998
B26	B26	05/05/2025	y = 1.137x-3.875	0.997
B27	B27	01/05/2025	y = 1.185x-6.360	0.999
B28	B28	01/05/2025	y = 1.180x-6.028	0.996
B29	B29	01/05/2025	y = 1.148x-2.869	0.998
B30	B30	01/05/2025	y = 1.125x-0.258	0.996
B31	B31	01/05/2025	y = 1.154x-4.528	0.996
B32	B32	02/05/2025	y = 1.179x-4.299	0.997
B33	B33	02/05/2025	y = 1.144x-1.976	0.999
B34	B34	05/05/2025	y = 1.135x-2.931	0.998

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บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด

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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@spscon.com, www.spscon.com

## High Volume Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard

Model : TE 5025A

S/N : 3611

### Calibration Data

High Volume Air Sampler Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft <sup>3</sup> /min)	R <sup>2</sup>
B35	B35	05/05/2025	$y = 1.179x - 3.347$	0.996
B36	B36	05/05/2025	$y = 1.166x - 3.602$	0.998
B37	B37	05/05/2025	$y = 1.086x + 1.195$	0.998
B38	B38	01/05/2025	$y = 1.149x - 5.480$	0.998
B39	B39	01/05/2025	$y = 1.130x - 3.044$	0.999
B40	B40	01/05/2025	$y = 1.142x - 3.372$	0.999
B41	B41	01/05/2025	$y = 1.180x - 3.769$	0.997
B42	B42	01/05/2025	$y = 1.158x - 2.865$	0.998
B43	B43	05/05/2025	$y = 1.170x - 3.980$	0.996
B44	B44	05/05/2025	$y = 1.143x - 1.683$	0.997
R01	R01	05/05/2025	$y = 1.132x - 2.374$	0.999
R02	R02	05/05/2025	$y = 1.146x - 3.852$	0.997
R03	R03	02/05/2025	$y = 1.128x - 2.825$	0.999
R04	R04	02/05/2025	$y = 1.149x - 3.932$	0.998
R05	R05	02/05/2025	$y = 1.107x + 0.389$	0.997
R06	R06	01/05/2025	$y = 1.145x - 2.356$	0.996
R07	R07	01/05/2025	$y = 1.072x - 0.849$	0.999
R08	R08	01/05/2025	$y = 1.161x - 4.426$	0.996
R09	R09	02/05/2025	$y = 1.129x - 2.040$	0.996
R10	R10	02/05/2025	$y = 1.167x - 4.503$	0.998
R11	R11	02/05/2025	$y = 1.139x - 3.520$	0.996
R12	R12	02/05/2025	$y = 1.110x - 1.762$	0.996
R13	R13	05/05/2025	$y = 1.187x - 6.302$	0.998
R14	R14	05/05/2025	$y = 1.144x - 2.722$	0.996
R15	R15	05/05/2025	$y = 1.137x - 4.842$	0.999
R16	R16	05/05/2025	$y = 1.183x - 5.960$	0.998
R17	R17	01/05/2025	$y = 1.158x - 3.663$	0.998
R18	R18	01/05/2025	$y = 1.185x - 4.771$	0.997
R19	R19	01/05/2025	$y = 1.173x - 5.427$	0.998
R20	R20	01/05/2025	$y = 1.175x - 6.682$	0.999



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## High Volume PM-10 Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard

