ภาคผนวกที่ 4

เอกสารสอบเทียบความถูกต้องของเครื่องมือตรวจวัดคุณภาพสิ่งแวดล้อม

ตารางสรุปรายการเอกสารการสอบเทียบความถูกต้องของเครื่องมือเก็บตัวอย่าง
และเครื่องมือตรวจวิเคราะห์คุณภาพสิ่งแวดล้อม

รายการตรวจวัด	เครื่องมือเก็บตัวอย่าง	เครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
1. คุณภาพอากาศในบรรยากาศ		
TSP	High Volume Air Sampler No. B12, B21, B23, B39	Digital Balance
PM_{10}	High Volume PM_{10} Air Sampler No. B03, B07, B14, B31	Digital Balance
NO_2	NO_2 Analyzer No. B07, B08, B15, B21	NO_2 Analyzer No. B07, B08, B15, B21
SO_2	SO_2 Analyzer No. B06, B07, B12, B14	SO_2 Analyzer No. B06, B07, B12, B14
2. คุณภาพอากาศจากปล่อง		
Total Suspended Particulate (TSP)	Console No. B03, B05 Pitot Tube No. B31, B37	Digital Balance
Oxides of Nitrogen (NO_x)	Vacuum Gauge	Spectrophotometer
Sulfur Dioxide (SO_2)	Personal Pump SKC No. B06 Rotameter No. H-B09	Digital Balance
3. ระดับเสียงในบรรยากาศ		
L_{eq} 1 hr, L_{eq} 8 hr, L_{eq} 24 hr, L_{dn}, L_{max} และ L_{90}	Acoustic Calibrator Sound Level Meter No. ACO-B41 ACO-ST-C1-B07, B11, B12	-
4. คุณภาพน้ำ		
Temperature	-	Thermometer
Conductivity	-	Conductivity Meter
Turbidity	-	Turbidity Meter
Color	-	Spectrophotometer
pH	-	pH Meter
BOD_5	-	BOD Analyzer
COD	-	COD Reactor
Total Suspended Solids	-	Digital Balance
Total Dissolved Solids	-	Digital Balance
Grease & Oil	-	Digital Balance
Nitrate-Nitrogen	-	Spectrophotometer
Phosphate-Phosphorus	-	Spectrophotometer
Cadmium	-	ICP
Lead	-	ICP
Mercury	-	AAS
Manganese	-	ICP
Fluoride	-	Spectrophotometer
Sulfate	-	Spectrophotometer
Total Iron	-	ICP

ตารางสรุปรายการเอกสารการสอบเทียบความถูกต้องของเครื่องมือเก็บตัวอย่าง
และเครื่องมือตรวจวิเคราะห์คุณภาพสิ่งแวดล้อม (ต่อ)

รายการตรวจวัด	เครื่องมือเก็บตัวอย่าง	เครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
5. ระดับเสียงในสถานที่ทำงาน		
L_{eq} 8 hr, L_{max} และ Noise Dose	Acoustic Calibrator Sound Level Meter No. CR-R50 Sound Level Meter No. NMD-B20	-
6. คุณภาพอากาศในสถานประกอบการ		
Total Dust	Personal Pump SKC No. B15, B16 Rotameter No. H-B07	Digital Balance
Respirable Dust	Personal Pump SKC No. B04, B58 Rotameter No. H-B07	Digital Balance

คุณภาพอากาศในบรรยากาศ

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^3/min)	R^2
B01	B01	02/02/2026	y = 1.147x-3.983	0.998
B02	B02	02/02/2026	y = 1.158x-3.531	0.997
B03	B03	02/02/2026	y = 1.109x-2.595	0.999
B04	B04	02/02/2026	y = 1.123x-1.928	0.998
B05	B05	02/02/2026	y = 1.145x-3.659	0.999
B06	B06	02/02/2026	y = 1.100x-2.379	0.999
B07	B07	02/02/2026	y = 1.122x-2.377	0.999
B08	B08	02/02/2026	y = 1.102x-2.500	0.998
B09	B09	02/02/2026	y = 1.121x-3.479	0.999
B10	B10	02/02/2026	y = 1.143x-3.199	0.996
B11	B11	03/02/2026	y = 1.105x-1.251	0.999
B12	B12	03/02/2026	y = 1.136x-3.106	0.996
B13	B13	03/02/2026	y = 1.142x-2.536	0.998
B14	B14	03/02/2026	y = 1.135x-3.133	0.998
B15	B15	03/02/2026	y = 1.111x-2.932	0.998
B16	B16	04/02/2026	y = 1.104x-3.794	0.998
B17	B17	04/02/2026	y = 1.151x-2.773	0.998
B18	B18	04/02/2026	y = 1.140x-2.730	0.998
B19	B19	04/02/2026	y = 1.137x-2.624	0.998
B20	B20	04/02/2026	y = 1.139x-1.402	0.998
B21	B21	04/02/2026	y = 1.131x-1.657	0.999
B22	B22	04/02/2026	y = 1.166x-3.887	0.997
B23	B23	04/02/2026	y = 1.162x-4.278	0.998
B24	B24	04/02/2026	y = 1.128x-2.436	0.998
B25	B25	04/02/2026	Y = 1.159x-4.833	0.998
B26	B26	03/02/2026	y = 1.103x-1.969	0.997
B27	B27	04/02/2026	y = 1.149x-3.761	0.997
B28	B28	04/02/2026	y = 1.134x-3.377	0.999
B29	B29	04/02/2026	y = 1.118x-2.903	0.997
B30	B30	04/02/2026	y = 1.157x-2.504	0.999
B31	B31	04/02/2026	y = 1.165x-3.108	0.999
B32	B32	04/02/2026	y = 1.113x-2.480	0.999
B33	B33	04/02/2026	y = 1.155x-2.774	0.997
B34	B34	04/02/2026	y = 1.125x-1.905	0.997

Calibrated by : [redacted]
(Mr.Adul Dangklom)

Approved by : [redacted]
(Mr. Peera Detudom)

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 PM-10 Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard	Model : TE 5025A	S/N : 3611

Calibration Data				
High Volume PM-10 Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft^3/min)	R^2
B01	B01	02/02/2026	y = 1.066x-0.702	0.998
B02	B02	02/02/2026	y = 1.076x+0.303	0.999
B03	B03	02/02/2026	y = 1.040x+0.622	0.997
B04	B04	02/02/2026	y = 1.135x-2.410	0.998
B05	B05	02/02/2026	y = 1.073x-1.284	0.997
B06	B06	02/02/2026	y = 1.017x+2.340	0.998
B07	B07	02/02/2026	y = 1.036x+0.117	0.998
B08	B08	02/02/2026	y = 1.144x-2.648	0.997
B09	B09	02/02/2026	y = 1.115x-4.423	0.999
B10	B10	02/02/2026	y = 1.090x-2.056	0.999
B11	B11	03/02/2026	y = 1.112x-3.640	0.997
B12	B12	03/02/2026	y = 1.136x-4.495	0.997
B13	B13	03/02/2026	y = 1.119x-2.873	0.999
B14	B14	03/02/2026	y = 1.145x-3.948	0.996
B15	B15	03/02/2026	y = 1.137x-2.722	0.999
B16	B16	03/02/2026	y = 1.087x+0.251	0.997
B17	B17	03/02/2026	y = 1.096x-0.862	0.998
B18	B18	03/02/2026	y = 1.111x-3.264	0.996
B19	B19	03/02/2026	y = 1.081x+0.507	0.998
B20	B20	03/02/2026	y = 1.137x-3.001	0.999
B21	B21	03/02/2026	y = 1.129x-3.073	0.999
B22	B22	03/02/2026	y = 1.130x-2.275	0.998
B23	B23	03/02/2026	y = 1.149x-4.649	0.997
B24	B24	03/02/2026	y = 1.103x-2.139	0.999
B25	B25	03/02/2026	y = 1.065x-1.466	0.999
B26	B26	03/02/2026	y = 1.035x+0.731	0.998
B27	B27	03/02/2026	y = 1.102x-2.849	0.998
B28	B28	03/02/2026	y = 1.138x-3.306	0.996
B29	B29	03/02/2026	y = 1.046x+0.180	0.997
B30	B30	03/02/2026	y = 1.140x-5.125	0.999
B31	B31	03/02/2026	y = 1.028x+0.644	0.998
B32	B32	04/02/2026	y = 1.044x+1.254	0.999
B33	B33	04/02/2026	y = 1.106x-2.101	0.999
B34	B34	04/02/2026	y = 1.059x+0.598	0.998

Calibrated by : [redacted]
(Mr.Adul Dangklom)

Approved by : [redacted]
(Mr. Peera Detudom)

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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CALIBRATION REPORT

CHEMILUMINESCENT NO / NO_2 / NO_X ANALYZER

DATE :	06 February 2026	BRAND :	API	MODEL :	200E
NO.	NOX-B07			SERIAL NO.	4338

Calibrator (Dilution System)

Brand	: API	Model	: 700
Last Cal. Date	: 01 September 2025	Serial No.	: 911

Reference Standard Gas

Standard Gas	: Nitric Oxide (NO)			Cylinder No.	: A00674SV
Certified Date	: 12 March 2025	Expired Date	: 12 March 2028	Cylinder Conc.	: 48.7 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	0.11	-	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 200E NO_X Analyzer Check List

Test Values	Observed Value	Units	Nominal Range
RANGE	500	PPB	500 standard
STABILITY (Zero Gas)	0.1	PPB	< 2 with zero air
SAMPLE FLOW	512	cc/min	500 ± 50
OZONE FLOW	79	cc/min	80 ± 15
PMT	103.5	mV	-20 - 150
AZERO	94.2	mV	-20 - 150
HVPS	670	V	420 - 900 constant
RCELL TEMP	50.1	°C	50 ± 1
BOX TEMP	28.9	°C	8 - 48
PMT TEMP	7.0	°C	7 ± 2
MOLY TEMP	315.1	°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	1.012	-	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 : [redacted]
(Mr.Adul Dangklom)

Approved by : [redacted]
(Mr.Peera Detudom)

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

CALIBRATION REPORT

CHEMILUMINESCENT NO / NO_2 / NO_X ANALYZER

DATE :	06 February 2026	BRAND :	API	MODEL :	200E
NO.	NOX-B08			SERIAL NO.	4336

Calibrator (Dilution System)

Brand	: API	Model	: 700
Last Cal. Date	: 01 September 2025	Serial No.	: 911

Reference Standard Gas

Standard Gas	: Nitric Oxide (NO)			Cylinder No.	: A00674SV
Certified Date	: 12 March 2025	Expired Date	: 12 March 2028	Cylinder Conc.	: 48.7 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	1.004
NO_X 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	511	cc/min	500 ± 50
OZONE FLOW	79	cc/min	80 ± 15
PMT	103.3	mV	-20 - 150
AZERO	94.1	mV	-20 - 150
HVPS	673	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	314.9	°C	315 ± 5
RCELL PRESS	8.3	IN-Hg-A	2 - 10 constant
SAMPLE PRESS	28.4	IN-Hg-A	25 - 30 constant
NO Span Conc	400	PPB	20 - 20,000
NO_X Span Conc	400	PPB	20 - 20,000
NO Slope	1.004	-	1.0 ± 0.3
NO_X Slope	1.008	-	1.0 ± 0.3
NO Offset	1.0	mV	-20 to +150
NO_X Offset	0.6	mV	-20 to 150
Stability at Zero	0.1	PPB	< 0.2
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas

Calibrated by : [redacted]
(Mr.Adul Dangklom)

Approved by : [redacted]
(Mr.Peera Detudom)

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
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CALIBRATION REPORT

CHEMILUMINESCENT NO / NO_2 / NO_X ANALYZER

DATE :	06 February 2026	BRAND :	API	MODEL :	200A
NO.	NOX-B15			SERIAL NO.	213

Calibrator (Dilution System)

Brand	: API	Model	: 700
Last Cal. Date	: 01 September 2025	Serial No.	: 911

Reference Standard Gas

Standard Gas	: Nitric Oxide (NO)			Cylinder No.	: A00674SV
Certified Date	: 12 March 2025	Expired Date	: 12 March 2028	Cylinder Conc.	: 48.7 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	399.8	-0.050	400.0	1.006
NO_X Span	400	400.2	0.050	400.0	1.010

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	103.1	mV	-20 - 150
AZERO	93.9	mV	-20 - 150
HVPS	675	V	420 - 900 constant
RCELL TEMP	50..0	°C	50 ± 1
BOX TEMP	28.8	°C	8 - 48
PMT TEMP	7.1	°C	7 ± 2
MOLY TEMP	315.4	°C	315 ± 5
RCELL PRESS	8.5	IN-Hg-A	2 - 10 constant
SAMPLE PRESS	28.7	IN-Hg-A	25 - 30 constant
NO Span Conc	400	PPB	20 - 20,000
NO_X Span Conc	400	PPB	20 - 20,000
NO Slope	1.006	-	1.0 ± 0.3
NO_X Slope	1.010	-	1.0 ± 0.3
NO Offset	1.3	mV	-20 to +150
NO_X Offset	0.9	mV	-20 to 150
Stability at Zero	0.1	PPB	< 0.2
Stability at Span	0.2	PPB	< 2 ppb @ 400 ppb span gas

Calibrated by : [redacted]
(Mr.Adul Dangklom)

Approved by : [redacted]
(Mr.Peera Detudom)

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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CALIBRATION REPORT

CHEMILUMINESCENT NO / NO_2 / NO_X ANALYZER

DATE :	06 February 2026	BRAND :	API	MODEL :	TML-41M
NO.	NOX-B21			SERIAL NO.	N02374

Calibrator (Dilution System)

Brand	: API	Model	: 700
Last Cal. Date	: 01 September 2025	Serial No.	: 911

Reference Standard Gas

Standard Gas	: Nitric Oxide (NO)			Cylinder No.	: A00674SV
Certified Date	: 12 March 2025	Expired Date	: 12 March 2028	Cylinder Conc.	: 48.7 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	399.9	-0.025	400.0	1.008
NO_X Span	400	400.1	0.025	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	508	cc/min	500 ± 50
OZONE FLOW	78	cc/min	80 ± 15
PMT	103.2	mV	-20 - 150
AZERO	94.0	mV	-20 - 150
HVPS	674	V	420 - 900 constant
RCELL TEMP	50.2	°C	50 ± 1
BOX TEMP	29.4	°C	8 - 48
PMT TEMP	7.3	°C	7 ± 2
MOLY TEMP	314.8	°C	315 ± 5
RCELL PRESS	8.4	IN-Hg-A	2 - 10 constant
SAMPLE PRESS	28.6	IN-Hg-A	25 - 30 constant
NO Span Conc	400	PPB	20 - 20,000
NO_X Span Conc	400	PPB	20 - 20,000
NO Slope	1.008	-	1.0 ± 0.3
NO_X Slope	1.011	-	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 : [redacted]
(Mr.Adul Dangklom)

Approved by : [redacted]
(Mr.Peera Detudom)

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

CALIBRATION REPORT

SO_2 FLUORESCENT ANALYZER

DATE :	06 February 2026	BRAND :	API	MODEL :	100E
NO.	SO_2-B06			SERIAL NO.	3430

Calibrator (Dilution System)

Brand	: API	Model	: 700
Last Cal. Date	: 01 September 2025	Serial No.	: 911

Reference Standard Gas

Standard Gas	: Sulphur Dioxide (SO_2)			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 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	-
SO_2 Span	400.0	399.9	-0.025	400.0	1.010

API Model 100E SO_2 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	657	cc/min	650 ± 10%
PMT	103.4	mV	-20-150 with Zero Air
UV LAMP	3041.5	mV	1000-4900
STR. LGT	61.7	PPB	<100
DRK PMT	63.1	mV	-50 - 200
DRK LMP	58.0	mV	-50 - 200
HVPS	671	V	550-900 constant
DCPS	2525	mV	2500 ± 200
RCELL TEMP	50.4	°C	50 ± 1
BOX TEMP	29.3	°C	5-40
PMT TEMP	7.4	°C	7 ± 2.0
SO_2 Span Conc	400	PPB	20-20,000
SO_2 Slope	1.010	-	1.0 ± 0.3
SO_2 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)

Calibrated by : [redacted]
(Mr.Adul Dangklom)

Approved by : [redacted]
(Mr.Peera Detudom)

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CALIBRATION REPORT

SO_2 FLUORESCENT ANALYZER

DATE :	06 February 2026	BRAND :	API	MODEL :	100E
NO.	SO_2-B07			SERIAL NO.	1706

Calibrator (Dilution System)

Brand	: API	Model	: 700
Last Cal. Date	: 01 September 2025	Serial No.	: 911

Reference Standard Gas

Standard Gas	: Sulphur Dioxide (SO_2)			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 Set Point	Initial Reading (Before Adj.),PPB			Final Reading (After Adj.),PPB	
	Expected Concentration	Analyzer Response	%Dif	Analyzer Response	Slope
Zero	0	0.11	-	0	-
SO_2 Span	400.0	400.2	0.050	400.0	1.012

API Model 100E SO_2 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	653	cc/min	650 ± 10%
PMT	103.0	mV	-20-150 with Zero Air
UV LAMP	3014.6	mV	1000-4900
STR. LGT	61.5	PPB	<100
DRK PMT	62.9	mV	-50 - 200
DRK LMP	57.6	mV	-50 - 200
HVPS	675	V	550-900 constant
DCPS	2528	mV	2500 ± 200
RCELL TEMP	50.3	°C	50 ± 1
BOX TEMP	29.5	°C	5-40
PMT TEMP	7.2	°C	7 ± 2.0
SO_2 Span Conc	400	PPB	20-20,000
SO_2 Slope	1.012	-	1.0 ± 0.3
SO_2 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)