Model : TE 5025A

S/N : 3611

### Calibration Data

High Volume PM-10 Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft <sup>3</sup> /min)	R <sup>2</sup>
B01	B01	01/05/2025	$y = 1.153x - 2.438$	0.997
B02	B02	01/05/2025	$y = 1.035x + 2.182$	0.996
B03	B03	01/05/2025	$y = 1.142x - 2.910$	0.999
B04	B04	01/05/2025	$y = 1.114x - 3.501$	0.998
B05	B05	01/05/2025	$y = 1.164x - 3.721$	0.998
B06	B06	05/05/2025	$y = 1.140x - 3.499$	0.999
B07	B07	05/05/2025	$y = 1.122x - 2.162$	0.999
B08	B08	05/05/2025	$y = 1.129x - 0.902$	0.997
B09	B09	02/05/2025	$y = 1.072x + 0.100$	0.998
B10	B10	02/05/2025	$y = 1.135x - 3.160$	0.999
B11	B11	02/05/2025	$y = 1.120x - 0.536$	0.996
B12	B12	01/05/2025	$y = 1.135x - 3.160$	0.999
B13	B13	01/05/2025	$y = 1.157x - 3.957$	0.999
B14	B14	05/05/2025	$y = 1.144x - 5.087$	0.998
B15	B15	05/05/2025	$y = 1.171x - 4.683$	0.999
B16	B16	05/05/2025	$y = 1.074x + 2.235$	0.997
B17	B17	05/05/2025	$y = 1.130x + 0.424$	0.996
B18	B18	01/05/2025	$y = 1.127x - 1.787$	0.999
B19	B19	01/05/2025	$y = 1.116x - 1.623$	0.997
B20	B20	01/05/2025	$y = 1.155x - 4.985$	0.997
B21	B21	01/05/2025	$y = 1.146x - 1.542$	0.998
B22	B22	05/05/2025	$y = 1.122x - 2.579$	0.996
B23	B23	01/05/2025	$y = 1.156x - 4.245$	0.998
B24	B24	02/05/2025	$y = 1.134x - 3.252$	0.999
B25	B25	02/05/2025	$y = 1.151x - 4.884$	0.997
B26	B26	02/05/2025	$y = 1.122x - 1.950$	0.999
B27	B27	02/05/2025	$y = 1.150x - 4.716$	0.999
B28	B28	02/05/2025	$y = 1.120x - 3.327$	0.997
B29	B29	02/05/2025	$y = 1.140x - 4.128$	0.999
B30	B30	02/05/2025	$y = 1.131x - 3.253$	0.998
B31	B31	02/05/2025	$y = 1.110x + 0.747$	0.996
B32	B32	01/05/2025	$y = 1.062x + 0.235$	0.999
B33	B33	02/05/2025	$y = 1.124x - 2.762$	0.998
B34	B34	01/05/2025	$y = 1.109x - 0.497$	0.999



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด  
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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 (Automatic 5 Lines) Fax: (662) 513-4221 E-mail: sale@spscon.com

CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	<input type="text" value="26 May 2025"/>	BRAND :	<input type="text" value="BGI"/>
		MODEL :	<input type="text" value="PQ200"/>
NO.	<input type="text" value="PM2.5-02"/>	SERIAL NO.	<input type="text" value="160810-47 (VSCC)"/>
CALIBRATING CONDITION			
Pressure	<input type="text" value="1011"/>	mmbar	Temp. <input type="text" value="24.6"/> °C
		% RH	<input type="text" value="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



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด

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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	26 May 2025	MODEL :	CCZ--30
NO.	PM2.5-11	SERIAL NO.	2024EN0242005
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





บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด

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7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900

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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	26 May 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	16.68	0.120	16.70



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7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900

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

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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	26 May 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	16.64	0.359	16.70



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CALIBRATION REPORT			
PM2.5 AIR SAMPLER (VERY SHARP CUT CYCLONE-VSCC)			
DATE :	26 May 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	16.68	0.120	16.70



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

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

CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO <sub>2</sub> / NO <sub>x</sub> ANALYZER					
DATE :	26 May 2025	BRAND :	API	MODEL :	200E
NO.	NOX-B05	SERIAL NO.	2284		
Calibrator (Dilution System)					
Brand : Teledyne			Model : 700E		
Last Cal. Date : 28 October 2024			Serial No. : 201-S		
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	%Dif	Analyzer Response	Slope
Zero	0	-0.10	-	0	-
NO Span	400	400.1	0.025	400.0	1.008
NO <sub>x</sub> Span	400	400.2	0.050	400.0	1.011
API Model 200E NO <sub>x</sub> 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	103.3	mV	-20 - 150		
AZERO	94.1	mV	-20 - 150		
HVPS	672	V	420 - 900 constant		
RCELL TEMP	50.5	°C	50 ± 1		
BOX TEMP	29.2	°C	8 - 48		
PMT TEMP	7.4	°C	7 ± 2		
MOLY TEMP	314.7	°C	315 ± 5		
RCELL PRESS	8.3	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 <sub>x</sub> Span Conc	400	PPB	20 - 20,000		
NO Slope	1.008	-	1.0 ± 0.3		
NO <sub>x</sub> Slope	1.011	-	1.0 ± 0.3		
NO Offset	1.7	mV	-20 to +150		
NO <sub>x</sub> Offset	1.0	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		





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

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

CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO <sub>2</sub> / NO <sub>x</sub> ANALYZER					
DATE :	26 May 2025	BRAND :	API	MODEL :	200E
NO.	NOX-B07			SERIAL NO.	4338
Calibrator (Dilution System)					
Brand	: Teledyne			Model	: 700E
Last Cal. Date	: 28 October 2024			Serial No.	: 201-S
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	%Dif	Analyzer Response	Slope
Zero	0	0.11	-	0	-
NO Span	400	399.8	-0.050	400.0	1.006
NO <sub>x</sub> Span	400	400.1	0.025	400.0	1.010
API Model 200E NO <sub>x</sub> 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	103.1	mV	-20 - 150		
AZERO	93.8	mV	-20 - 150		
HVPS	674	V	420 - 900 constant		
RCELL TEMP	50.2	°C	50 ± 1		
BOX TEMP	29.1	°C	8 - 48		
PMT TEMP	7.3	°C	7 ± 2		
MOLY TEMP	315.2	°C	315 ± 5		
RCELL PRESS	8.5	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.7	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO <sub>x</sub> Span Conc	400	PPB	20 - 20,000		
NO Slope	1.006	-	1.0 ± 0.3		
NO <sub>x</sub> Slope	1.010	-	1.0 ± 0.3		
NO Offset	1.4	mV	-20 to +150		
NO <sub>x</sub> Offset	0.9	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		



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7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900  
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CALIBRATION REPORT					
CHEMILUMINESCENT NO / NO <sub>2</sub> / NO <sub>x</sub> ANALYZER					
DATE :	26 May 2025	BRAND :	API	MODEL :	200E
NO.	NOX-B08	SERIAL NO.	4336		
Calibrator (Dilution System)					
Brand	: Teledyne			Model	: 700E
Last Cal. Date	: 28 October 2024			Serial No.	: 201-S
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	%Dif	Analyzer Response	Slope
Zero	0	0.11	-	0	-
NO Span	400	400.1	0.025	400.0	1.010
NO <sub>x</sub> Span	400	400.4	0.100	400.0	1.013
API Model 200E NO <sub>x</sub> Analyzer Check List					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	500 standard		
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air		
SAMPLE FLOW	505	cc/min	500 ± 50		
OZONE FLOW	78	cc/min	80 ± 15		
PMT	103.5	mV	-20 - 150		
AZERO	94.2	mV	-20 - 150		
HVPS	670	V	420 - 900 constant		
RCELL TEMP	50.3	°C	50 ± 1		
BOX TEMP	29.4	°C	8 - 48		
PMT TEMP	7.2	°C	7 ± 2		
MOLY TEMP	314.8	°C	315 ± 5		
RCELL PRESS	8.2	IN-Hg-A	2 - 10 constant		
SAMPLE PRESS	28.4	IN-Hg-A	25 - 30 constant		
NO Span Conc	400	PPB	20 - 20,000		
NO <sub>x</sub> Span Conc	400	PPB	20 - 20,000		
NO Slope	1.010	-	1.0 ± 0.3		
NO <sub>x</sub> Slope	1.013	-	1.0 ± 0.3		
NO Offset	1.8	mV	-20 to +150		
NO <sub>x</sub> Offset	1.0	mV	-20 to 150		
Stability at Zero	0.1	PPB	< 0.2		
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas		



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## CALIBRATION REPORT

### CHEMILUMINESCENT NO / NO<sub>2</sub> / NO<sub>x</sub> ANALYZER

DATE : 26 May 2025

BRAND : API

MODEL : 200E

NO. NOX-R06

SERIAL NO. 4466

#### Calibrator (Dilution System)

Brand : Teledyne

Model : 700E

Last Cal. Date : 28 October 2024

Serial No. : 201-S

#### 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 Set Point	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	0.10	-	0	-
NO Span	400	399.6	-0.100	400.0	1.005
NO <sub>x</sub> Span	400	399.9	-0.025	400.0	1.008