Calibrated by : [redacted]
(Mr.Adul Dangklom)

Approved by : [redacted]
(Mr.Peera Detudom)

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CALIBRATION REPORT

SO_2 FLUORESCENT ANALYZER

DATE :	06 February 2026	BRAND :	TELEDYNE	MODEL :	TML-50
NO.	SO_2-B12			SERIAL NO.	1886

Calibrator (Dilution System)

Brand	: API	Model	: 700
Last Cal. Date	: 01 September 2025	Serial No.	: 911

Reference Standard Gas

Standard Gas	: Sulphur Dioxide (SO_2)			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 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	-
SO_2 Span	400.0	399.7	-0.075	400.0	1.008

API Model TML-50 SO_2 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	103.2	mV	-20-150 with Zero Air
UV LAMP	3029.4	mV	1000-4900
STR. LGT	61.8	PPB	<100
DRK PMT	63.3	mV	-50 - 200
DRK LMP	58.1	mV	-50 - 200
HVPS	669	V	550-900 constant
DCPS	2521	mV	2500 ± 200
RCELL TEMP	50.0	°C	50 ± 1
BOX TEMP	28.8	°C	5-40
PMT TEMP	7.1	°C	7 ± 2.0
SO_2 Span Conc	400	PPB	20-20,000
SO_2 Slope	1.008	-	1.0 ± 0.3
SO_2 Offset	22.2	mV	<250
Stability at Zero	0.1	PPB	<0.2
Stability at Span	0.2	PPB	0.5% of reading (above 50 ppb)

Calibrated by : [redacted]
(Mr.Adul Dangklom)

Approved by : [redacted]
(Mr.Peera Detudom)

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CALIBRATION REPORT

SO_2 FLUORESCENT ANALYZER

DATE :	06 February 2026	BRAND :	TELEDYNE	MODEL :	M100E
NO.	SO_2-B14			SERIAL NO.	3549

Calibrator (Dilution System)

Brand	: API	Model	: 700
Last Cal. Date	: 01 September 2025	Serial No.	: 911

Reference Standard Gas

Standard Gas	: Sulphur Dioxide (SO_2)			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 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	-
SO_2 Span	400.0	400.1	0.025	400.0	1.011

API Model 100E SO_2 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	659	cc/min	650 ± 10%
PMT	103.3	mV	-20-150 with Zero Air
UV LAMP	3031.5	mV	1000-4900
STR. LGT	61.6	PPB	<100
DRK PMT	63.0	mV	-50 - 200
DRK LMP	57..8	mV	-50 - 200
HVPS	673	V	550-900 constant
DCPS	2524	mV	2500 ± 200
RCELL TEMP	50.2	°C	50 ± 1
BOX TEMP	29.1	°C	5-40
PMT TEMP	7.3	°C	7 ± 2.0
SO_2 Span Conc	400	PPB	20-20,000
SO_2 Slope	1.011	-	1.0 ± 0.3
SO_2 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)

Calibrated by : [redacted]
(Mr.Adul Dangklom)

Approved by : [redacted]
(Mr.Peera Detudom)

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

NSC-TISI-TIS17025
CALIBRATION 0049

CERTIFICATE No : 25M2254
REFERENCE No : 76365-1

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	:	[redacted] PONGSAK J.
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, Bangkae, Bangkok 10160
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www.qcalibration.com

CERTIFICATE No : 25M2254

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 ± 1mbar	**CALIBRATION DATE**	:	07-Mar-25
AMBIENT TEMPERATURE	:	24° C ± 1° C	**RELATIVE HUMIDITY**	:	54 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS 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 LINEARLITY 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

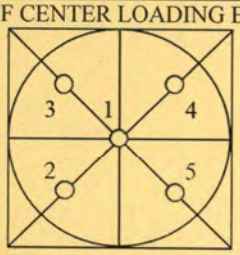
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
   - NATIONAL INSTITUTE OF METROLOGY (THAILAND)

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 (± 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	50.0000	0.0000	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

[redacted]

คุณภาพอากาศจากปล่องระบาย

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Console Calibration Report

Calibration Method	Critical Orifices

Calibration Data				
Console Data		Calibration Data		
No.	Serial No.	Date	y	$\Delta H_@$ (mmH_2O)
B01	1563	01/12/2025	1.003	49.79
B02	8002514	01/12/2025	1.004	49.61
B03	1503016	03/12/2025	0.999	49.84
B04	00006659	02/12/2025	0.998	50.06
B05	00007428	01/12/2025	1.005	49.40
R01	1561	01/12/2025	0.997	49.92
R02	8002513	03/12/2025	0.999	49.70
R03	1570	03/12/2025	1.002	49.82
R04	8002519	01/12/2025	1.005	49.95
R05	1503015	03/12/2025	0.998	49.86

Remark : Accept Value of y (test) is $0.97 < y < 1.03$

Accept Value of $\Delta H_@$ (test) is 46.7 ± 6.4 (mmH_2O)

Calibrated by :	Approved by :
[redacted]	[redacted]
(Mr. Adul Dangklom)	(Mr. Peera Detudom)

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Pitot Tube Calibration Report

Calibration Method	Standard Pitot Tube

Calibration Data					
Pitot Tube Data			Calibration Data		
No.	Type of Pitot	Coefficience of Standard Pitot	Date	Avg. of Cp (test)	
				Side A	Side B
B03	S	0.99	02/02/2026	0.84	0.84
B04	S	0.99	02/02/2026	0.84	0.83
B05	S	0.99	03/02/2026	0.84	0.84
B07	S	0.99	04/02/2026	0.84	0.83
B08	S	0.99	04/02/2026	0.85	0.84
B09	S	0.99	04/02/2026	0.84	0.84
B11	S	0.99	03/02/2026	0.84	0.85
B16	S	0.99	03/02/2026	0.83	0.84
B18	S	0.99	03/02/2026	0.84	0.84
B19	S	0.99	02/02/2026	0.84	0.84
B21	S	0.99	02/02/2026	0.84	0.83
B24	S	0.99	02/02/2026	0.84	0.83
B27	S	0.99	02/02/2026	0.84	0.84
B30	S	0.99	03/02/2026	0.84	0.85
B31	S	0.99	03/02/2026	0.84	0.84
B33	S	0.99	03/02/2026	0.83	0.84
B35	S	0.99	04/02/2026	0.84	0.84

Remark : Accept value of Cp (test) is 0.84 ± 0.01

Calibrated by : [redacted]	Approved by : [redacted]
(Mr. Adul Dangklom)	(Mr. Peera Detudom)

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Pitot Tube Calibration Report

Calibration Method	Standard Pitot Tube

Calibration Data					
Pitot Tube Data			Calibration Data		
No.	Type of Pitot	Coefficience of Standard Pitot	Date	Avg. of Cp (test)	
				Side A	Side B
B36	S	0.99	04/02/2026	0.85	0.84
B37	S	0.99	02/02/2026	0.84	0.83
B38	S	0.99	03/02/2026	0.83	0.84
B39	S	0.99	03/02/2026	0.85	0.84
B40	S	0.99	02/02/2026	0.84	0.84
B41	S	0.99	02/02/2026	0.83	0.84
B44	S	0.99	04/02/2026	0.84	0.84
B45	S	0.99	04/02/2026	0.85	0.84
B46	S	0.99	04/02/2026	0.83	0.84
B47	S	0.99	04/02/2026	0.84	0.85
B48	S	0.99	03/02/2026	0.84	0.84
B49	S	0.99	03/02/2026	0.85	0.84
B54	S	0.99	02/02/2026	0.84	0.84
B56	S	0.99	02/02/2026	0.84	0.83
B57	S	0.99	03/02/2026	0.84	0.85
B58	S	0.99	03/02/2026	0.84	0.84

Remark : Accept value of Cp (test) is 0.84 ± 0.01

Calibrated by : [redacted]	Approved by : [redacted]
(Mr. Adul Dangklom)	(Mr. Peera Detudom)

CALIBRATION LABORATORY Co.,LTD.
2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-G353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com

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Accredited
ISO/IEC17025

ACCREDIT ED
ACDM-28 14

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE	VACUUM GAUGE
MANUFACTURER	HI-LIGHT
MODEL/TYPE	N/A
SERIAL NO.	N/A[64-220088-1]
CLID.NO.	212301422
JOB CONTROL NO.	240720076546

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

DATE OF RECEIVED : 19 July 2025 **DATE OF ISSUED: 24 July 2025**

The report or calibration shall not be reproduced except in full without approval of the Calib.-ation Laborator·y Co., Ltd.

Calibrated By : **Sittipong Pimdee**
Calibration Engineer

[redacted]

Approved By : **Mongkol Yotsoontorn**
Authorized Signatory
24 July 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. Q24076546

CALIBRATION LABORATORY Co., LTD.
211Q-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-Q353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com

CLC
AccredUed
ISO/IEC 17025

CALIBRATION AND DIMENSIONAL MEASUREMENT
ACDM-2814

REPORT OF CALIBRATION

FOR

NOMENCLATURE	**VACUUM GAUGE**
MANUFACTURER	**HI-LIGHT**
MODEL/TYPE	**N/A**
SERIAL NO.	**N/A [64-220088-1]**
DATE OF CALIBRATION	**23 July 2025**
DUE DATE OF CALIBRATION	**23 July 2026**

ENVIRONMENT CONDITIONS

Temperature : (23 ± 2) °C Relative Humidity (55 ± 10) %RH

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPPP-05 according to DKD-R 6-1 as calibration guidelines. The calibration was performed by direct measurement with Document Process Calibrator and Pressure Module which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Document Process Calibrator, Fluke Model 74 1B *SIN.* 8295020 with Pressure Module Model 700PD5 *SIN.* 89404505.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand). Certificate No. MP-0040-24.

UNCERTAINTY :

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of $k = 2$. It has been evaluated according to the "Calibration of Pressure Gauges (DKD-R 6-1)" which provides a level of confidence approximately 95%.

CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

2/1Q-11,14,55 Soi Prasert Manukit 29 Yaek 4. Prasert Manukit Rd.,Ladphrao, Bangkok 10230
Tel. 02-578-D353-4 Fax:02-578-2672 ww.w.caHaboratory.com E-mail:sale@cal-laboratory.com

ANAB
ACCR E DIT E D
CALIBAATK>N AND DIMENSIONAL MEASUREMENT
ACDM-2814

CONDITION OF CALIBRATION ITEM :RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS: (X) without adjustment ( ) adjustment

The DUC was exercised by applying a known pressure from its zero to full scale I times. Then 2 series of known gauge pressure were applied. The STD reading were recorded and the means value were reported in the table below.

CALIBRATION DATA

CORRECTION OF PRESSURE

DUC Test point	STD Reading (kPa)		Conversion to inHg		Correction (inHg)	
(inHg)	Up	Down	Up	Down	Up	Down
0	0.00	0.00	0.0	0.0	0.0	0.0
-5	-15.07	-15.10	-4.5	-4.5	+0.5	+0.5
-10	-32.50	-32.84	-9.6	-9.7	+0.4	+0.3
-15	-49.44	-49.77	-14.6	-14.7	+0.4	+0.3
-20	-66.70	-66.70	-19.7	- 19.7	+0.3	+0.3
-25	-83.63	-83.97	-24.7	-24.8	+0.3	+0.2
-30	-100.39	-100.39	-29.6	-29.6	+0.4	+0.4

Uncertainty of measurement± 0.2 inHg

Transmitting fluid : Air.

Technical Note. Conversion factor I kPa ; 0.2953003 inHg

Note. The Scope of Accredited ANAB Certificate No. ACDM-28!4 Version 012 Page 43 of 67

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

End of Certificate

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

Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H | S/N : 136164

Environmental Conditions

Temperature	25	± 3	°C
Pressure	1010	± 15	mmbar

Personal Pump Data				Calibration Data								
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3	y	R^2
B01	SKC	224-PCXR4	262101	05/01/2026	1,000	1,500	2,000	1,004	1,501	2,003	1.010x – 18.941	0.999
B02	SKC	224-PCXR4	626166	05/01/2026	1,000	1,500	2,000	1,000	1,500	2,002	1.012x - 23.432	0.999
B03	SKC	224-PCXR4	612968	05/01/2026	1,000	1,500	2,000	993	1,503	2,001	1.008x - 15.587	1.000
B04	SKC	224-PCXR4	602804	06/01/2026	1,000	1,500	2,000	1,001	1,498	1,996	0.997x + 2.672	1.000
B05	SKC	224-PCXR4	612693	07/01/2026	1,000	1,500	2,000	999	1,494	1,993	0.995x + 1.555	1.000
B06	SKC	224-PCXR4	262188	06/01/2026	1,000	1,500	2,000	1,002	1,501	2,004	1.007x - 12.528	1.000
B07	SKC	224-PCXR4	626262	06/01/2026	1,000	1,500	2,000	1,003	1,501	2,002	1.010x - 19.021	0.999
B08	SKC	224-PCXR4	626100	06/01/2026	1,000	1,500	2,000	1,005	1,500	2,006	1.006x - 8.619	1.000
B09	SKC	224-PCXR4	626479	05/01/2026	1,000	1,500	2,000	1,001	1,500	2,000	1.007x - 14.458	1.000
B10	SKC	224-PCXR4	091950	05/01/2026	1,000	1,500	2,000	998	1,503	2,000	1.001x – 5.945	1.000
B11	SKC	224-PCXR8	564315	05/01/2026	1,000	1,500	2,000	993	1,494	1,993	1.010x - 25.765	0.999
B12	SKC	224-PCXR4	034656	05/01/2026	1,000	1,500	2,000	995	1,497	1,998	0.996x - 4.790	0.999
B13	SKC	224-PCXR4	602073	05/01/2026	1,000	1,500	2,000	994	1,499	1,975	0.990x + 6.525	0.999
B14	SKC	224-PCXR4	626313	05/01/2026	1,000	1,500	2,000	993	1,499	1,994	1.001x - 7.291	1.000
B15	SKC	224-PCXR4	626474	05/01/2026	1,000	1,500	2,000	992	1,505	2,002	1.012x - 23.464	1.000
B16	SKC	224-PCXR4	626477	06/01/2026	1,000	1,500	2,000	993	1,496	1,991	0.996x + 0.945	1.000
B17	SKC	224-PCXR4	626860	06/01/2026	1,000	1,500	2,000	1,000	1,500	2,001	1.007x - 14.414	1.000
B18	SKC	224-PCXR4	691484	05/01/2026	1,000	1,500	2,000	994	1,502	2,002	1.015x - 30.763	0.999
B19	SKC	224-PCXR4	691599	05/01/2026	1,000	1,500	2,000	993	1,490	1,999	1.006x - 14.713	1.000
B20	SKC	224-PCXR4	691587	05/01/2026	1,000	1,500	2,000	991	1,500	1,997	1.005x - 13.565	1.000
B21	SKC	224-PCXR4	691531	05/01/2026	1,000	1,500	2,000	1,002	1,500	2,000	1.002x - 6.050	1.000
B22	SKC	224-PCXR4	691654	05/01/2026	1,000	1,500	2,000	1,008	1,498	1,995	1.000x - 6.158	0.999
B23	SKC	224-PCXR4	798393	06/01/2026	1,000	1,500	2,000	992	1,498	1,972	0.990x + 3.813	0.999
B24	SKC	224-PCXR4	626363	06/01/2026	1,000	1,500	2,000	1,003	1,493	2,002	1.001x - 5.201	1.000
B25	SKC	224-PCXR4	798489	06/01/2026	1,000	1,500	2,000	993	1,496	1,995	1.003x - 10.857	1.000
B26	SKC	224-PCXR4	798479	06/01/2026	1,000	1,500	2,000	994	1,505	2,002	1.012x - 23.253	1.000
B27	SKC	224-PCXR4	691673	06/01/2026	1,000	1,500	2,000	996	1,506	1,989	0.994x + 5.799	1.000
B28	SKC	224-PCXR4	691570	06/01/2026	1,000	1,500	2,000	995	1,502	1,998	0.999x - 5.193	1.000
B29	SKC	224-PCXR4	626472	05/01/2026	1,000	1,500	2,000	995	1,491	1,993	0.999x - 4.662	1.000
B30	SKC	224-PCXR4	691489	05/01/2026	1,000	1,500	2,000	1,003	1,500	1,998	1.002x – 6.804	1.000
B31	SKC	224-PCXR4	691509	05/01/2026	1,000	1,500	2,000	993	1,500	1,997	0.992x + 4.256	1.000
B32	SKC	224-PCXR4	091567	05/01/2026	1,000	1,500	2,000	994	1,487	1,972	0.990x - 2.389	0.999
B33	SKC	224-PCXR4	091756	05/01/2026	1,000	1,500	2,000	993	1,496	1,998	1.013x – 28.816	0.999
B34	SKC	224-PCXR4	612962	05/01/2026	1,000	1,500	2,000	994	1,502	2,003	1.011x - 21.717	1.000
B35	SKC	224-PCXR4	602682	06/01/2026	1,000	1,500	2,000	998	1,493	2,000	1.001x - 2.561	1.000
B36	SKC	224-PCXR4	626164	06/01/2026	1,000	1,500	2,000	993	1,497	1,994	1.003x - 8.755	1.000
B37	SKC	224-PCXR4	626256	06/01/2026	1,000	1,500	2,000	993	1,508	2,007	1.009x - 10.996	1.000
B38	SKC	224-PCXR4	626167	06/01/2026	1,000	1,500	2,000	993	1,502	2,000	1.013x - 28.162	0.999
B39	SKC	224-PCXR4	034637	06/01/2026	1,000	1,500	2,000	1,000	1,497	1,993	0.991x + 9.544	1.000
B40	SKC	224-PCXR4	798349	06/01/2026	1,000	1,500	2,000	1,000	1,499	1,994	0.998x - 0.160	1.000