#### API Model 200E NO<sub>x</sub> Analyzer Check List

Test Values	Observed Value	Units	Nominal Range
RANGE	500	PPB	500 standard
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air
SAMPLE FLOW	509	cc/min	500 ± 50
OZONE FLOW	79	cc/min	80 ± 15
PMT	103.0	mV	-20 - 150
AZERO	93.7	mV	-20 - 150
HVPS	669	V	420 - 900 constant
RCELL TEMP	50.1	°C	50 ± 1
BOX TEMP	28.8	°C	8 - 48
PMT TEMP	7.0	°C	7 ± 2
MOLY TEMP	315.1	°C	315 ± 5
RCELL PRESS	8.4	IN-Hg-A	2 - 10 constant
SAMPLE PRESS	28.6	IN-Hg-A	25 - 30 constant
NO Span Conc	400	PPB	20 - 20,000
NO <sub>x</sub> Span Conc	400	PPB	20 - 20,000
NO Slope	1.005	-	1.0 ± 0.3
NO <sub>x</sub> Slope	1.008	-	1.0 ± 0.3
NO Offset	1.1	mV	-20 to +150
NO <sub>x</sub> 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





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## CALIBRATION REPORT

### CHEMILUMINESCENT NO / NO<sub>2</sub> / NO<sub>x</sub> ANALYZER

DATE : 26 May 2025

BRAND : API

MODEL : 200E

NO. NOX-R09

SERIAL NO. 252

#### Calibrator (Dilution System)

Brand	: Teledyne	Model	: 700E
Last Cal. Date	: 28 October 2024	Serial No.	: 201-S

#### 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	
	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	0.11	-	0	-
NO Span	400	399.9	-0.025	400.0	1.009
NO <sub>x</sub> Span	400	400.2	0.050	400.0	1.012

#### API Model 200E NO<sub>x</sub> 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	94.0	mV	-20 - 150
HVPS	673	V	420 - 900 constant
RCELL TEMP	50.4	°C	50 ± 1
BOX TEMP	29.3	°C	8 - 48
PMT TEMP	7.1	°C	7 ± 2
MOLY TEMP	314.9	°C	315 ± 5
RCELL PRESS	8.4	IN-Hg-A	2 - 10 constant
SAMPLE PRESS	28.7	IN-Hg-A	25 - 30 constant
NO Span Conc	400	PPB	20 - 20,000
NO <sub>x</sub> Span Conc	400	PPB	20 - 20,000
NO Slope	1.009	-	1.0 ± 0.3
NO <sub>x</sub> Slope	1.012	-	1.0 ± 0.3
NO Offset	1.5	mV	-20 to +150
NO <sub>x</sub> Offset	0.9	mV	-20 to 150
Stability at Zero	0.1	PPB	< 0.2
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas



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CALIBRATION REPORT					
SO <sub>2</sub> FLUORESCENT ANALYZER					
DATE :	26 May 2025	BRAND :	API	MODEL :	100A
NO.	SO <sub>2</sub> -B01			SERIAL NO.	1749
Calibrator (Dilution System)					
Brand	: Teledyne			Model	: 700E
Last Cal. Date	: 28 October 2024			Serial No.	: 201-S
Reference Standard Gas					
Standard Gas	: Sulphur Dioxide (SO <sub>2</sub> )			Cylinder No.	: A00814SK
Certified Date	: 21 June 2021	Expired Date	: 21 June 2029	Cylinder Conc.	: 49.8 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	-
SO <sub>2</sub> Span	400.0	399.9	-0.025	400.0	1.010
API Model 100A SO <sub>2</sub> Analyzer Check list					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	0-500		
SAMPLE PRESS	28.6	in-Hg	25-35		
SAMPLE FLOW	660	cc/min	650 ± 10%		
PMT	103.1	mV	-20-150 with Zero Air		
UV LAMP	3019.5	mV	1000-4900		
STR. LGT	61.8	PPB	<100		
DRK PMT	63.2	mV	-50 - 200		
DRK LMP	58.0	mV	-50 - 200		
HVPS	673	V	550-900 constant		
DCPS	2519	mV	2500 ± 200		
RCELL TEMP	50.3	°C	50 ± 1		
BOX TEMP	29.1	°C	5-40		
PMT TEMP	7.0	°C	7 ± 2.0		
SO <sub>2</sub> Span Conc	400	PPB	20-20,000		
SO <sub>2</sub> Slope	1.010	-	1.0 ± 0.3		
SO <sub>2</sub> Offset	21.8	mV	<250		
Stability at Zero	0.1	PPB	<0.2		
Stability at Span	0.2	PPB	0.5% of reading (above 50 ppb)		