Calibrated by : [redacted]
(Mr. Adul Dangklom)

Approved by : [redacted]
(Mr. Peera Detudom)

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com., www.spscon.com

Rotameter Calibration Report (For Personal Pump High 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
H-B01	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	506.0	991.5	1985.3	0.991x + 9.075	1.000
H-B02	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	496.1	998.2	1994.1	0.994x + 5.436	1.000
H-B03	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	499.0	987.7	2010.2	1.004x - 13.828	0.999
H-B04	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	505.4	999.9	2008.7	0.997x + 2.196	1.000
H-B05	Dwyer	VFB-65	07/01/2026	500	1,000	2,000	494.6	997.4	1987.1	0.990x + 10.392	1.000
H-B06	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	504.3	993.8	1981.8	1.005x - 9.139	0.999
H-B07	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	504.1	996.5	2018.3	1.001x - 0.092	1.000
H-B08	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	493.6	999.9	1987.8	1.000x - 1.064	0.999
H-B09	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	503.7	1006.2	2014.3	0.994x + 14.192	1.000
H-B10	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	496.9	999.4	2012.4	0.998x + 1.930	1.000

Calibrated by : [redacted]
(Mr.Adul Dangklom)

Approved by : [redacted]
(Mr. Peera Detudom)

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

NSC-TISI-TIS17025
CALIBRATION 0049

CERTIFICATE No : 25M2254
REFERENCE No : 76365-1

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	:	[redacted] PONGSAK J.
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, Bangkae, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584
www.qcalibration.com

CERTIFICATE No : 25M2254

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 ± 1mbar	**CALIBRATION DATE**	:	07-Mar-25
AMBIENT TEMPERATURE	:	24° C ± 1° C	**RELATIVE HUMIDITY**	:	54 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS 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 LINEARLITY 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

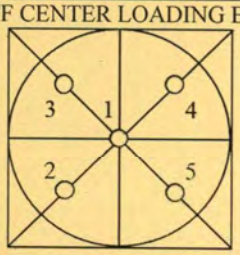
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
   - NATIONAL INSTITUTE OF METROLOGY (THAILAND)

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 (± 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	50.0000	0.0000	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

[redacted]

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

451-451/1 Sirinthorn Road, Bangbumru, Bangplud, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email : calibration@sithiphorn.com

NSC-TISI-TIS 17025
CALIBRATION 0394

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 : Nitinun Srihawan

Approved by : [redacted]

(Wichok Ekpongpradit)

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

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

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 mutiplied by a coverage factor *k*, providing a level of confidence of approximately 95%

End of Calibration Certificate

การตรวจสอบความถูกต้องของการทำงานระบบ CEMs (Audit)

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Certificate Of Analysis

Special Gases Mixture

Customer Details

Name:	Address:	Customer Tag No.:
S.P.S CONSULTING SERVICE	7 Soi Phahon Yothin 24, Phahon Yotin Rd., Chatujak Khet Chatuchak Bangkok 10900	-

Certificate Details

Number:	2813/24	Date of Issue:	6-Sep-2024	Expiry date:	6-Sep-2027

Material Details

Production Order:	90186129	Material Code:	553600-SV-44	Cylinder No.:	A00618SV
Gas content:	1.250 M^3	Filling pressure:	130.0 bar	Valve:	CGA 660 SS
Cylinder Owner:	LINDE	Cylinder Material:	Spectra seal	Cylinder Size:	10 L

Laboratory Report

Analytical Result

Component	Nominal Concentration	Analysis Result[1]	Uncertainty[2]	Method of Analysis[3]	Assay Date
Nitric Oxide	100 ppm	99.8 ppm	± 1% relative	(6) I-PB-352	30-Aug & 6-Sep-2024
Other NOx impurity In Nitrogen		Less than 4.9 ppm			

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Nitric Oxide In Nitrogen	QA2565	100.72 ± 0.50 ppm	24-Jul-2025

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-NO	31-Jul & 6-Sep-2024

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

1. All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocal EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1
2. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
3. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

[redacted]

Sukanya Parinyasoontorn
Signatory for and on behalf of Linde (Thailand) Co., Ltd.

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PB-002/F006
Iss:M/1, 01 December 2023

บริษัท ลินเด้ (ประเทศไทย) จำกัด (มหาชน)
เลขทะเบียนบริษัทมหาชนที่ 0107537000785
ชั้น 15 บางนากาวเวอร์ เอ 2/3 หมู่ 14 ถนนบางนา-ตราด กม. 6.5 ต.บางแก้ว
อ.บางพลี จ.สมุทรปราการ 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333
โรงงานเวลโกรว์: 105 หมู่ 5 ต.บางสมัคร อ.บางปะกง จ.ฉะเชิงเทรา 24180
โทรศัพท์ (66) 38.570-479-93 โทรสาร (66) 38.570-323

Linde (Thailand) Public Company Limited
PLC. Registration no.0107537000785
15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkaew Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333
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Certificate Of Analysis

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Customer Details

Name:
S.P.S Consulting Service

Address:
7 Soi Phahon Yothin 24, Phahon Yotin Rd.,
Chatujak Khet Chatuchak Bangkok 10900

Customer Tag No.:
-

Certificate Details

Number:	1403/24	Date of Issue:	10-May-2024	Expiry date:	10-May-2027

Material Details

Production Order:	90182955	Material Code:	411800-AV-44	Cylinder No.:	D599233
Gas content:	1.250 M^3	Filling pressure:	130 bar	Valve:	CGA 660 SS
Cylinder Owner:	LINDE	Cylinder Material:	Aluminum	Cylinder Size:	10 L

Laboratory Report

Analytical Result

Component	Nominal Concentration	Analysis Result[1]	Uncertainty[2]	Method of Analysis[3]	Assay Date
Nitric Oxide	200 ppm	207 ppm	± 1% relative	(6) I-PB-352	3&10- May-2024
Other Nox impurity		Less than 10.3 ppm			
In Nitrogen					

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Nitric Oxide In Nitrogen	D619611	207 ± 0.3 ppm	22-Apr-2027

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-NO	2-May-2024

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.
Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

1. All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocal EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1
2. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
3. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

[redacted]

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PB-002/F006
Iss:M/1, 01 December 2023

บริษัท ลินเด้ (ประเทศไทย) จำกัด (มหาชน)
ทะเบียนบริษัทเลขที่ 0107537000785
ชั้น 15 บางนาทาวเวอร์ เอ 2/3 หมู่ 14 ถนนบางนา-ตราด กม. 6.5 ต.บางแก้ว
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โรงงานเวลโกรว์: 105 หมู่ 5 ต.บางสมัคร อ.บางปะกง ฉะเชิงเทรา 24180
โทรศัพท์ (66) 38.570-479-93 โทรสาร (66) 38.570-323

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15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkaew
Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333
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WORLD RECOGNISED ACCREDITATION Accreditation for compliance with ISO/IEC 17025-Testing
Accreditation number : 9864

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Special Gases Mixture

Customer Details

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S.P.S Consulting Service	7 Soi Phahon Yothin 24, Phahon Yotin Rd., Chatujak , Khet Chatuchak Bangkok 10900	

Certificate Details

Number:	2891/24	Date of Issue:	13-Sep-2024	Expiry date:	12-Sep-2032

Material Details

Production Order:	90186130	Material Code:	627400-SV-45	Cylinder No.:	A007S1SV
Gas content:	1.250 M^3	Filling pressure:	130 bar (g)	Valve:	CGA 660 SS
Cylinder Owner:	LINDE	Cylinder Material:	Spectra seal	Cylinder Size:	10 L

Laboratory Report

Analytical Result

Component	Nominal Concentration	Analysis Result[1]	Uncertainty[2]	Method of Analysis[3]	Assay Date
Sulphur Dioxide In Nitrogen	50.0 ppm	50.8 ppm	± 1% relative	(6) I-PB-352	5 & 12 Sep 2024

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Sulphur Dioxide	D022340	65.8 ±0.2 ppm	23-Apr-2027
Sulphur Dioxide In Nitrogen	A00882SK	55.64 ±0.45 ppm	17-Jul-2025

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-SO2	27-Aug-2024

Comments

- When reordering, please quote the material number
- NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers and reference materials producers reports and certificates.

Note:

1. All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocal EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1
2. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
3. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasoontorn
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บริษัท ลินเด้ (ประเทศไทย) จำกัด (มหาชน)
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ชั้น 15 บางนาทาวเวอร์ เอ 2/3 หมู่ 14 ถนนบางนา-ตราด กม. 6.5 ต.บางแก้ว
อ.บางพลี จ.สมุทรปราการ 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333
โรงงานเวลโกรว์ : 105 หมู่ 5 ต.บางสมัคร อ.บางปะกง จ.ฉะเชิงเทรา 24180
โทรศัพท์ (66) 38.570-479-93 โทรสาร (66) 38.570-323

Linde (Thailand) Public Company Limited
PLC. Registration no.0107537000785
15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkaew
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Thailand, Tel (66) 38.570-479-93 Fax (66) 38.570-323

THE LINDE GROUP

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Certificate Of Analysis

Special Gases Mixture

Customer Details

Name:	Address:	Customer Tag No.:
S.P.S Consulting Service	House No. 7, Soi Phahon Yothin 24, Phahon Yotin Rd., Chatujak , Bangkok 10900	

Certificate Details

Number:	2861/22	Date of Issue:	17-Sep-2022	Expiry date:	17-Sep-2030

Material Details

Production Order:	90173618	Material Code:	636400-SK-44	Cylinder No.:	D519S20
Gas content:	5.52 M^3	Filling pressure:	145.0 bar	Valve:	CGA 660 SS
Cylinder Owner:	LINDE	Cylinder Material:	Spectra seal	Cylinder Size:	40 L

Laboratory Report

Analytical Result

Component	Norminal Concentration	Analysis Result[1]	Uncertainty[2]	Method of Analysis[3]	Assay Date
Sulphur Dioxide In Nitrogen	100 ppm	100 ppm	± 1% relative	(6) I-PB-352	10-Sep & 17-Sep-22

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Sulphur Dioxide In Nitrogen	QA8539	99.5 ± 0.7 ppm	21-Jan-2023

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-SO2	29-Aug-2022

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

1. All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocal EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1
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3. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

[redacted]

Sukanya Parinyasoontorn
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บริษัท ลินเด้ (ประเทศไทย) จำกัด (มหาชน)
เลขทะเบียนบริษัทมหาชนเลขที่ 0107537000785
ชั้น 15 บางนาทาวเวอร์ เอ 2/3 หมู่ 14 ถนนบางนา-ตราด กม. 6.5 ต.บางแก้ว
อ.บางเสาธง จ.สมุทรปราการ 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333
โรงงานเวลโกรว์: 105 หมู่ 5 ต.บางสมัคร์ อ.บางปะกง ฉะเชิงเทรา 24180
โทรศัพท์ (66) 38.570-479-93 โทรสาร (66) 38.570-323

Linde (Thailand) Public Company Limited Iss:K/2, 15 Oct 2021
PLC. Registration no.0107537000785
15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkaew
Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333
Wellgrow Plant: 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180
Thailand, Tel (66) 38.570-479-93 Fax (66) 38.570-323

THE LINDE GROUP

Linde

Certificate Of Analysis

Special Gases Mixture

Customer Details

Name:	Address:	Customer Tag No.:
S.P.S Consulting Service	7 Soi Phahon Yothin 24, Phahon Yotin Rd., Khet Chatuchak, Bangkok 10900	

Certificate Details

Number:	2317/20	Date of Issue:	25-May-2020	Expiry date:	24-May-2028

Material Details

Production Order:	90160383	Material Code:	413500-AL-44	Cylinder No.:	D900872
Gas content:	6.90 M^3	Filling pressure:	145.0 bar	Valve:	CGA 350 BRASS
Cylinder Owner:	LINDE	Cylinder Material:	Aluminum	Cylinder Size:	50 L

Laboratory Report

Analytical Result

Component	Norminal Concentration	Analysis Result[1]	Uncertainty[2]	Method of Analysis[3]	Assay Date
Carbon Monoxide In Nitrogen	200 ppm	201 ppm	± 1% relative	(6) I-PB-3S2	25-May-2020

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Carbon Monoxide In Nitrogen	2580015G	99.5 ± 0.8 ppm	30-Aug-2020

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-CO	19-May-2020

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

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3. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasoontorn [redacted]
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PB-002/F006

Iss:I/1, 01 October 2019

บริษัท ลินเด้ (ประเทศไทย) จำกัด (มหาชน)
ทะเบียนบริษัทเลขที่ 0107537000785
ชั้น 15 บางนาทาวเวอร์ เอ 2/3 หมู่ 14 ถนนบางนา-ตราด กม. 6.5 ต.บางแก้ว
อ.บางพลี จ.สมุทรปราการ 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333
โรงงานเวลโกรว์ : 105 หมู่ 5 ต.บางสมัคร อ.บางปะกง ฉะเชิงเทรา 24180
โทรศัพท์ (66) 38.570-479-93 โทรสาร (66) 38.570-323

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15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkaew
Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333
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Customer Details

Name:	Address:	Customer Tag No.:
S.P.S Consulting Service	House No.20, Soi Phahon Yothin 24, Phahon Yotin Rd., Chatujak , A. Chatuchak Bangkok 10900	-

Certificate Details

Number:	3934/24	Date of Issue:	27-Dec-2024	Expiry date:	27-Dec-2032

Material Details

Production Order:	90188420	Material Code:	575100-AV-44	Cylinder No.:	D198079
Gas content:	1.380 M^3	Filling pressure:	145.0 bar	Valve:	CGA 350 BRASS
Cylinder Owner:	LINDE	Cylinder Material:	Aluminum	Cylinder Size:	10 L

Laboratory Report

Analytical Result

Component	Nominal Concentration	Analysis Result[1]	Uncertainty[2]	Method of Analysis[3]	Assay Date
Carbon Monoxide In Nitrogen	800 ppm	810 ppm	± 1% relative	(6) I-PB-352	18-Dec-2024

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Carbon Monoxide In Nitrogen	HA603	518.6 ± 2.6 ppm	18-Jul-2028

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-CO	22-Nov-2024

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

1. All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocal EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1
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3. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasoontorn

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PB-002/F006

Iss:M/1, 01 December 2023

บริษัท ลินเด้ (ประเทศไทย) จำกัด (มหาชน)

ทะเบียนบริษัทเลขที่ 0107537000785

ชั้น 15 บางนาทาวเวอร์ เอ 2/3 หมู่ 14 ถนนบางนา-ตราด กม. 6.5 ต.บางแก้ว

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โรงงานเวลโกรว์ : 105 หมู่ 5 ต.บางสมัคร อ.บางปะกง ฉะเชิงเทรา 24180

โทรศัพท์ (66) 38.570-479-93 โทรสาร (66) 38.570-323

Linde (Thailand) Public Company Limited

PLC. Registration no.0107537000785

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkaew

Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333

Wellgrow Plant : 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180

Thailand, Tel (66) 38.570-479-93 Fax (66) 38.570-323

THE LINDE GROUP

Certificate Of Analysis

Special Gases Mixture

Customer Details

Name:	Address:	Customer Tag No.:
S.P.S Consulting Service	7 Soi Phahon Yothin 24, Phahon Yotin Rd., Chatujak , A. Chatuchak Bangkok 10900	-

Certificate Details

Number:	0302/23	Date of Issue:	13-Feb-2023	Expiry date:	13-Feb-2031
Material Details					
Production Order:	90176240	Material Code:	491600-V-44	Cylinder No.:	18K1149177
Gas content:	1.40 M^3	Filling pressure:	145.0 bar	Valve:	CGA 590 BRASS
Cylinder Owner:	LINDE	Cylinder Material:	STEEL	Cylinder Size:	10 L

Laboratory Report

Analytical Result

Component	Norminal Concentration	Analysis Result[1]	Uncertainty[2]	Method of Analysis[3]	Assay Date
Oxygen In Nitrogen	15.0%	15.1%	± 1% relative	(2) I-PB-354	13-Feb-2023

Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Oxygen In Nitrogen	48664	9.930 ± 0.025%	19-Aug-2024

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Servomex 4100 O2 analyser	Paramagnetic	14-Jan-2023

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

1. All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocal EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1
2. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
3. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

[redacted]

Sukanya Parinyasoontorn
Signatory for and on behalf of Linde (Thailand) Co., Ltd.