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CALIBRATION REPORT					
SO <sub>2</sub> FLUORESCENT ANALYZER					
DATE :	26 May 2025	BRAND :	API	MODEL :	100A
NO.	SO <sub>2</sub> -B03	SERIAL NO.	1846		
Calibrator (Dilution System)					
Brand	: Teledyne		Model	: 700E	
Last Cal. Date	: 28 October 2024		Serial No.	: 201-S	
Reference Standard Gas					
Standard Gas	: Sulphur Dioxide (SO <sub>2</sub> )		Cylinder No.	: A00814SK	
Certified Date	: 21 June 2021	Expired Date	: 21 June 2029	Cylinder Conc.	: 49.8 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	-
SO <sub>2</sub> Span	400.0	399.7	-0.075	400.0	1.007
API Model 100A SO <sub>2</sub> Analyzer Check list					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	0-500		
SAMPLE PRESS	28.4	in-Hg	25-35		
SAMPLE FLOW	655	cc/min	650 ± 10%		
PMT	103.3	mV	-20-150 with Zero Air		
UV LAMP	3034.8	mV	1000-4900		
STR. LGT	61.6	PPB	<100		
DRK PMT	63.0	mV	-50 - 200		
DRK LMP	57.9	mV	-50 - 200		
HVPS	670	V	550-900 constant		
DCPS	2521	mV	2500 ± 200		
RCELL TEMP	50.1	°C	50 ± 1		
BOX TEMP	29.2	°C	5-40		
PMT TEMP	7.3	°C	7 ± 2.0		
SO <sub>2</sub> Span Conc	400	PPB	20-20,000		
SO <sub>2</sub> Slope	1.007	-	1.0 ± 0.3		
SO <sub>2</sub> Offset	22.0	mV	<250		
Stability at Zero	0.1	PPB	<0.2		
Stability at Span	0.2	PPB	0.5% of reading (above 50 ppb)		





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7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900  
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CALIBRATION REPORT					
SO <sub>2</sub> FLUORESCENT ANALYZER					
DATE :	26 May 2025	BRAND :	API	MODEL :	100E
NO.	SO <sub>2</sub> -B06	SERIAL NO.	3430		
Calibrator (Dilution System)					
Brand	: Teledyne			Model	: 700E
Last Cal. Date	: 28 October 2024			Serial No.	: 201-S
Reference Standard Gas					
Standard Gas	: Sulphur Dioxide (SO <sub>2</sub> )			Cylinder No.	: A00814SK
Certified Date	: 21 June 2021	Expired Date	: 21 June 2029	Cylinder Conc.	: 49.8 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	-
SO <sub>2</sub> Span	400.0	399.6	-0.100	400.0	1.005
API Model 100E SO <sub>2</sub> Analyzer Check list					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	0-500		
SAMPLE PRESS	28.5	in-Hg	25-35		
SAMPLE FLOW	659	cc/min	650 ± 10%		
PMT	103.0	mV	-20-150 with Zero Air		
UV LAMP	3012.7	mV	1000-4900		
STR. LGT	61.5	PPB	<100		
DRK PMT	62.9	mV	-50 - 200		
DRK LMP	57.7	mV	-50 - 200		
HVPS	675	V	550-900 constant		
DCPS	2529	mV	2500 ± 200		
RCELL TEMP	50.0	°C	50 ± 1		
BOX TEMP	29.4	°C	5-40		
PMT TEMP	7.2	°C	7 ± 2.0		
SO <sub>2</sub> Span Conc	400	PPB	20-20,000		
SO <sub>2</sub> Slope	1.005	-	1.0 ± 0.3		
SO <sub>2</sub> Offset	21.9	mV	<250		
Stability at Zero	0.1	PPB	<0.2		
Stability at Span	0.2	PPB	0.5% of reading (above 50 ppb)		