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บริษัท ลินเด้ (ประเทศไทย) จำกัด (มหาชน)
เลขที่ประจำตัวผู้เสียภาษีอากร 0107537000785
ชั้น 15 บางนาทาวเวอร์ เอ 2/3 หมู่ 14 ถนนบางนา-ตราด กม. 6.5 ต.บางแก้ว
อ.บางพลี จ.สมุทรปราการ 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333
โรงงานเวลโกรว์ : 105 หมู่ 5 ต.บางสมัคร อ.บางปะกง ฉะเชิงเทรา 24180
โทรศัพท์ (66) 38.570-479-93 โทรสาร (66) 38.570-323

PB-002/F006
Linde (Thailand) Public Company Limited Iss:K/2, 15 Oct 2021
PLC. Registration no.0107537000785
15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkaew Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333
Wellgrow Plant : 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180 Thailand, Tel (66) 38.570-479-93 Fax (66) 38.570-323

บริษัท ยูไนเต็ดอินดัสเตรียลแก๊ส จำกัด (สำนักงานใหญ่)
聯育股份有限公司
UNITED INDUSTRIAL GASES CO., LTD. (Head Office)
29/3 หมู่ที่ 5 ถนนบางนา-ตราด ตำบลบางเสาธง อำเภอบางเสาธง จังหวัดสมุทรปราการ 10570
29/3 MOO 5 BANGNA-TRAD ROAD, TAMBOL BANGSAOTONG, AMPHUR BANGSAOTONG, SAMUTPRAKARN 10570
TEL.: 0-2338-1460-1, 0-2708-4148-9 FAX.: 0-2338-1548, 0-2708-3873 E-mail: uiggases@truemail.co.th, uiggases@gmail.com Web: http://www.uiggases.com
เลขประจำตัวผู้เสียภาษี : 0115528000610

Certificate of Analysis

Certificate No.: **QA25020128**

Client Name :	บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด		
Address :	7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900		
Telephone :	0-2939-4370	Fax :	0-2513-4221
Contact Name :	-	Contact Email :	-

Sample Description

Sample Name :	Nitrogen 99.999% Ultra High Purity Grade	Shelf Life	3 Years
Sampling Condition :	Cylinder 7 M3 Pressure 2000 psig	Valve Ty	CGA 580
Lot No. :	-	Test Date	20/01/2025

รายการทดสอบ (Test Item)	วิธีทดสอบ (Test Method)	หน่วย (Unit)	เกณฑ์กำหนด (Specification)	ผลการทดสอบ (Results)
1. Moisture (H_2O)	LT-UIG-01 (Shaw Moisture Meter)	ppm	≤ 3.0	< 3.0
2. Oxygen (O_2)	LT-UIG-03 (Oxygen Analyzer)	ppm	≤ 3.0	< 3.0
3. Carbon Monoxide (CO)	In-house method : LT-UIG-05 (Gas Chromatography)	ppm	≤ 1.0	< 1.0
4. Carbon Dioxide (CO_2)	In-house method : LT-UIG-05 (Gas Chromatography)	ppm	≤ 1.0	< 1.0
5. THC as CH_4	In-house method : LT-UIG-06 (Gas Chromatography)	ppm	≤ 1.0	< 1.0

Note : CYLINDER No. : NI0307-0006

UNITED INDUSTRIAL GASES CO.,LTD. QC

Approved By : [redacted]

(Mr.Tuksin Kumart)

Quality Control

Date : 20 / 01 / 2025

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซออพหลโยธิน 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

Analyzer Calibration Error Data for Sampling

Source Identification : Boiler Stack No.1
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 10/02/2026

Test Personnel : Panuwit Choosing

Time : 13:50-16:20

NO_x Analyzer Calibration Data

Analyzer Type : NO_x Analyzer
Serial No. : 097

Analyzer Model : T200H
Calibration Span (ppm) : 207 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	-0.02	0.02	0.01
Mid-Level Calibration Gas	99.8	99.70	0.10	0.05
High-Level Calibration Gas	207.0	207.21	0.21	0.10
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.07

SO_2 Analyzer Calibration Data

Analyzer Type : SO_2 Analyzer
Serial No. : 224

Analyzer Model : T100H
Calibration Span (ppm) : 100 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.01	0.01	0.01
Mid-Level Calibration Gas	50.80	50.73	0.07	0.07
High-Level Calibration Gas	100.00	100.17	0.17	0.17
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.12

O_2 Analyzer Calibration Data

Analyzer Type : NO_x Analyzer (Optional Internal O_2 Sensor)
Serial No. : 097

Analyzer Model : T200H
Calibration Span (%) : 20.9 %

	Certified Cylinder Value (%)	Analyzer Calibration Response (%)	Absolute Difference (%)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.02	0.02	0.10
Mid-Level Calibration Gas	15.10	15.11	0.01	0.05
High-Level Calibration Gas	20.90	20.87	0.03	0.14
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.10

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Analyzer Calibration Error Data for Sampling

Source Identification : Boiler Stack No.1
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 10/02/2026

Test Personnel : Panuwit Choosing

Time : 13:50-16:20

CO Analyzer Calibration Data

Analyzer Type : CO Analyzer

Analyzer Model : T300M

Serial No. : 80

Calibration Span (ppm) : 810 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.03	0.03	0.00
Mid-Level Calibration Gas	201.0	201.25	0.25	0.03
High-Level Calibration Gas	810.0	810.39	0.39	0.05
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.04

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
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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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.1
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 11/02/2026

Test Personnel : Panuwit Choosing

Time : 12:10-13:00, 15:35-16:25

O_2 Analyzer Calibration Response

System Calibration : NO_x Analyzer (Optional internal O_2 Sensor)
Calibration Span. : 20.9 %

Cylinder No. : 18K1149177
Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.02	-0.01	-0.15	0.00	-0.10	0.05
Upscale Gas	15.11	15.13	0.10	15.10	-0.05	-0.15
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.15	-	-0.10	-
Drift Average (< ±3% of Span)					(Pass)	-0.15

NO_x Analyzer Calibration Response

System Calibration : NO_x Analyzer
Calibration Span. : 207.0 ppm

Cylinder No. : D599233
Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.02	0.01	0.01	0.03	0.02	0.01
Upscale Gas	207.21	207.43	0.11	207.29	0.04	-0.07
System Cal Bias Average (< ±5% of Span)		(Pass)	0.11	-	0.04	-
Drift Average (< ±3% of Span)					(Pass)	-0.07

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer
Calibration Span. : 100 ppm

Cylinder No. : A00751SV
Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.01	0.02	0.01	0.00	-0.01	-0.02
Upscale Gas	50.73	50.63	-0.10	50.76	0.03	0.13
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.10	-	0.03	-
Drift Average (< ±3% of Span)					(Pass)	0.13

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
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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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.1
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 11/02/2026

Test Personnel : Panuwit Choosing

Time : 12:10-13:00, 15:35-16:25

CO Analyzer Calibration Response

System Calibration : CO Analyzer

Cylinder No. : D198079

Calibration Span. : 810 ppm

Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.03	0.12	0.01	0.03	0.00	-0.01
Upscale Gas	810.39	810.61	0.03	810.32	-0.01	-0.04
System Cal Bias Average (< ±5% of Span)		(Pass)	0.03	-	-0.01	-
Drift Average (< ±3% of Span)					(Pass)	-0.04

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.1
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 11/02/2026

Test Personnel : Panuwit Choosing

Time : 15:35-16:25, 18:35-19:25

O_2 Analyzer Calibration Response

System Calibration : NO_x Analyzer (Optional internal O_2 Sensor)
Calibration Span. : 20.9 %

Cylinder No. : 18K1149177
Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.02	0.00	-0.10	0.02	0.00	0.10
Upscale Gas	15.11	15.10	-0.05	15.12	0.05	0.10
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.10	-	0.05	-
Drift Average (< ±3% of Span)					(Pass)	0.10

NO_x Analyzer Calibration Response

System Calibration : NO_x Analyzer
Calibration Span. : 207.0 ppm

Cylinder No. : D599233
Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.02	0.03	0.02	-0.02	0.00	-0.02
Upscale Gas	207.21	207.29	0.04	207.10	-0.05	-0.09
System Cal Bias Average (< ±5% of Span)		(Pass)	0.04	-	-0.05	-
Drift Average (< ±3% of Span)					(Pass)	-0.09

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer
Calibration Span. : 100 ppm

Cylinder No. : A00751SV
Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.01	0.00	-0.01	-0.02	-0.03	-0.02
Upscale Gas	50.73	50.76	0.03	50.84	0.11	0.08
System Cal Bias Average (< ±5% of Span)		(Pass)	0.03	-	0.11	-
Drift Average (< ±3% of Span)					(Pass)	0.08

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.1
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 11/02/2026

Test Personnel : Panuwit Choosing

Time : 15:35-16:25, 18:35-19:25

CO Analyzer Calibration Response

System Calibration : CO Analyzer

Cylinder No. : D198079

Calibration Span. : 810 ppm

Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.03	0.03	0.00	-0.06	-0.01	-0.01
Upscale Gas	810.39	810.32	-0.01	810.17	-0.03	-0.02
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.01	-	-0.03	-
Drift Average (< ±3% of Span)					(Pass)	-0.02

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.1 Date : 11/02/2026

บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)

ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Test Personnel : Panuwit Choosing Time : 18:35-19:25, 21:35-22:25

O_2 Analyzer Calibration Response

System Calibration : NO_x Analyzer (Optional internal O_2 Sensor) Cylinder No. : 18K1149177

Calibration Span. : 20.9 % Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.02	0.02	0.00	0.03	0.05	0.05
Upscale Gas	15.11	15.12	0.05	15.14	0.15	0.10
System Cal Bias Average (< ±5% of Span)		(Pass)	0.05	-	0.15	-
Drift Average (< ±3% of Span)					(Pass)	0.10

NO_x Analyzer Calibration Response

System Calibration : NO_x Analyzer Cylinder No. : D599233

Calibration Span. : 207.0 ppm Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.02	-0.02	0.00	0.00	0.01	0.01
Upscale Gas	207.21	207.10	-0.05	207.37	0.08	0.13
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.05	-	0.08	-
Drift Average (< ±3% of Span)					(Pass)	0.13

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer Cylinder No. : A00751SV

Calibration Span. : 100 ppm Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.01	-0.02	-0.03	0.01	0.00	0.03
Upscale Gas	50.73	50.84	0.11	50.70	-0.03	-0.14
System Cal Bias Average (< ±5% of Span)		(Pass)	0.11	-	-0.03	-
Drift Average (< ±3% of Span)					(Pass)	-0.14

[redacted]

(Panuwit Choosing)

Site Operator

[redacted]

(Peera Detudom)

Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.1
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 11/02/2026

Test Personnel : Panuwit Choosing

Time : 18:35-19:25, 21:35-22:25

CO Analyzer Calibration Response

System Calibration : CO Analyzer

Calibration Span. : 810 ppm

Cylinder No. : D198079

Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.03	-0.06	-0.01	-0.12	-0.02	-0.01
Upscale Gas	810.39	810.17	-0.03	810.65	0.03	0.06
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.03	-	0.03	-
Drift Average (< ±3% of Span)					(Pass)	0.06

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.1
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

NO_x Standard Gas Data

Cylinder Number : A00618SV
Certified Concentration : 99.8 ppm

Certification Date : 6-Sep-2024
Expiration Date : 6-Sep-2027

NO_x Standard Gas Verified Data

Analyzer Type : NO_x Analyzer
Serial No. : 097

Analyzer Model : T200H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	99.8	99.73	-0.07	-0.070
2	99.8	99.67	-0.13	-0.130
3	99.8	99.75	-0.05	-0.050
% Diff. Average (< ±1% of Certified Cylinder Value)			(Pass)	-0.084

NO_x Standard Gas Data

Cylinder Number : D599233
Certified Concentration : 207 ppm

Certification Date : 10-May-2024
Expiration Date : 10-May-2027

NO_x Standard Gas Verified Data

Analyzer Type : NO_x Analyzer
Serial No. : 097

Analyzer Model : T200H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	207.0	207.13	0.13	0.063
2	207.0	207.25	0.25	0.121
3	207.0	207.09	0.09	0.043
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.076

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.1
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

SO_2 Standard Gas Data

Cylinder Number : A00751SV
Certified Concentration : 50.8 ppm

Certification Date : 13-Sep-2024
Expiration Date : 12-Sep-2032

SO_2 Standard Gas Verified Data

Analyzer Type : SO_2 Analyzer
Serial No. : 224

Analyzer Model : T100H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	50.8	50.74	-0.06	-0.118
2	50.8	50.68	-0.12	-0.236
3	50.8	50.72	-0.08	-0.157
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	-0.171

SO_2 Standard Gas Data

Cylinder Number : D519520
Certified Concentration : 100 ppm

Certification Date : 17-Sep-2022
Expiration Date : 17-Sep-2030

SO_2 Standard Gas Verified Data

Analyzer Type : SO_2 Analyzer
Serial No. : 224

Analyzer Model : T100H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	100.0	100.12	0.12	0.120
2	100.0	100.20	0.20	0.200
3	100.0	100.08	0.08	0.080
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.133

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com., www.spscon.com

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.1
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

CO Standard Gas Data

Cylinder Number : D900872
Certified Concentration : 201 ppm

Certification Date : 25-May-2020
Expiration Date : 24-May-2028

CO Standard Gas Verified Data

Analyzer Type : CO Analyzer
Serial No. : 80

Analyzer Model : T300M

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	201.0	201.16	0.16	0.080
2	201.0	201.29	0.29	0.144
3	201.0	201.11	0.11	0.055
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.093

CO Standard Gas Data

Cylinder Number : D198079
Certified Concentration : 810 ppm

Certification Date : 27-Dec-2024
Expiration Date : 27-Dec-2032

CO Standard Gas Verified Data

Analyzer Type : CO Analyzer
Serial No. : 80

Analyzer Model : T300M

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	810.0	810.21	0.21	0.026
2	810.0	810.45	0.45	0.056
3	810.0	810.14	0.14	0.017
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.033

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
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Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com., www.spscon.com

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.1
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

O_2 Standard Gas Data

Cylinder Number : 18K1149177
Certified Concentration : 15.1%

Certification Date : 13-Feb-2023
Expiration Date : 13-Feb-2031

O_2 Standard Gas Verified Data

Analyzer Type : NO_x Analyzer (Optional Internal O_2 Sensor)
Analyzer Model : T200H
Serial No. : 097

Number of Sample	Certified Cylinder Value (%)	Verified Data Response (%)	Difference Value (%)	% Diff.
1	15.10	15.11	0.01	0.066
2	15.10	15.12	0.02	0.132
3	15.10	15.10	0.00	0.000
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.066

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Analyzer Calibration Error Data for Sampling

Source Identification : Boiler Stack No.2
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 10/02/2026

Test Personnel : Panuwit Choosing

Time : 13:50-16:20

NO_X Analyzer Calibration Data

Analyzer Type : NO_X Analyzer
Serial No. : 328
Analyzer Model : T200H
Calibration Span (ppm) : 207 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.02	0.02	0.01
Mid-Level Calibration Gas	99.8	99.73	0.07	0.03
High-Level Calibration Gas	207.0	207.19	0.19	0.09
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.06

SO_2 Analyzer Calibration Data

Analyzer Type : SO_2 Analyzer
Serial No. : 97
Analyzer Model : T100H
Calibration Span (ppm) : 100 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	-0.01	0.01	0.01
Mid-Level Calibration Gas	50.80	50.71	0.09	0.09
High-Level Calibration Gas	100.00	100.14	0.14	0.14
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.11

O_2 Analyzer Calibration Data

Analyzer Type : NO_X Analyzer (Optional Internal O_2 Sensor)
Serial No. : 328
Analyzer Model : T200H
Calibration Span (%) : 20.9 %

	Certified Cylinder Value (%)	Analyzer Calibration Response (%)	Absolute Difference (%)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.03	0.03	0.14
Mid-Level Calibration Gas	15.10	15.12	0.02	0.10
High-Level Calibration Gas	20.90	20.88	0.02	0.10
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.10

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Analyzer Calibration Error Data for Sampling

Source Identification : Boiler Stack No.2
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 10/02/2026

Test Personnel : Panuwit Choosing

Time : 13:50-16:20

CO Analyzer Calibration Data

Analyzer Type : CO Analyzer

Analyzer Model : T300M

Serial No. : 250

Calibration Span (ppm) : 810 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.06	0.06	0.01
Mid-Level Calibration Gas	201.0	201.20	0.20	0.02
High-Level Calibration Gas	810.0	810.34	0.34	0.04
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.03

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
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System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.2 Date : 11/02/2026

บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)

ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Test Personnel : Panuwit Choosing Time : 12:10-13:00, 15:35-16:25

O_2 Analyzer Calibration Response

System Calibration : NO_x Analyzer (Optional internal O_2 Sensor) Cylinder No. : 18K1149177

Calibration Span. : 20.9 % Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.03	0.02	-0.05	-0.01	-0.20	-0.15
Upscale Gas	15.12	15.10	-0.10	15.14	0.10	0.20
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.10	-	-0.20	-
Drift Average (< ±3% of Span)					(Pass)	0.20

NO_x Analyzer Calibration Response

System Calibration : NO_x Analyzer Cylinder No. : D599233

Calibration Span. : 207.0 ppm Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.02	-0.02	-0.02	0.02	0.00	0.02
Upscale Gas	207.19	206.98	-0.10	207.25	0.03	0.13
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.10	-	0.03	-
Drift Average (< ±3% of Span)					(Pass)	0.13

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer Cylinder No. : A00751SV

Calibration Span. : 100 ppm Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.01	0.01	0.02	0.02	0.03	0.01
Upscale Gas	50.71	50.78	0.07	50.85	0.14	0.07
System Cal Bias Average (< ±5% of Span)		(Pass)	0.07	-	0.14	-
Drift Average (< ±3% of Span)					(Pass)	0.07

[redacted]

(Panuwit Choosing)

Site Operator

[redacted]

(Peera Detudom)

Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.2
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 11/02/2026

Test Personnel : Panuwit Choosing

Time : 12:10-13:00, 15:35-16:25

CO Analyzer Calibration Response

System Calibration : CO Analyzer
Calibration Span. : 810 ppm

Cylinder No. : D198079
Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.06	-0.06	-0.01	0.06	0.00	0.01
Upscale Gas	810.34	810.12	-0.03	810.51	0.02	0.05
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.03	-	0.02	-
Drift Average (< ±3% of Span)					(Pass)	0.05

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.2 — Date : 11/02/2026

บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)

ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Test Personnel : Panuwit Choosing — Time : 15:35-16:25, 18:35-19:25

O_2 Analyzer Calibration Response

System Calibration : NO_x Analyzer (Optional internal O_2 Sensor) — Cylinder No. : 18K1149177