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CALIBRATION REPORT					
SO <sub>2</sub> FLUORESCENT ANALYZER					
DATE :	26 May 2025	BRAND :	Thermo	MODEL :	43C
NO.	SO2-B09	SERIAL NO.	43C-59325-322		
Calibrator (Dilution System)					
Brand : Teledyne			Model : 700E		
Last Cal. Date : 28 October 2024			Serial No. : 201-S		
Reference Standard Gas					
Standard Gas : Sulphur Dioxide (SO <sub>2</sub> )			Cylinder No. : A00814SK		
Certified Date : 21 June 2021		Expired Date : 21 June 2029		Cylinder Conc. : 49.8 ppm	
CALIBRATING CONDITION					
Pressure	1011	mmbar	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
Zero	0	-0.10		-	0
SO <sub>2</sub> Span	400.0	400.1		0.025	400.0
INSTRUMENT STATUS					
CHAMBER TEMP	44.5 °C		FLOW	1.0 LPM	
PRESSURE	728.6 mm Hg				





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CALIBRATION REPORT					
SO <sub>2</sub> FLUORESCENT ANALYZER					
DATE :	26 May 2025	BRAND :	API	MODEL :	100E
NO.	SO <sub>2</sub> -R05	SERIAL NO.	3490		
Calibrator (Dilution System)					
Brand	: Teledyne			Model	: 700E
Last Cal. Date	: 28 October 2024			Serial No.	: 201-S
Reference Standard Gas					
Standard Gas	: Sulphur Dioxide (SO <sub>2</sub> )			Cylinder No.	: A00814SK
Certified Date	: 21 June 2021	Expired Date	: 21 June 2029	Cylinder Conc.	: 49.8 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	-
SO <sub>2</sub> Span	400.0	399.8	-0.050	400.0	1.009
API Model 100E SO <sub>2</sub> Analyzer Check list					
Test Values	Observed Value	Units	Nominal Range		
RANGE	500	PPB	0-500		
SAMPLE PRESS	28.7	in-Hg	25-35		
SAMPLE FLOW	658	cc/min	650 ± 10%		
PMT	103.2	mV	-20-150 with Zero Air		
UV LAMP	3026.3	mV	1000-4900		
STR. LGT	61.9	PPB	<100		
DRK PMT	63.3	mV	-50 - 200		
DRK LMP	58.1	mV	-50 - 200		
HVPS	672	V	550-900 constant		
DCPS	2523	mV	2500 ± 200		
RCELL TEMP	50.2	°C	50 ± 1		
BOX TEMP	29.3	°C	5-40		
PMT TEMP	7.4	°C	7 ± 2.0		
SO <sub>2</sub> Span Conc	400	PPB	20-20,000		
SO <sub>2</sub> Slope	1.009	-	1.0 ± 0.3		
SO <sub>2</sub> Offset	22.1	mV	<250		
Stability at Zero	0.1	PPB	<0.2		
Stability at Span	0.2	PPB	0.5% of reading (above 50 ppb)		



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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@spscon.com., www.spscon.com

Calibration Report  
Non-Dispersive Infrared CO Analyzer

Date : 26 May 2025

Brand : API

Model : 300E

No. CO-B01

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 Set Point	Initial Reading (Before Adj.), PPM			Final Reading (After Adj.), PPM
	Expected Concentration	Analyzer Response	%Dif	Analyzer Response
Zero	0	-0.10	-	0
CO Span	40.00	39.97	-0.075	40.00

API Model 300E CO Analyzer Check List

Parameter	Observed Value	Units	Nominal Range
Range	50	PPM	0-1000 ppm
Stability	0.10	PPM	< 1 ppm With Zero Air
CO Measure	4014.5	mV	2500-4800 mV
CO Reference	3947.3	mV	2500-4800 mV
Measure/Reference Ratio	1.180	-	1.1-1.3 W/Zero Air
Sample Pressure	28.5	In-Hg-A	~2" < Ambient Absolute Pressure
Sample Flow	807	CC/Min	800 ± 10%
Sample Temperature	48.3	°C	48 ± 4
Bench Temperature	48.1	°C	48 ± 2
Wheel Temperature	68.4	°C	68 ± 2
Box Temperature	30.8	°C	Ambient Temp + 7 ± 10
Photo-Drive	3034.2	mV	250 mV to 4750 mV
Slope	1.017	-	1.0 ± 0.3
Offset	0.2	-	0 ± 0.3



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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@spscon.com, www.spscon.com