Calibration Span. : 20.9 % — Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.03	-0.01	-0.20	0.01	-0.10	0.10
Upscale Gas	15.12	15.14	0.10	15.13	0.05	-0.05
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.20	-	-0.10	-
Drift Average (< ±3% of Span)					(Pass)	0.10

NO_x Analyzer Calibration Response

System Calibration : NO_x Analyzer — Cylinder No. : D599233

Calibration Span. : 207.0 ppm — Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.02	0.02	0.00	0.04	0.01	0.01
Upscale Gas	207.19	207.25	0.03	207.43	0.12	0.09
System Cal Bias Average (< ±5% of Span)		(Pass)	0.03	-	0.12	-
Drift Average (< ±3% of Span)					(Pass)	0.09

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer — Cylinder No. : A00751SV

Calibration Span. : 100 ppm — Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.01	0.02	0.03	-0.01	0.00	-0.03
Upscale Gas	50.71	50.85	0.14	50.68	-0.03	-0.17
System Cal Bias Average (< ±5% of Span)		(Pass)	0.14	-	-0.03	-
Drift Average (< ±3% of Span)					(Pass)	-0.17

[redacted]

(Panuwit Choosing)

Site Operator

[redacted]

(Peera Detudom)

Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.2
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 11/02/2026

Test Personnel : Panuwit Choosing

Time : 15:35-16:25, 18:35-19:25

CO Analyzer Calibration Response

System Calibration : CO Analyzer

Cylinder No. : D198079

Calibration Span. : 810 ppm

Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.06	0.06	0.00	0.12	0.01	0.01
Upscale Gas	810.34	810.51	0.02	810.73	0.05	0.03
System Cal Bias Average (< ±5% of Span)		(Pass)	0.02	-	0.05	-
Drift Average (< ±3% of Span)					(Pass)	0.03

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.2
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 11/02/2026

Test Personnel : Panuwit Choosing

Time : 18:35-19:25, 21:35-22:25

O_2 Analyzer Calibration Response

System Calibration : NO_X Analyzer (Optional internal O_2 Sensor)
Calibration Span. : 20.9 %

Cylinder No. : 18K1149177
Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.03	0.01	-0.10	-0.02	-0.25	-0.15
Upscale Gas	15.12	15.13	0.05	15.11	-0.05	-0.10
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.10	-	-0.25	-
Drift Average (< ±3% of Span)					(Pass)	-0.15

NO_X Analyzer Calibration Response

System Calibration : NO_X Analyzer
Calibration Span. : 207.0 ppm

Cylinder No. : D599233
Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.02	0.04	0.01	0.00	-0.01	-0.02
Upscale Gas	207.19	207.43	0.12	207.31	0.06	-0.06
System Cal Bias Average (< ±5% of Span)		(Pass)	0.12	-	0.06	-
Drift Average (< ±3% of Span)					(Pass)	-0.06

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer
Calibration Span. : 100 ppm

Cylinder No. : A00751SV
Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.01	-0.01	0.00	-0.02	-0.01	-0.01
Upscale Gas	50.71	50.68	-0.03	50.76	0.05	0.08
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.03	-	0.05	-
Drift Average (< ±3% of Span)					(Pass)	0.08

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซออพหลโยธิน 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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.2
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210
Test Personnel : Panuwit Choosing

Date : 11/02/2026
Time : 18:35-19:25, 21:35-22:25

CO Analyzer Calibration Response

System Calibration : CO Analyzer
Calibration Span. : 810 ppm

Cylinder No. : D198079
Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.06	0.12	0.01	0.00	-0.01	-0.01
Upscale Gas	810.34	810.73	0.05	810.47	0.02	-0.03
System Cal Bias Average (< ±5% of Span)		(Pass)	0.05	-	0.02	-
Drift Average (< ±3% of Span)					(Pass)	-0.03

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.2
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

NO_x Standard Gas Data

Cylinder Number : A00618SV
Certified Concentration : 99.8 ppm

Certification Date : 6-Sep-2024
Expiration Date : 6-Sep-2027

NO_x Standard Gas Verified Data

Analyzer Type : NO_x Analyzer
Serial No. : 097

Analyzer Model : T200H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	99.8	99.73	-0.07	-0.070
2	99.8	99.67	-0.13	-0.130
3	99.8	99.75	-0.05	-0.050
% Diff. Average (< ±1% of Certified Cylinder Value)			(Pass)	-0.084

NO_x Standard Gas Data

Cylinder Number : D599233
Certified Concentration : 207 ppm

Certification Date : 10-May-2024
Expiration Date : 10-May-2027

NO_x Standard Gas Verified Data

Analyzer Type : NO_x Analyzer
Serial No. : 097

Analyzer Model : T200H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	207.0	207.13	0.13	0.063
2	207.0	207.25	0.25	0.121
3	207.0	207.09	0.09	0.043
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.076

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.2
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

SO_2 Standard Gas Data

Cylinder Number : A00751SV
Certified Concentration : 50.8 ppm

Certification Date : 13-Sep-2024
Expiration Date : 12-Sep-2032

SO_2 Standard Gas Verified Data

Analyzer Type : SO_2 Analyzer
Serial No. : 224

Analyzer Model : T100H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	50.8	50.74	-0.06	-0.118
2	50.8	50.68	-0.12	-0.236
3	50.8	50.72	-0.08	-0.157
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	-0.171

SO_2 Standard Gas Data

Cylinder Number : D519520
Certified Concentration : 100 ppm

Certification Date : 17-Sep-2022
Expiration Date : 17-Sep-2030

SO_2 Standard Gas Verified Data

Analyzer Type : SO_2 Analyzer
Serial No. : 224

Analyzer Model : T100H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	100.0	100.12	0.12	0.120
2	100.0	100.20	0.20	0.200
3	100.0	100.08	0.08	0.080
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.133

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.2
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

CO Standard Gas Data

Cylinder Number : D900872
Certified Concentration : 201 ppm

Certification Date : 25-May-2020
Expiration Date : 24-May-2028

CO Standard Gas Verified Data

Analyzer Type : CO Analyzer
Serial No. : 80

Analyzer Model : T300M

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	201.0	201.16	0.16	0.080
2	201.0	201.29	0.29	0.144
3	201.0	201.11	0.11	0.055
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.093

CO Standard Gas Data

Cylinder Number : D198079
Certified Concentration : 810 ppm

Certification Date : 27-Dec-2024
Expiration Date : 27-Dec-2032

CO Standard Gas Verified Data

Analyzer Type : CO Analyzer
Serial No. : 80

Analyzer Model : T300M

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	810.0	810.21	0.21	0.026
2	810.0	810.45	0.45	0.056
3	810.0	810.14	0.14	0.017
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.033

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.2
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

O_2 Standard Gas Data

Cylinder Number : 18K1149177
Certified Concentration : 15.1%

Certification Date : 13-Feb-2023
Expiration Date : 13-Feb-2031

O_2 Standard Gas Verified Data

Analyzer Type : NO_X Analyzer (Optional Internal O_2 Sensor)
Analyzer Model : T200H
Serial No. : 097

Number of Sample	Certified Cylinder Value (%)	Verified Data Response (%)	Difference Value (%)	% Diff.
1	15.10	15.11	0.01	0.066
2	15.10	15.12	0.02	0.132
3	15.10	15.10	0.00	0.000
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.066

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Analyzer Calibration Error Data for Sampling

Source Identification : Boiler Stack No.3
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 10/02/2026

Test Personnel : Panuwit Choosing

Time : 13:50-16:20

NO_x Analyzer Calibration Data

Analyzer Type : NO_x Analyzer
Serial No. : 097
Analyzer Model : T200H
Calibration Span (ppm) : 207 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	-0.02	0.02	0.01
Mid-Level Calibration Gas	99.8	99.70	0.10	0.05
High-Level Calibration Gas	207.0	207.21	0.21	0.10
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.07

SO_2 Analyzer Calibration Data

Analyzer Type : SO_2 Analyzer
Serial No. : 224
Analyzer Model : T100H
Calibration Span (ppm) : 100 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.01	0.01	0.01
Mid-Level Calibration Gas	50.80	50.73	0.07	0.07
High-Level Calibration Gas	100.00	100.17	0.17	0.17
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.12

O_2 Analyzer Calibration Data

Analyzer Type : NO_x Analyzer (Optional Internal O_2 Sensor)
Serial No. : 097
Analyzer Model : T200H
Calibration Span (%) : 20.9 %

	Certified Cylinder Value (%)	Analyzer Calibration Response (%)	Absolute Difference (%)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.02	0.02	0.10
Mid-Level Calibration Gas	15.10	15.11	0.01	0.05
High-Level Calibration Gas	20.90	20.87	0.03	0.14
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.10

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Analyzer Calibration Error Data for Sampling

Source Identification : Boiler Stack No.3
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 10/02/2026

Test Personnel : Panuwit Choosing

Time : 13:50-16:20

CO Analyzer Calibration Data

Analyzer Type : CO Analyzer

Analyzer Model : T300M

Serial No. : 80

Calibration Span (ppm) : 810 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.03	0.03	0.00
Mid-Level Calibration Gas	201.0	201.25	0.25	0.03
High-Level Calibration Gas	810.0	810.39	0.39	0.05
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.04

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 อนนพหลโยธิน 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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.3
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 15/02/2026

Test Personnel : Panuwit Choosing

Time : 10:50-11:40, 14:05-14:55

O_2 Analyzer Calibration Response

System Calibration : NO_x Analyzer (Optional internal O_2 Sensor)
Calibration Span. : 20.9 %

Cylinder No. : 18K1149177
Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.02	0.05	0.15	0.03	0.05	-0.10
Upscale Gas	15.11	15.09	-0.10	15.12	0.05	0.15
System Cal Bias Average (< ±5% of Span)		(Pass)	0.15	-	0.05	-
Drift Average (< ±3% of Span)					(Pass)	0.15

NO_x Analyzer Calibration Response

System Calibration : NO_x Analyzer
Calibration Span. : 207.0 ppm

Cylinder No. : D599233
Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.02	0.00	0.01	0.04	0.03	0.02
Upscale Gas	207.21	206.94	-0.13	207.16	-0.02	0.11
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.13	-	0.03	-
Drift Average (< ±3% of Span)					(Pass)	0.11

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer
Calibration Span. : 100 ppm

Cylinder No. : A00751SV
Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.01	-0.02	-0.03	-0.03	-0.04	-0.01
Upscale Gas	50.73	50.79	0.06	50.88	0.15	0.09
System Cal Bias Average (< ±5% of Span)		(Pass)	0.06	-	0.15	-
Drift Average (< ±3% of Span)					(Pass)	0.09

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.3
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 15/02/2026

Test Personnel : Panuwit Choosing

Time : 10:50-11:40, 14:05-14:55

CO Analyzer Calibration Response

System Calibration : CO Analyzer
Calibration Span. : 810 ppm

Cylinder No. : D198079
Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.03	-0.06	-0.01	0.12	0.01	0.02
Upscale Gas	810.39	810.12	-0.03	810.46	0.01	0.04
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.03	-	0.01	-
Drift Average (< ±3% of Span)					(Pass)	0.04

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.3
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 15/02/2026

Test Personnel : Panuwit Choosing

Time : 14:05-14:55, 17:05-17:55

O_2 Analyzer Calibration Response

System Calibration : NO_x Analyzer (Optional internal O_2 Sensor)
Calibration Span. : 20.9 %

Cylinder No. : 18K1149177
Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.02	0.03	0.05	0.01	-0.05	-0.10
Upscale Gas	15.11	15.12	0.05	15.10	-0.05	-0.10
System Cal Bias Average (< ±5% of Span)		(Pass)	0.05	-	-0.05	-
Drift Average (< ±3% of Span)					(Pass)	-0.10

NO_x Analyzer Calibration Response

System Calibration : NO_x Analyzer
Calibration Span. : 207.0 ppm

Cylinder No. : D599233
Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.02	0.04	0.03	0.02	0.02	-0.01
Upscale Gas	207.21	207.16	-0.02	207.53	0.15	0.18
System Cal Bias Average (< ±5% of Span)		(Pass)	0.03	-	0.15	-
Drift Average (< ±3% of Span)					(Pass)	0.18

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer
Calibration Span. : 100 ppm

Cylinder No. : A00751SV
Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.01	-0.03	-0.04	-0.01	-0.02	0.02
Upscale Gas	50.73	50.88	0.15	50.71	-0.02	-0.17
System Cal Bias Average (< ±5% of Span)		(Pass)	0.15	-	-0.02	-
Drift Average (< ±3% of Span)					(Pass)	-0.17

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.3
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 15/02/2026

Test Personnel : Panuwit Choosing

Time : 14:05-14:55, 17:05-17:55

CO Analyzer Calibration Response

System Calibration : CO Analyzer

Cylinder No. : D198079

Calibration Span. : 810 ppm

Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.03	0.12	0.01	0.03	0.00	-0.01
Upscale Gas	810.39	810.46	0.01	810.74	0.04	0.03
System Cal Bias Average (< ±5% of Span)		(Pass)	0.01	-	0.04	-
Drift Average (< ±3% of Span)					(Pass)	0.03

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.3
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 15/02/2026

Test Personnel : Panuwit Choosing

Time : 17:05-17:55, 20:05-20:55

O_2 Analyzer Calibration Response

System Calibration : NO_x Analyzer (Optional internal O_2 Sensor)
Calibration Span. : 20.9 %

Cylinder No. : 18K1149177
Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.02	0.01	-0.05	-0.02	-0.20	-0.15
Upscale Gas	15.11	15.10	-0.05	15.11	0.00	0.05
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.05	-	-0.20	-
Drift Average (< ±3% of Span)					(Pass)	-0.15

NO_x Analyzer Calibration Response

System Calibration : NO_x Analyzer
Calibration Span. : 207.0 ppm

Cylinder No. : D599233
Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.02	0.02	0.02	-0.02	0.00	-0.02
Upscale Gas	207.21	207.53	0.15	207.26	0.02	-0.13
System Cal Bias Average (< ±5% of Span)		(Pass)	0.15	-	0.02	-
Drift Average (< ±3% of Span)					(Pass)	-0.13

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer
Calibration Span. : 100 ppm

Cylinder No. : A00751SV
Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.01	-0.01	-0.02	0.01	0.00	0.02
Upscale Gas	50.73	50.71	-0.02	50.65	-0.08	-0.06
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.02	-	-0.08	-
Drift Average (< ±3% of Span)					(Pass)	-0.06

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 อนนพหลโยธิน 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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.3
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 15/02/2026

Test Personnel : Panuwit Choosing

Time : 17:05-17:55, 20:05-20:55

CO Analyzer Calibration Response

System Calibration : CO Analyzer

Cylinder No. : D198079

Calibration Span. : 810 ppm

Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.03	0.03	0.00	0.08	0.01	0.01
Upscale Gas	810.39	810.74	0.04	810.55	0.02	-0.02
System Cal Bias Average (< ±5% of Span)		(Pass)	0.04	-	0.02	-
Drift Average (< ±3% of Span)					(Pass)	-0.02

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.3
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

NO_x Standard Gas Data

Cylinder Number : A00618SV
Certified Concentration : 99.8 ppm

Certification Date : 6-Sep-2024
Expiration Date : 6-Sep-2027

NO_x Standard Gas Verified Data

Analyzer Type : NO_x Analyzer
Serial No. : 097

Analyzer Model : T200H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	99.8	99.73	-0.07	-0.070
2	99.8	99.67	-0.13	-0.130
3	99.8	99.75	-0.05	-0.050
% Diff. Average (< ±1% of Certified Cylinder Value)			(Pass)	-0.084

NO_x Standard Gas Data

Cylinder Number : D599233
Certified Concentration : 207 ppm

Certification Date : 10-May-2024
Expiration Date : 10-May-2027

NO_x Standard Gas Verified Data

Analyzer Type : NO_x Analyzer
Serial No. : 097

Analyzer Model : T200H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	207.0	207.13	0.13	0.063
2	207.0	207.25	0.25	0.121
3	207.0	207.09	0.09	0.043
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.076

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.3
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

SO_2 Standard Gas Data

Cylinder Number : A00751SV
Certified Concentration : 50.8 ppm

Certification Date : 13-Sep-2024
Expiration Date : 12-Sep-2032

SO_2 Standard Gas Verified Data

Analyzer Type : SO_2 Analyzer
Serial No. : 224

Analyzer Model : T100H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	50.8	50.74	-0.06	-0.118
2	50.8	50.68	-0.12	-0.236
3	50.8	50.72	-0.08	-0.157
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	-0.171

SO_2 Standard Gas Data

Cylinder Number : D519520
Certified Concentration : 100 ppm

Certification Date : 17-Sep-2022
Expiration Date : 17-Sep-2030

SO_2 Standard Gas Verified Data

Analyzer Type : SO_2 Analyzer
Serial No. : 224

Analyzer Model : T100H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	100.0	100.12	0.12	0.120
2	100.0	100.20	0.20	0.200
3	100.0	100.08	0.08	0.080
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.133

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.3
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

CO Standard Gas Data

Cylinder Number : D900872
Certified Concentration : 201 ppm

Certification Date : 25-May-2020
Expiration Date : 24-May-2028

CO Standard Gas Verified Data

Analyzer Type : CO Analyzer
Serial No. : 80

Analyzer Model : T300M

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	201.0	201.16	0.16	0.080
2	201.0	201.29	0.29	0.144
3	201.0	201.11	0.11	0.055
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.093

CO Standard Gas Data

Cylinder Number : D198079
Certified Concentration : 810 ppm

Certification Date : 27-Dec-2024
Expiration Date : 27-Dec-2032

CO Standard Gas Verified Data

Analyzer Type : CO Analyzer
Serial No. : 80

Analyzer Model : T300M

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	810.0	810.21	0.21	0.026
2	810.0	810.45	0.45	0.056
3	810.0	810.14	0.14	0.017
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.033

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.3
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 1)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

O_2 Standard Gas Data

Cylinder Number : 18K1149177
Certified Concentration : 15.1%

Certification Date : 13-Feb-2023
Expiration Date : 13-Feb-2031

O_2 Standard Gas Verified Data

Analyzer Type : NO_X Analyzer (Optional Internal O_2 Sensor)
Analyzer Model : T200H
Serial No. : 097

Number of Sample	Certified Cylinder Value (%)	Verified Data Response (%)	Difference Value (%)	% Diff.
1	15.10	15.11	0.01	0.066
2	15.10	15.12	0.02	0.132
3	15.10	15.10	0.00	0.000
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.066

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Analyzer Calibration Error Data for Sampling

Source Identification : Boiler Stack No.4
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 10/02/2026

Test Personnel : Panuwit Choosing

Time : 13:50-16:20

NO_x Analyzer Calibration Data

Analyzer Type : NO_x Analyzer
Serial No. : 097

Analyzer Model : T200H
Calibration Span (ppm) : 207 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	-0.02	0.02	0.01
Mid-Level Calibration Gas	99.8	99.70	0.10	0.05
High-Level Calibration Gas	207.0	207.21	0.21	0.10
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.07

SO_2 Analyzer Calibration Data

Analyzer Type : SO_2 Analyzer
Serial No. : 224

Analyzer Model : T100H
Calibration Span (ppm) : 100 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.01	0.01	0.01
Mid-Level Calibration Gas	50.80	50.73	0.07	0.07
High-Level Calibration Gas	100.00	100.17	0.17	0.17
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.12

O_2 Analyzer Calibration Data

Analyzer Type : NO_x Analyzer (Optional Internal O_2 Sensor)
Serial No. : 097

Analyzer Model : T200H
Calibration Span (%) : 20.9 %

	Certified Cylinder Value (%)	Analyzer Calibration Response (%)	Absolute Difference (%)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.02	0.02	0.10
Mid-Level Calibration Gas	15.10	15.11	0.01	0.05
High-Level Calibration Gas	20.90	20.87	0.03	0.14
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.10

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Analyzer Calibration Error Data for Sampling

Source Identification : Boiler Stack No.4
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 10/02/2026

Test Personnel : Panuwit Choosing

Time : 13:50-16:20

CO Analyzer Calibration Data

Analyzer Type : CO Analyzer

Analyzer Model : T300M

Serial No. : 80

Calibration Span (ppm) : 810 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.03	0.03	0.00
Mid-Level Calibration Gas	201.0	201.25	0.25	0.03
High-Level Calibration Gas	810.0	810.39	0.39	0.05
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.04

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.4 — Date : 13/02/2026

บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)

ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Test Personnel : Panuwit Choosing — Time : 11:20-12:20, 14:35-15:25

O_2 Analyzer Calibration Response

System Calibration : NO_X Analyzer (Optional internal O_2 Sensor) — Cylinder No. : 18K1149177

Calibration Span. : 20.9 % — Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.02	0.03	0.05	0.02	0.00	-0.05
Upscale Gas	15.11	15.15	0.20	15.13	0.10	-0.10
System Cal Bias Average (< ±5% of Span)		(Pass)	0.20	-	0.10	-
Drift Average (< ±3% of Span)					(Pass)	-0.10

NO_X Analyzer Calibration Response

System Calibration : NO_X Analyzer — Cylinder No. : D599233

Calibration Span. : 207.0 ppm — Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.02	0.03	0.02	-0.02	0.00	-0.02
Upscale Gas	207.21	207.15	-0.03	207.32	0.05	0.08
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.03	-	0.05	-
Drift Average (< ±3% of Span)					(Pass)	0.08

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer — Cylinder No. : A00751SV

Calibration Span. : 100 ppm — Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.01	-0.01	-0.02	-0.02	-0.03	-0.01
Upscale Gas	50.73	50.79	0.06	50.67	-0.06	-0.12
System Cal Bias Average (< ±5% of Span)		(Pass)	0.06	-	-0.06	-
Drift Average (< ±3% of Span)					(Pass)	-0.12

[redacted]

(Panuwit Choosing)

Site Operator

[redacted]

(Peera Detudom)

Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.4
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 13/02/2026

Test Personnel : Panuwit Choosing

Time : 11:20-12:20, 14:35-15:25

CO Analyzer Calibration Response

System Calibration : CO Analyzer
Calibration Span. : 810 ppm

Cylinder No. : D198079
Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.03	-0.03	-0.01	-0.10	-0.02	-0.01
Upscale Gas	810.39	810.12	-0.03	810.47	0.01	0.04
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.03	-	-0.02	-
Drift Average (< ±3% of Span)					(Pass)	0.04

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.4 — Date : 13/02/2026

บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)

ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Test Personnel : Panuwit Choosing — Time : 14:35-15:25, 17:35-18:25

O_2 Analyzer Calibration Response

System Calibration : NO_x Analyzer (Optional internal O_2 Sensor) — Cylinder No. : 18K1149177

Calibration Span. : 20.9 % — Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.02	0.02	0.00	0.04	0.10	0.10
Upscale Gas	15.11	15.13	0.10	15.10	-0.05	-0.15
System Cal Bias Average (< ±5% of Span)		(Pass)	0.10	-	0.10	-
Drift Average (< ±3% of Span)					(Pass)	-0.15

NO_x Analyzer Calibration Response

System Calibration : NO_x Analyzer — Cylinder No. : D599233

Calibration Span. : 207.0 ppm — Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.02	-0.02	0.00	0.04	0.03	0.03
Upscale Gas	207.21	207.32	0.05	207.42	0.10	0.05
System Cal Bias Average (< ±5% of Span)		(Pass)	0.05	-	0.10	-
Drift Average (< ±3% of Span)					(Pass)	0.05

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer — Cylinder No. : A00751SV

Calibration Span. : 100 ppm — Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.01	-0.02	-0.03	0.01	0.00	0.03
Upscale Gas	50.73	50.67	-0.06	50.83	0.10	0.16
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.06	-	0.10	-
Drift Average (< ±3% of Span)					(Pass)	0.16

[redacted]

(Panuwit Choosing)

Site Operator

[redacted]

(Peera Detudom)

Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.4
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 13/02/2026

Test Personnel : Panuwit Choosing

Time : 14:35-15:25, 17:35-18:25

CO Analyzer Calibration Response

System Calibration : CO Analyzer

Cylinder No. : D198079

Calibration Span. : 810 ppm

Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.03	-0.10	-0.02	0.00	0.00	0.01
Upscale Gas	810.39	810.47	0.01	810.64	0.03	0.02
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.02	-	0.03	-
Drift Average (< ±3% of Span)					(Pass)	0.02

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.4 Date : 13/02/2026

บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)

ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Test Personnel : Panuwit Choosing Time : 17:35-18:25, 20:40-21:20

O_2 Analyzer Calibration Response

System Calibration : NO_x Analyzer (Optional internal O_2 Sensor) Cylinder No. : 18K1149177

Calibration Span. : 20.9 % Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.02	0.04	0.10	0.01	-0.05	-0.15
Upscale Gas	15.11	15.10	-0.05	15.14	0.15	0.20
System Cal Bias Average (< ±5% of Span)		(Pass)	0.10	-	0.15	-
Drift Average (< ±3% of Span)					(Pass)	0.20

NO_x Analyzer Calibration Response

System Calibration : NO_x Analyzer Cylinder No. : D599233

Calibration Span. : 207.0 ppm Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.02	0.04	0.03	0.02	0.02	-0.01
Upscale Gas	207.21	207.42	0.10	207.26	0.02	-0.08
System Cal Bias Average (< ±5% of Span)		(Pass)	0.10	-	0.02	-
Drift Average (< ±3% of Span)					(Pass)	-0.08

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer Cylinder No. : A00751SV

Calibration Span. : 100 ppm Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.01	0.01	0.00	0.00	-0.01	-0.01
Upscale Gas	50.73	50.83	0.10	50.70	-0.03	-0.13
System Cal Bias Average (< ±5% of Span)		(Pass)	0.10	-	-0.03	-
Drift Average (< ±3% of Span)					(Pass)	-0.13

[redacted]

(Panuwit Choosing)

Site Operator

[redacted]

(Peera Detudom)

Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
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System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.4
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 13/02/2026

Test Personnel : Panuwit Choosing

Time : 17:35-18:25, 20:40-21:20

CO Analyzer Calibration Response

System Calibration : CO Analyzer

Cylinder No. : D198079

Calibration Span. : 810 ppm

Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.03	0.00	0.00	0.08	0.01	0.01
Upscale Gas	810.39	810.64	0.03	810.25	-0.02	-0.05
System Cal Bias Average (< ±5% of Span)		(Pass)	0.03	-	-0.02	-
Drift Average (< ±3% of Span)					(Pass)	-0.05

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.4
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

NO_x Standard Gas Data

Cylinder Number : A00618SV
Certified Concentration : 99.8 ppm

Certification Date : 6-Sep-2024
Expiration Date : 6-Sep-2027

NO_x Standard Gas Verified Data

Analyzer Type : NO_x Analyzer
Serial No. : 097

Analyzer Model : T200H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	99.8	99.73	-0.07	-0.070
2	99.8	99.67	-0.13	-0.130
3	99.8	99.75	-0.05	-0.050
% Diff. Average (< ±1% of Certified Cylinder Value)			(Pass)	-0.084

NO_x Standard Gas Data

Cylinder Number : D599233
Certified Concentration : 207 ppm

Certification Date : 10-May-2024
Expiration Date : 10-May-2027

NO_x Standard Gas Verified Data

Analyzer Type : NO_x Analyzer
Serial No. : 097

Analyzer Model : T200H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	207.0	207.13	0.13	0.063
2	207.0	207.25	0.25	0.121
3	207.0	207.09	0.09	0.043
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.076

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
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Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com., www.spscon.com

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.4
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

SO_2 Standard Gas Data

Cylinder Number : A00751SV
Certified Concentration : 50.8 ppm

Certification Date : 13-Sep-2024
Expiration Date : 12-Sep-2032

SO_2 Standard Gas Verified Data

Analyzer Type : SO_2 Analyzer
Serial No. : 224

Analyzer Model : T100H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	50.8	50.74	-0.06	-0.118
2	50.8	50.68	-0.12	-0.236
3	50.8	50.72	-0.08	-0.157
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	-0.171

SO_2 Standard Gas Data

Cylinder Number : D519520
Certified Concentration : 100 ppm

Certification Date : 17-Sep-2022
Expiration Date : 17-Sep-2030

SO_2 Standard Gas Verified Data

Analyzer Type : SO_2 Analyzer
Serial No. : 224

Analyzer Model : T100H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	100.0	100.12	0.12	0.120
2	100.0	100.20	0.20	0.200
3	100.0	100.08	0.08	0.080
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.133

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.4
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

CO Standard Gas Data

Cylinder Number : D900872
Certified Concentration : 201 ppm

Certification Date : 25-May-2020
Expiration Date : 24-May-2028

CO Standard Gas Verified Data

Analyzer Type : CO Analyzer
Serial No. : 80

Analyzer Model : T300M

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	201.0	201.16	0.16	0.080
2	201.0	201.29	0.29	0.144
3	201.0	201.11	0.11	0.055
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.093

CO Standard Gas Data

Cylinder Number : D198079
Certified Concentration : 810 ppm

Certification Date : 27-Dec-2024
Expiration Date : 27-Dec-2032

CO Standard Gas Verified Data

Analyzer Type : CO Analyzer
Serial No. : 80

Analyzer Model : T300M

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	810.0	810.21	0.21	0.026
2	810.0	810.45	0.45	0.056
3	810.0	810.14	0.14	0.017
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.033

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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
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Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.4
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

O_2 Standard Gas Data

Cylinder Number : 18K1149177
Certified Concentration : 15.1%

Certification Date : 13-Feb-2023
Expiration Date : 13-Feb-2031

O_2 Standard Gas Verified Data

Analyzer Type : NO_x Analyzer (Optional Internal O_2 Sensor)
Analyzer Model : T200H
Serial No. : 097

Number of Sample	Certified Cylinder Value (%)	Verified Data Response (%)	Difference Value (%)	% Diff.
1	15.10	15.11	0.01	0.066
2	15.10	15.12	0.02	0.132
3	15.10	15.10	0.00	0.000
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.066

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซออพหลโยธิน 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

Analyzer Calibration Error Data for Sampling

Source Identification : Boiler Stack No.5 — Date : 10/02/2026

บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)

ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Test Personnel : Panuwit Choosing — Time : 13:50-16:20

NO_x Analyzer Calibration Data

Analyzer Type : NO_x Analyzer — Analyzer Model : T200H

Serial No. : 328 — Calibration Span (ppm) : 207 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.02	0.02	0.01
Mid-Level Calibration Gas	99.8	99.73	0.07	0.03
High-Level Calibration Gas	207.0	207.19	0.19	0.09
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.06

SO_2 Analyzer Calibration Data

Analyzer Type : SO_2 Analyzer — Analyzer Model : T100H

Serial No. : 97 — Calibration Span (ppm) : 100 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	-0.01	0.01	0.01
Mid-Level Calibration Gas	50.80	50.71	0.09	0.09
High-Level Calibration Gas	100.00	100.14	0.14	0.14
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.11

O_2 Analyzer Calibration Data

Analyzer Type : NO_x Analyzer (Optional Internal O_2 Sensor) — Analyzer Model : T200H

Serial No. : 328 — Calibration Span (%) : 20.9 %

	Certified Cylinder Value (%)	Analyzer Calibration Response (%)	Absolute Difference (%)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.03	0.03	0.14
Mid-Level Calibration Gas	15.10	15.12	0.02	0.10
High-Level Calibration Gas	20.90	20.88	0.02	0.10
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.10

[redacted]

(Panuwit Choosing)

Site Operator

[redacted]

(Peera Detudom)

Technical Supervisor

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

Analyzer Calibration Error Data for Sampling

Source Identification : Boiler Stack No.5
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 10/02/2026

Test Personnel : Panuwit Choosing

Time : 13:50-16:20

CO Analyzer Calibration Data

Analyzer Type : CO Analyzer

Analyzer Model : T300M

Serial No. : 250

Calibration Span (ppm) : 810 ppm

	Certified Cylinder Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Calibration Error (% of Calibration Span)
Zero Gas	0.00	0.06	0.06	0.01
Mid-Level Calibration Gas	201.0	201.20	0.20	0.02
High-Level Calibration Gas	810.0	810.34	0.34	0.04
Analyzer Calibration Error Average (< 2% of Calibration Span)			(Pass)	0.03

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.5
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 13/02/2026

Test Personnel : Panuwit Choosing

Time : 11:20-12:20, 14:35-15:25

O_2 Analyzer Calibration Response

System Calibration : NO_x Analyzer (Optional internal O_2 Sensor)
Calibration Span. : 20.9 %

Cylinder No. : 18K1149177
Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.03	0.05	0.10	0.01	-0.10	-0.20
Upscale Gas	15.12	15.14	0.10	15.12	0.00	-0.10
System Cal Bias Average (< ±5% of Span)		(Pass)	0.10	-	-0.10	-
Drift Average (< ±3% of Span)					(Pass)	-0.20

NO_x Analyzer Calibration Response

System Calibration : NO_x Analyzer
Calibration Span. : 207.0 ppm

Cylinder No. : D599233
Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.02	-0.01	-0.01	0.04	0.01	0.02
Upscale Gas	207.19	207.35	0.08	207.11	-0.04	-0.12
System Cal Bias Average (< ±5% of Span)		(Pass)	0.08	-	-0.04	-
Drift Average (< ±3% of Span)					(Pass)	-0.12

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer
Calibration Span. : 100 ppm

Cylinder No. : A00751SV
Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.01	0.02	0.03	0.01	0.02	-0.01
Upscale Gas	50.71	50.76	0.05	50.82	0.11	0.06
System Cal Bias Average (< ±5% of Span)		(Pass)	0.05	-	0.11	-
Drift Average (< ±3% of Span)					(Pass)	0.06

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.5
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 13/02/2026

Test Personnel : Panuwit Choosing

Time : 11:20-12:20, 14:35-15:25

CO Analyzer Calibration Response

System Calibration : CO Analyzer

Cylinder No. : D198079

Calibration Span. : 810 ppm

Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.06	-0.03	-0.01	0.06	0.00	0.01
Upscale Gas	810.34	810.19	-0.02	810.58	0.03	0.05
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.02	-	0.03	-
Drift Average (< ±3% of Span)					(Pass)	0.05

[redacted]

(Panuwit Choosing)
Site Operator

[redacted]

(Peera Detudom)
Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.5
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 13/02/2026

Test Personnel : Panuwit Choosing

Time : 14:35-15:25, 17:35-18:25

O_2 Analyzer Calibration Response

System Calibration : NO_X Analyzer (Optional internal O_2 Sensor)
Calibration Span. : 20.9 %

Cylinder No. : 18K1149177
Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.03	0.01	-0.10	-0.01	-0.20	-0.10
Upscale Gas	15.12	15.12	0.00	15.15	0.15	0.15
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.10	-	-0.20	-
Drift Average (< ±3% of Span)					(Pass)	0.15

NO_X Analyzer Calibration Response

System Calibration : NO_X Analyzer
Calibration Span. : 207.0 ppm

Cylinder No. : D599233
Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.02	0.04	0.01	0.02	0.00	-0.01
Upscale Gas	207.19	207.11	-0.04	206.93	-0.13	-0.09
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.04	-	-0.13	-
Drift Average (< ±3% of Span)					(Pass)	-0.09