Calibration Report					
Non-Dispersive Infrared CO Analyzer					
Date :	26 May 2025	Brand :	API	Model :	300E
No.	CO-B05			Serial No.	3116
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	%Dif	Analyzer Response	
Zero	0	-0.10	-	0	
CO Span	40.00	40.07	0.175	40.00	
API Model 300E CO Analyzer Check List					
Parameter	Observed Value	Units	Nominal Range		
Range	50	PPM	0-1000 ppm		
Stability	0.10	PPM	< 1 ppm With Zero Air		
CO Measure	4015.6	mV	2500-4800 mV		
CO Reference	3948.2	mV	2500-4800 mV		
Measure/Reference Ratio	1.180	-	1.1-1.3 W/Zero Air		
Sample Pressure	28.6	In-Hg-A	~2" < Ambient Absolute Pressure		
Sample Flow	812	CC/Min	800 ± 10%		
Sample Temperature	48.4	°C	48 ± 4		
Bench Temperature	48.2	°C	48 ± 2		
Wheel Temperature	68.3	°C	68 ± 2		
Box Temperature	30.7	°C	Ambient Temp + 7 ± 10		
Photo-Drive	3041.5	mV	250 mV to 4750 mV		
Slope	1.017	-	1.0 ± 0.3		
Offset	0.2	-	0 ± 0.3		





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

Calibration Report					
Non-Dispersive Infrared CO Analyzer					
Date :	26 May 2025	Brand :	API	Model :	300E
No.	CO-B06			Serial No.	3117
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		%Dif	
Zero	0	-0.10		-	
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	3946.8	mV	2500-4800 mV		
Measure/Reference Ratio	1.180	-	1.1-1.3 W/Zero Air		
Sample Pressure	28.7	In-Hg-A	~2" < Ambient Absolute Pressure		
Sample Flow	810	CC/Min	800 ± 10%		
Sample Temperature	48.3	°C	48 ± 4		
Bench Temperature	48.0	°C	48 ± 2		
Wheel Temperature	68.2	°C	68 ± 2		
Box Temperature	30.6	°C	Ambient Temp + 7 ± 10		
Photo-Drive	3032.3	mV	250 mV to 4750 mV		
Slope	1.017	-	1.0 ± 0.3		
Offset	0.2	-	0 ± 0.3		



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

Calibration Report					
Non-Dispersive Infrared CO Analyzer					
Date :	26 May 2025	Brand :	Thermo	Model :	48C
No.	CO-B08	Serial No.	0508011067		
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		%Dif	
Zero	0	0.10		-	
CO Span	40.00	39.96		-0.100	
Instrument Status					
Chamber Temp	47.2 °C		Flow	1.5 LPM	
Pressure	730.7 mm Hg		Motor Speed	100.00%	



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

Calibration Report					
Non-Dispersive Infrared CO Analyzer					
Date :	26 May 2025	Brand :	API	Model :	300E
No.	CO-B10			Serial No.	199-S
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		%Dif Analyzer Response	
Zero	0	0.11		-	
CO Span	40.00	40.05		0.125	
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	4016.9	mV	2500-4800 mV		
CO Reference	3949.1	mV	2500-4800 mV		
Measure/Reference Ratio	1.180	-	1.1-1.3 W/Zero Air		
Sample Pressure	28.4	In-Hg-A	~2" < Ambient Absolute Pressure		
Sample Flow	811	CC/Min	800 ± 10%		
Sample Temperature	48.2	°C	48 ± 4		
Bench Temperature	48.0	°C	48 ± 2		
Wheel Temperature	68.4	°C	68 ± 2		
Box Temperature	30.9	°C	Ambient Temp + 7 ± 10		
Photo-Drive	3027.5	mV	250 mV to 4750 mV		
Slope	1.017	-	1.0 ± 0.3		
Offset	0.2	-	0 ± 0.3		





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** :

**CALIBRATION DATE** :

**APPROVED BY** :

**ISSUED DATE** :

**RECEIVED DATE** :

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







CERTIFICATE No : 25M2254

PAGE : 2 OF 2

## Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : XS105DU  
MANUFACTURER : METTLER TOLEDO S/N : 1126422905  
ID No : BA05/50 RECEIVED DATE : 07-Mar-25  
AIR PRESSURE : 1009mbar  $\pm$  1mbar CALIBRATION DATE : 07-Mar-25  
AMBIENT TEMPERATURE : 24° C  $\pm$  1° C 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