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer
Calibration Span. : 100 ppm

Cylinder No. : A00751SV
Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.01	0.01	0.02	0.03	0.04	0.02
Upscale Gas	50.71	50.82	0.11	50.87	0.16	0.05
System Cal Bias Average (< ±5% of Span)		(Pass)	0.11	-	0.16	-
Drift Average (< ±3% of Span)					(Pass)	0.05

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
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7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
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System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.5
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 13/02/2026

Test Personnel : Panuwit Choosing

Time : 14:35-15:25, 17:35-18:25

CO Analyzer Calibration Response

System Calibration : CO Analyzer

Calibration Span. : 810 ppm

Cylinder No. : D198079

Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.06	0.06	0.00	0.12	0.01	0.01
Upscale Gas	810.34	810.58	0.03	810.10	-0.03	-0.06
System Cal Bias Average (< ±5% of Span)		(Pass)	0.03	-	-0.03	-
Drift Average (< ±3% of Span)					(Pass)	-0.06

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
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System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.5 — Date : 13/02/2026

บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)

ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Test Personnel : Panuwit Choosing — Time : 17:35-18:25, 20:40-21:20

O_2 Analyzer Calibration Response

System Calibration : NO_X Analyzer (Optional internal O_2 Sensor) — Cylinder No. : 18K1149177

Calibration Span. : 20.9 % — Cylinder Conc. : 15.10%

	Analyzer Calibration Response (%)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (%)	System Cal Bias (% of Span)	System Calibration Response (%)	System Cal Bias (% of Span)	
Zero Gas	0.03	-0.01	-0.20	0.02	-0.05	0.15
Upscale Gas	15.12	15.15	0.15	15.11	-0.05	-0.20
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.20	-	-0.05	-
Drift Average (< ±3% of Span)					(Pass)	-0.20

NO_X Analyzer Calibration Response

System Calibration : NO_X Analyzer — Cylinder No. : D599233

Calibration Span. : 207.0 ppm — Cylinder Conc. : 207 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.02	0.02	0.00	-0.02	-0.02	-0.02
Upscale Gas	207.19	206.93	-0.13	207.28	0.04	0.17
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.13	-	0.04	-
Drift Average (< ±3% of Span)					(Pass)	0.17

SO_2 Analyzer Calibration Response

System Calibration : SO_2 Analyzer — Cylinder No. : A00751SV

Calibration Span. : 100 ppm — Cylinder Conc. : 50.8 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	-0.01	0.03	0.04	0.00	0.01	-0.03
Upscale Gas	50.71	50.87	0.16	50.78	0.07	-0.09
System Cal Bias Average (< ±5% of Span)		(Pass)	0.16	-	0.07	-
Drift Average (< ±3% of Span)					(Pass)	-0.09

[redacted]

(Panuwit Choosing)

Site Operator

[redacted]

(Peera Detudom)

Technical Supervisor

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

System Calibration Bias and Drift Data

Source Identification : Boiler Stack No.5
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 13/02/2026

Test Personnel : Panuwit Choosing

Time : 17:35-18:25, 20:40-21:20

CO Analyzer Calibration Response

System Calibration : CO Analyzer

Cylinder No. : D198079

Calibration Span. : 810 ppm

Cylinder Conc. : 810 ppm

	Analyzer Calibration Response (ppm)	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response (ppm)	System Cal Bias (% of Span)	System Calibration Response (ppm)	System Cal Bias (% of Span)	
Zero Gas	0.06	0.12	0.01	0.04	0.00	-0.01
Upscale Gas	810.34	810.10	-0.03	810.63	0.04	0.07
System Cal Bias Average (< ±5% of Span)		(Pass)	-0.03	-	0.04	-
Drift Average (< ±3% of Span)					(Pass)	0.07

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.5
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

NO_x Standard Gas Data

Cylinder Number : A00618SV
Certified Concentration : 99.8 ppm

Certification Date : 6-Sep-2024
Expiration Date : 6-Sep-2027

NO_x Standard Gas Verified Data

Analyzer Type : NO_x Analyzer
Serial No. : 097

Analyzer Model : T200H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	99.8	99.73	-0.07	-0.070
2	99.8	99.67	-0.13	-0.130
3	99.8	99.75	-0.05	-0.050
% Diff. Average (< ±1% of Certified Cylinder Value)			(Pass)	-0.084

NO_x Standard Gas Data

Cylinder Number : D599233
Certified Concentration : 207 ppm

Certification Date : 10-May-2024
Expiration Date : 10-May-2027

NO_x Standard Gas Verified Data

Analyzer Type : NO_x Analyzer
Serial No. : 097

Analyzer Model : T200H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	207.0	207.13	0.13	0.063
2	207.0	207.25	0.25	0.121
3	207.0	207.09	0.09	0.043
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.076

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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S.P.S. CONSULTING SERVICE CO., LTD.
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Tel : (662) 939-4370-72. Fax : (662) 513-4221. E-mail : sale@spscon.com., www.spscon.com

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.5
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

SO_2 Standard Gas Data

Cylinder Number : A00751SV
Certified Concentration : 50.8 ppm

Certification Date : 13-Sep-2024
Expiration Date : 12-Sep-2032

SO_2 Standard Gas Verified Data

Analyzer Type : SO_2 Analyzer
Serial No. : 224

Analyzer Model : T100H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	50.8	50.74	-0.06	-0.118
2	50.8	50.68	-0.12	-0.236
3	50.8	50.72	-0.08	-0.157
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	-0.171

SO_2 Standard Gas Data

Cylinder Number : D519520
Certified Concentration : 100 ppm

Certification Date : 17-Sep-2022
Expiration Date : 17-Sep-2030

SO_2 Standard Gas Verified Data

Analyzer Type : SO_2 Analyzer
Serial No. : 224

Analyzer Model : T100H

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	100.0	100.12	0.12	0.120
2	100.0	100.20	0.20	0.200
3	100.0	100.08	0.08	0.080
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.133

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.5
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

CO Standard Gas Data

Cylinder Number : D900872
Certified Concentration : 201 ppm

Certification Date : 25-May-2020
Expiration Date : 24-May-2028

CO Standard Gas Verified Data

Analyzer Type : CO Analyzer
Serial No. : 80

Analyzer Model : T300M

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	201.0	201.16	0.16	0.080
2	201.0	201.29	0.29	0.144
3	201.0	201.11	0.11	0.055
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.093

CO Standard Gas Data

Cylinder Number : D198079
Certified Concentration : 810 ppm

Certification Date : 27-Dec-2024
Expiration Date : 27-Dec-2032

CO Standard Gas Verified Data

Analyzer Type : CO Analyzer
Serial No. : 80

Analyzer Model : T300M

Number of Sample	Certified Cylinder Value (ppm)	Verified Data Response (ppm)	Difference Value (ppm)	% Diff.
1	810.0	810.21	0.21	0.026
2	810.0	810.45	0.45	0.056
3	810.0	810.14	0.14	0.017
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.033

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

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7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
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Tel : (662) 939-4370-72 Fax : (662) 513-4221, E-mail : sale@spscon.com., www.spscon.com

Verified Standard Gas for Sampling

Source Identification : Boiler Stack No.5
บริษัท ทิพย์กำแพงเพชร ไบโอเอนเนอยี่ จำกัด (เฟส 2)
ตำบลเทพนิมิต อำเภอบึงสามัคคี จังหวัดกำแพงเพชร 62210

Date : 08/02/2026

Test Personnel : Panuwit Choosing

Time : 09:00-11:25

O_2 Standard Gas Data

Cylinder Number : 18K1149177
Certified Concentration : 15.1%

Certification Date : 13-Feb-2023
Expiration Date : 13-Feb-2031

O_2 Standard Gas Verified Data

Analyzer Type : NO_x Analyzer (Optional Internal O_2 Sensor)
Analyzer Model : T200H
Serial No. : 097

Number of Sample	Certified Cylinder Value (%)	Verified Data Response (%)	Difference Value (%)	% Diff.
1	15.10	15.11	0.01	0.066
2	15.10	15.12	0.02	0.132
3	15.10	15.10	0.00	0.000
% Diff. Average (< ± 1% of Certified Cylinder Value)			(Pass)	0.066

[redacted]
(Panuwit Choosing)
Site Operator

[redacted]
(Peera Detudom)
Technical Supervisor

ระดับเสียงในบรรยากาศ

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

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

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 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 : [redacted]

(Mr.Weerachai Deechaiyae)

Approved by : [redacted]

(Mr.Prawate Kluaypa)

Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 21 Feb. 2025

Date of Issue : 24 Feb. 2025

Ref : 20112680219007390O1

End of Certificate

The results relate only to the items tested/calibrated or value assigned.
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Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 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

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Noise B_049/26

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-B18	ACO	6236	00172048	08 February 2026	93.7	93.9
ACO-B37	ACO	6236	00192028	08 February 2026	93.8	93.9
ACO-B40	ACO	6236	00192031	08 February 2026	93.8	93.9
ACO-B41	ACO	6236	00192032	08 February 2026	93.8	93.9
ACO-B43	ACO	6236	00192034	08 February 2026	93.8	93.9
ST-C1-B07	SCARLET	ST-12D	10351464	08 February 2026	93.9	93.9
ST-C1-B11	SCARLET	ST-12D	10351484	08 February 2026	93.9	93.9
ST-C1-B12	SCARLET	ST-12D	10351485	08 February 2026	93.9	93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.81 ± 0.10 dB	

Calibrated by : [redacted]
(Mr. Adul Dangklom)

Approved by : [redacted]
(Mr. Peera Detudom)

คุณภาพน้ำ

CAL
Calibratech Co.,Ltd.
7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120
Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com

NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : **69-400023-2**

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 : 13 January 2026
Date of Calibration : 16 January 2026
Date of Issue : 16 January 2026
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	25E1656	22 May 2027	National Institute of Metrology Thailand (NIMT)
400004	25E1656	22 May 2027	National Institute of Metrology Thailand (NIMT)

Approved by : [redacted]
(Permpon Chanpu)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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CAL
Calibratech Co.,Ltd.
7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120
Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com

Certificate of Calibration

Certificate No. : 69-400023-2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Ice point check : UUC* reading 0 °C Standard reading 0.4773 °C

Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
20.3922	20	0.4	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%

- o0o -

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

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Accredited
ISO/IEC 17025

NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

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 : Sukgasem Seehanart
Wenick Inchaisri
Calibration Engineer

[redacted]

Approved By : Mongkol Yotsoontorn
Authorized Signatory
06 February 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. Q25013412

@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

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Accredited
ISO/IEC 17025

NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

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 ± 2.5) °C** **Relative Humidity :** **(50 ± 15) % 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.

@clccalibration

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)"

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

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

CLC Accredited ISO/IEC 17025

ilac-MRA

THAILAND

NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

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.	:	260202014122
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 : 02 February 2026 DATE OF ISSUED : 04 February 2026

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

Calibrated By : Sukgasem Seehanart
Wenick Inchaisri
Calibration Engineer

[redacted]

Approved By : Mongkol Yotsoontorn
Authorized Signatory
04 February 2026

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. Q26014122

F3-011-05/12-23

@clccalibration

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

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THAILAND
NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

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	:	**03 February 2026**

ENVIRONMENT CONDITIONS :

Temperature : **(25 ± 2.5) °C** **Relative Humidity :** **(50 ± 15) % 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 Temperature Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Conductivity Standard , Hanna Product Code HI7033L Lot Number 0101.
2. Potassium Chloride Solution, Sigma-Aldrich Canada Co Product No. 1.01203.0500.
3. Potassium Chloride Solution, Sigma-Aldrich Canada Co Product No. 1.01254.0500.
4. Temperature Bath, Jingmi Model RTS-35S S/N. 16339.
5. Precision Thermometer, ASL Model F200-A-8 S/N. 014433/03.
6. IPRT, ASL Model T100-250-1D S/N. PO106346-1-13.

@clccalibration

TRACEABILITY :

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

Certificate No. 07D45, Due Date April 2027.

2. The measurements are traceable to International System of Units (SI) , through Sigma-Aldrich Canada Co.

Lot Number. HC56384703, Due Date 31 January 2028.

3. The measurements are traceable to International System of Units (SI) , through Sigma-Aldrich Canada Co.

Lot Number. HC33528554, Due Date 30 November 2026.

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

Certificate No. Q25097314, Due Date 29 August 2026.

5. The measurements are traceable to International System of Units (SI) , through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 0177/68, Due Date 10 February 2026.

6. The measurements are traceable to International System of Units (SI) , through National Institute of Metrology (Thailand).

Certificate No. TT-1008-25, Due Date 04 March 2026.

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)"

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 µS/cm	83.95 µS/cm [Cell Constant 0.470]	± 1.15 µS/cm	2,00
1414 µS/cm	1414 µS/cm [Cell Constant 0.510]	± 21 µS/cm	2,00
12.83 mS/cm	12.83 mS/cm [Cell Constant 0.570]	± 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	25.00	25.1	-0.10	0.08

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 $k = 2$.

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

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484

Certificate of Calibration

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) ºC
Relative Humidity :	(50 ± 20) %
Calibration Procedure :	In - house method : CP-CH11 Direct measurement by using Formazin standard solution
Calibrated by :	Walalak Sirithean
Approved by :	Approved Signatory

( ) 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.

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 Throught 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

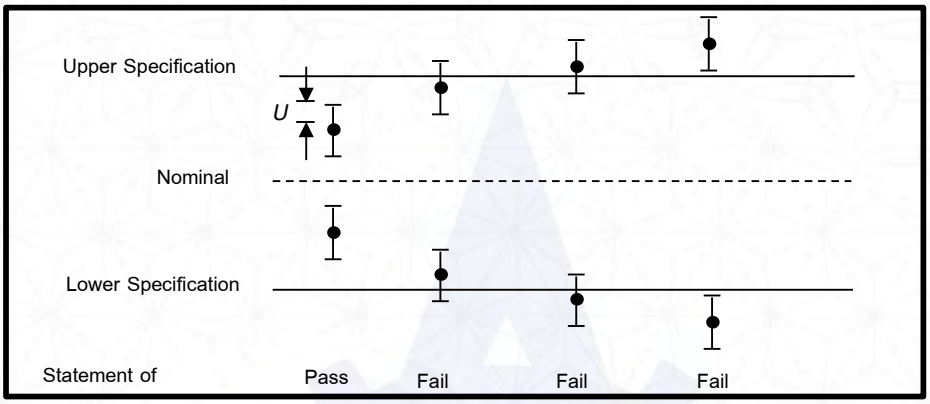
Standard Formazine suspension (NTU)	UUC* Reading (NTU)	Error (NTU)	Uncertainty of Measurement (± NTU)	Coverage Factor *k*	Tolerance Limit (± NTU)	Judgement
20	19.4	-0.6	0.38	2.00	2.0	Pass
40	39.9	-0.1	0.40	2.00	2.0	Pass
100	98.9	-1.1	0.70	2.00	2.0	Pass
400	391	-9	1.5	2.05	20.0	Pass

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

Decision Rule : The decision rule is prescribed by customer (Error ± 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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484

Certificate of Calibration

Equipment :	Turbidity Meter
Manufacturer :	Eutech
Model :	CyberScan WLTB1000
Serial No. :	201802206
ID. No. :	TB 02/50
Condition As-Received:	Used Item
Received Date :	09 February 2026
Calibration Date :	16 February 2026
Reference :	2602-0291WN-1
Submitted by :	S.P.S. Consulting Service Co.,Ltd. 7 Phaholyothin 24, Phaholyothin Road., Jompol, Chatuchak, Bangkok 10900
Ambient Temperature :	(23 ± 3.0) ºC
Relative Humidity :	(50 ± 20) %
Calibration Procedure :	In - house method : CP-CH11 Direct measurement by using Formazin standard solution
Calibrated by :	Walalak Sirithean

Approved by :

Approved Signatory

(✓) Chakrit Waewwanjua
( ) Ponpan Paipim
( ) Saithip Meangmai

Issue Date : 22 February 2026

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.

Condition of this calibration result

1. Reference Standard Instruments :

Instruments	ID No.	Certificate No.	Due date
1) Liquid-in Glass Thermometer	130RC114	25I972	10 Sep 2026

- This measurement result is traceable to SI through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials : Turbidity Standard solution (Formzin)

- The measurement results are traceable to SI through CPA chem Ltd.,

Turbidity Solution	Manufacturer	Lot No.	Exp. date
20.0 NTU	CPA Chem	1135349	16 Aug 2026
40.0 NTU	CPA Chem	1135350	16 Aug 2026
100.0 NTU	CPA Chem	1135352	16 Aug 2026
400 NTU	CPA Chem	1135360	16 Aug 2026

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
Tubidity Meter serial number : 201802206

Standard Formazine suspension (NTU)	UUC* Reading (NTU)	Uncertainty of Measurement (± NTU)	Coverage Factor *k*
20.0	19.8	0.20	2.00
40.0	40.5	0.28	2.00
100.0	101	1.2	2.00
400	392	2.3	2.00

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

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 %.

-o0o-

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

451-451/1 Sirinthorn Road, Bangbumru, Bangplud, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email : calibration@sithiphorn.com

NSC-TISI-TIS 17025
CALIBRATION 0394

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 : Nitinun Srihawan

Approved by : [redacted]
(Wichok Ekpongpradit)

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

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

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 mutiplied by a coverage factor *k*, providing a level of confidence of approximately 95%

End of Calibration Certificate

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

CLC Accredited ISO/IEC 17025

ilac-MRA

ANAB ANSI National Accreditation Board ACCREDITED ISO/IEC 17025 CALIBRATION AND DIMENSIONAL MEASUREMENT ACDM-2814

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 : Sukgasem Seehanart
Wenick Inchaisri
Calibration Engineer

[redacted]

Approved By : Mongkol Yotsoontorn
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

@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

CLC Accredited ISO/IEC 17025

ANAB ANSI National Accreditation Board ACCREDITED ISO/IEC 17025 CALIBRATION AND DIMENSIONAL MEASUREMENT ACDM-2814

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 ± 2.5) °C **Relative Humidity :** (50 ± 15) % 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.