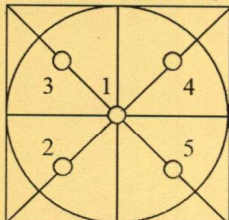
2. TARE FUNCTION : NORMAL

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 M  
COVERAGE FACTOR  $k=2$ , PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT





## เอกสารที่ 5-2

เอกสารสอบเทียบเครื่องมือการตรวจวัดคุณภาพน้ำ

## Certificate of Calibration

**Certificate No. :** 68-400046-2

**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 : SK Model : N/A  
 Range : 0 °C to 100 °C Resolution : 1 °C  
 Serial No. : N/A Immersion : Total  
 ID No. : TM21/59

**Environment :** Ambient Temperature : (23 ± 2) °C  
 Relative Humidity : (50 ± 15) %  
 Line Voltage : (220 ± 22) VAC

**Date of Received :** 21 January 2025

**Date of Calibration :** 24 January 2025

**Date of Issue :** 24 January 2025

**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)

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)

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

**Certificate No. : 68-400046-2**

**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 0.4429 °C

Standard Reading ( °C )	UUC Reading ( °C )	Correction ( °C )	Uncertainty ( ± °C )
20.4801	20	0.5	0.31

### 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%

- oOo -





# 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 :

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

page 1 of 4



@clccalibration





**CLC**  
Accredited  
ISO/IEC 17025

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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-CPTH-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**

page 2 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



## 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

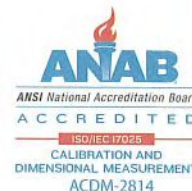


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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



**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 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





# 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 : 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 :



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



## 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.





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



## TRACEABILITY :

1. The measurements are traceable to International System of Units (SI) , through 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

page 3 of 4



@clccalibration

## 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







CERTIFICATE No : 25M2256  
REFERENCE No : 76365-3

PAGE : 1 OF 2

## 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** :

**CALIBRATION DATE** :

**APPROVED BY** :

**ISSUED DATE** :

**RECEIVED DATE** :

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







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 :-

<u>INSTRUMENT</u>	<u>MODEL</u>	<u>SERIAL No</u>	<u>CERTIFICATE No</u>	<u>DUE DATE</u>
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

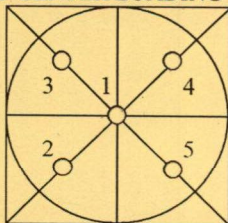
2. TARE FUNCTION : NORMAL

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







## MAINTENANCE AND TEST CERTIFICATE MODEL

### OPTIMA 5300DV

<b>Customer :</b> <u>S.P.S.Consulting Service Co.,Ltd</u>	Date Tested: <u>July 1, 2025</u>	
	Recommendation Recertification	
<b>Address :</b> <u>7 Soi Phaholyothin 24</u>	Period <u>6</u> Months	
<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>	
<b>User Name:</b> <u>K.Phenpha Vipasthawatt</u>	Visit Number: <u>1 of 2</u>	
<b>Phone:</b> <u>083-9269252</u>	PerkinElmer Phone: <u>02-719-6420 ext 206</u>	
<b>Fax:</b> <u>02-513-4221</u>	PerkinElmer Fax: <u>02-318-5597</u>	

CONFIGURATION TESTED		ACCESSORIES/COMPONENT NOT INCLUDED
<b>MODEL</b>	<b>SERIAL NUMBER</b>	
<u>OPTIMA 5300DV</u>	<u>077C7042401</u>	
<b>TESTED EQUIPMENT</b>	<b>CALIBRATION NUMBER</b>	<b>EXPIRATION</b>
<u>IPV Methods</u>		
<b>TEST STANDARD USED</b>	<b>PART NUMBER</b>	<b>EXPIRATION DATE</b>
<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>
<b>CUSTOMER SUPPLIED</b>	<b>COMMENTS</b>	<b>CUSTOMER INITIALS</b>
<u>2 % HNO3</u>		
<u>10 % HNO3</u>		



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





## 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

☒

meets

☐

does not meet

the PerkinElmer Specifications listed on this certificate.

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

**Authorized Representat**