@clccalibration

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)"

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 (± 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 ± (°C)
100	25.00	25.0	0.00	0.07

Technical Note. Type of sensor : Thermistor

Probe ∅ 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

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

CERT.No.: HS-W015C

Certificate of Calibration

Calibration Date :	18 Mar 25	Model	: YSI 5000
Submitted by :	S.P.S CONSULTING SERVICE CO.,LTD	S/N	: 15B100751
	7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol,	Probe	: YSI 5010
	Chatuchak, Bangkok, Thailand 10900	S/N	: 22D100097
		ID NO.	: -
Avg Room Temp :	20 °C	Air Temp ref	: S/N. F8065C26
Avg Water Temp :	20 °C	Barometric ref	: S/N. F8065C26
Air Pressure :	760.00 mmHg	Water Temp ref	: -
Salinity :	0 ppt	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.

[redacted]

Technician Signature

(Kittipong Maekwong)

[redacted]

Laboratory Manager

(Natenapha Pisatkunchon)

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

CERT.No.: HS-X014C

Certificate of Calibration

Calibration Date : 16 March 2026

Submitted by : S.P.S CONSULTING SERVICE CO.,LTD
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol,
Chatuchak, Bangkok, Thailand 10900

Avg Room Temp : 20 °C
Avg Water Temp : 20 °C
Air Pressure : 760.00 mmHg
Salinity : 0 ppt

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)	9.09	(PASS)	-	-
Measurement 2 (mg/l)	9.09	(PASS)	-	-
Measurement 3 (mg/l)	9.09	(PASS)	-	-
Measurement 4 (mg/l)	9.09	(PASS)	-	-
Measurement 5 (mg/l)	9.09	(PASS)	-	-
Measurement 6 (mg/l)	9.08	(PASS)	-	-
Measurement 7 (mg/l)	9.08	(PASS)	-	-
Measurement 8 (mg/l)	9.08	(PASS)	-	-
Measurement 9 (mg/l)	9.08	(PASS)		-
Measurement 10 (mg/l)	9.08	(PASS)	-	-
Mean Measurement	9.09	mg/l	-	-
Inaccuracy	0.00	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.

[redacted]

Technician Signature

(Kittipong Maekwong)

[redacted]

Laboratory Manager

(Natenapha Pisatkunchon)

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

CERTIFICATE No : 25T0521
REFERENCE No : 75853-2

Certificate of Calibration

EQUIPMENT	:	COD REACTOR
MANUFACTURER	:	HACH
MODEL	:	DRB 200
SERIAL No	:	15110C0498
ID No	:	CRB 06/59
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	:	03-Feb-25
APPROVED BY	:	[redacted] PONGSAK J.
ISSUED DATE	:	03-Feb-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.

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

CERTIFICATE No : 25T0521

Calibration Report

EQUIPMENT	:	COD REACTOR			
MANUFACTURER	:	HACH	**MODEL**	:	DRB 200
ID NUMBER	:	CRB 06/59	**SERIAL NUMBER**	:	15110C0498
RECEIVED DATE	:	15-Jan-25	**CALIBRATION DATE**	:	03-Feb-25
AMBIENT TEMPERATURE	:	23° C ± 1° C	**RELATIVE HUMIDITY**	:	53 %RH ± 10 % RH

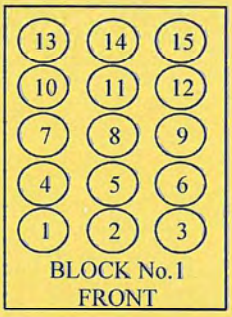
CONDITION OF THIS RESULTS OF CALIBRATION

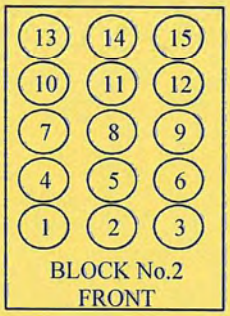
1. THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASURMENT METHOD WITH CALIBRATED THERMOCOUPLE TYPE K UNDER NO LOAD CONDITION. THE THERMOCOUPLES WERE PLACED ON POINTS AND LOCATED AS THE PICTURE .
2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH TC TYPE K	HYDRA 2635A	7301307	24T6467	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





Block No.		1	2
Calibration Point (°C)		150	150
Controller temperature (°C)		145	145
Indicating Temperature		145	145
Measured Temperature (° C) at Spread Locations	1	150.23	150.64
	2	149.73	149.78
	3	150.29	150.29
	4	150.04	150.49
	5	150.09	150.51
	6	150.74	150.67
	7	149.97	150.66
	8	150.76	150.57
	9	150.54	150.51
	10	149.44	149.94
	11	150.12	150.64
	12	149.93	150.33
	13	149.19	149.82
	14	148.96	149.70
	15	149.09	149.79
Uncertainty of Measurement(± °C)		0.88	0.88

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 UNCERTAIN[redacted]
COVERAGE FACTOR k =2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT

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

CERTIFICATE No : 26T0464
REFERENCE No : 79659-1

Certificate of Calibration

EQUIPMENT	:	COD REACTOR
MANUFACTURER	:	HACH
MODEL	:	DRB 200
SERIAL No	:	15110C0497
ID No	:	DRB 04/59
SUBMITTED BY	:	S.P.S. CONSULTING SERVICE CO., LTD. 7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD., JOMPOL, CHATUCHAK, BANGKOK 10900
CALIBRATED BY	:	SOMCHAI S.
CALIBRATION DATE	:	30-Jan-26
APPROVED BY	:	[redacted] PONGSAK J.
ISSUED DATE	:	30-Jan-26
RECEIVED DATE	:	30-Jan-26

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, Bangkae, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 26T0464

Calibration Report

EQUIPMENT	:	COD REACTOR			
MANUFACTURER	:	HACH	**MODEL**	:	DRB 200
ID NUMBER	:	DRB 04/59	**SERIAL NUMBER**	:	15110C0497
RECEIVED DATE	:	30-Jan-26	**CALIBRATION DATE**	:	30-Jan-26
AMBIENT TEMPERATURE	:	23° C ± 1° C	**RELATIVE HUMIDITY**	:	54 %RH ± 10 % RH

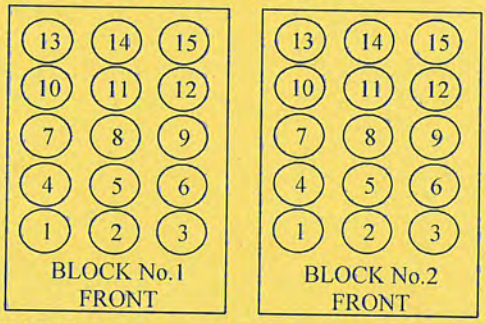
CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASURMENT 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	6849323	25T5342	18-Jun-26

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



TEMPERATURE MEASUREMENT ACCURACY TEST

Block No.		1	2
Controller temperature (°C)		144	145
Indicating Temperature		144	145
Measured Temperature (° C) at Spread Locations	1	149.3	149.8
	2	149.1	149.9
	3	149.9	149.6
	4	150.0	149.3
	5	149.8	149.5
	6	149.9	149.1
	7	149.7	149.7
	8	149.5	149.9
	9	149.8	149.4
	10	148.5	149.4
	11	149.1	150.2
	12	149.2	150.0
	13	149.0	149.6
	14	149.1	150.3
	15	148.5	149.0
Uncertainty of Measurement(± °C)		0.89	0.89

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.
NOTE 2 : LOCATION 10 WAS REFERENCE LOCATION.
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

[redacted]

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

NSC-TISI-TIS17025
CALIBRATION 0049

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	:	[redacted] PONGSAK J.
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, Bangkae, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584
www.qcalibration.com

CERTIFICATE No : 25M2256

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 ± 1mbar	**CALIBRATION DATE**	:	07-Mar-25
AMBIENT TEMPERATURE	:	24° C ± 1° C	**RELATIVE HUMIDITY**	:	52 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS 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 LINEARLITY 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

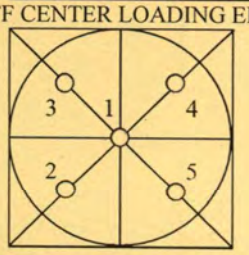
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
   - NATIONAL INSTITUTE OF METROLOGY (THAILAND)

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 (± 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

[redacted]

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

NSC-TISI-TIS17025
CALIBRATION 0049

CERTIFICATE No : 26M2268
REFERENCE No : 80204-3

Certificate of Calibration

EQUIPMENT	:	DIGITAL BALANCE
MANUFACTURER	:	SARTORIUS
MODEL	:	BSA224S-CW
SERIAL No	:	36591843
ID No	:	BA 09/61
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	:	SUCHAT S.
CALIBRATION DATE	:	05-Mar-26
APPROVED BY	:	[redacted] PONGSAK J.
ISSUED DATE	:	06-Mar-26
RECEIVED DATE	:	05-Mar-26

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.
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Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584
www.qcalibration.com

Calibration Report

EQUIPMENT	:	DIGITAL BALANCE	**MODEL**	:	BSA224S-CW
MANUFACTURER	:	SARTORIUS	**S/N**	:	36591843
ID No	:	BA 09/61	**RECEIVED DATE**	:	05-Mar-26
AIR PRESSURE	:	1004mbar ± 1mbar	**CALIBRATION DATE**	:	05-Mar-26
AMBIENT TEMPERATURE	:	25° C ± 1° C	**RELATIVE HUMIDITY**	:	50 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS 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 LINEARLITY 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

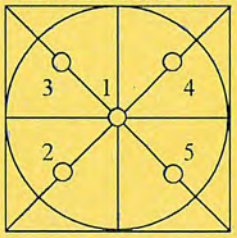
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
   - NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL
2. TARE FUNCTION : NORMAL
3. REPEATABILITY OF READING AT 200 g WAS 0.000055 g
4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (± g)
0.0	0.0000	0.0000	0.00010
0.1	0.1000	0.0000	0.00011
0.2	0.2000	0.0000	0.00010
0.5	0.5000	0.0000	0.00011
1.0	1.0000	0.0000	0.00011
2.0	2.0000	0.0000	0.00011
5.0	5.0000	0.0000	0.00011
10.0	10.0000	0.0000	0.00011
20.0	20.0001	-0.0001	0.00011
50.0	50.0000	0.0000	0.00013
100.0	100.0001	-0.0001	0.00019
200.0	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

[redacted]

PerkinElmer

MAINTENANCE AND TEST CERTIFICATE MODEL

OPTIMA 5300DV

Customer :	**S.P.S.Consulting Service Co.,Ltd**	Date Tested:	December 18, 2025
		Recommendation Recertification	
Address :	**7 Soi Phaholyothin 24**	Period	6 Months
	Paholyothin Road	Recertification Due:	June 28, 2026
	Jompol Chatuchak, Bangkok 1090	Date Last Certified:	July 1, 2025
User Name:	**K.Phenpha Viphasthawat**	Visit Number:	2of 2
Phone:	**083-9269252**	PerkinElmer Phone:	02-719-6420 ext 206
Fax:	**02-513-4221**	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	November 30, 2026
Wavecal Solution	N058-2152	July 30, 2026
VIS Wavecal solution	N930-2946	August 30, 2026
Instrument Cal. STD4	N930-0221	November 30, 2026

CUSTOMER SUPPLIED	**COMMENTS**	**CUSTOMER INITIALS**
2 % HNO3		
10 % HNO3		

PerkinElmer Scientific (Thailand) Co., Ltd.
290 Soi Soonvijai 4, Bangkapi, Huay Kwang, Bangkok 10310 Head Office

PerkinElmer

MAINTENANCE AND TEST CERTIFICATE MODEL

OPTIMA 5300DV

SERIAL NUMBER 077C7042401 **DATE TESTED** December 18, 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 reqiured, 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

PerkinElmer Scientific (Thailand) Co., Ltd.
290 Soi Soonvijai 4, Bangkapi, Huay Kwang, Bangkok 10310 Head Office

PerkinElmer

MAINTENANCE AND TEST CERTIFICATE MODEL

OPTIMA 5300DV

SERIAL NUMBER : 077C7042401 **DATE TESTED :** December 18, 2025

PARAMETER			SPECIFICATION		FINAL VALUE	
Spectral Resolution : UV	**As**	**193.696 nm**	≤ 0.007		0.00530	
	Ni	**231.604 nm**	≤ 0.008		0.00708	
	Ni	**341.476 nm**	≤ 0.012		0.00776	
Spectral Resolution : VIS	**La**	**408.672 nm**	≤ 0.020		0.01614	
	Ba	**455.403 nm**	≤ 0.025		0.02377	
Precision						
	As	**193.656 nm**	% RSD	< 1.0	0.67	%
	Zn	**213.856 nm**	% RSD	< 1.0	0.62	%
	Mn	**257.610 nm**	% RSD	< 1.0	0.88	%
	La	**379.478 nm**	% RSD	< 1.0	0.63	%
	Ba	**455.403 nm**	% RSD	< 1.0	0.65	%
	Ba	**493.408 nm**	% RSD	< 1.0	0.45	%
Detection Limits : Axial	**Tl**	**190.080 nm**	3(sd)		3.21	ppb
	As	**193.696 nm**	3(sd)		6.06	ppb
	Pb	**220.353 nm**	3(sd)		0.92	ppb
Detection Limits : Radial	**As**	**193.696 nm**	3(sd)		17.35	ppb
	Zn	**213.856 nm**	3(sd)		1.79	ppb
	Mn	**257.610 nm**	3(sd)		0.18	ppb
	La	**379.478 nm**	3(sd)		0.76	ppb
	Ba	**455.403 nm**	3(sd)		0.11	ppb
	Ba	**493.408 nm**	3(sd)		0.56	ppb
BEC : Axial (IB X 500)/(IS-IB)	**Cd**	**226.502 nm**	≤ 150 ppb		40.52	
BEC : Radial (IB X 1000)/(IS-IB)	**Mn**	**257.610 nm**	≤ 45 ppb		42.33	

PerkinElmer Scientific (Thailand) Co., Ltd.
290 Soi Soonvijai 4, Bangkapi, Huay Kwang, Bangkok 10310 Head Office

PerkinElmer

MAINTENANCE AND TEST CERTIFICATE MODEL

OPTIMA 5300DV

SERIAL NUMBER 077C7042401 **DATE TESTED** December 18, 2025

Remarks :

Commissioning follow as commissioning performance sheets.

This is to certify that the above tests have been perfomed 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.

Service Department PerkinElmer Ltd.

Authorized Representative: [redacted]

(Wiphan Promlumda)

Service Engineer

PerkinElmer Scientific (Thailand) Co., Ltd.
290 Soi Soonvijai 4, Bangkapi, Huay Kwang, Bangkok 10310 Head Office

PinAAcle 900T Preventive Maintenance (PM)

Company Name:	S.P.S Consulting Service Co.,Ltd		
Address (Instrument Location):	Phaholyothin 24, Phaholyothin Rd, Ladyao, Jatujak, Bangkok 10900		
Serial Number:	PTCS1411103	**PM Number:**	2/2
Customer Name (if applicable):	K.Phenpha	**Telephone Number:**	WO-11540402
Customer Support Engineer Name:	Prasit	**Service Order Number:**	083-9269252
Date PM Performed: (DD-MMM-YYYY)	18 DEC 2025	**Next PM Due Date:** (DD-MMM-YYYY)	18 JUN 2026
Standard Labor Hours to Complete PM :		**5 hours**	

Part Number	Release	Publication Date
09370143 Rev.9	A	January 2018

Scope

The purpose of this PM is to ensure the continued functionality of the PinAAcle 900T by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer.

The customer should save their method before the PM begins.

General Instructions:

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM. Always check with the customer before making any changes that may affect the customer's analysis or calibration, including a current back-up of system software and/or data files. The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer. Update the PM sticker and instrument logbook as required.

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PerkinElmer shall not be liable for incidental or consequential damages in connection with the furnishing or use of this document.

Component List

Component / Specific Model	Serial #	Configuration Notes
PinAAcle900T	PTCS1411103	WinLab32 Ver 7.4.1.0730

Parts Lists

Parts Included with the PM		
Part Number (if applicable)	**Description**	**Quantity**
B0501696	Fan Filters	N/A
B3002013	THGA Contact Cylinders	N/A
B3141064	Glycerol for THGA Cooling	N/A
N3160156	O-Ring Kits for Sampling Introduction (Stainless Steels Nebulizer)	N/A
N3160157	O-Ring Kits for Sampling Introduction (Plastic Nebulizer)	N/A
N9301714	Replacement Acetylene Filter Cartridge	N/A
TH001022	Replacement Air Filter Cartridge	N/A

Additional Reagents and Standards Required for PM				
Part Number (if applicable)	**Description**	**Quality**	**Batch/Lot #**	**Expired Date (MM/YY)**
N9300183	1000 mg/L Copper Standard	AR	27-156CUY1	SEP-2026
N9300244	GFAAS Mixed Standard	AR		

Additional Reagents and Standards Required for PM (Customer Support Solution)				
Part Number (if applicable)	**Description**	**Quantity**	**Batch/Lot #**	**Expiration Date (MM/YY)**
N/A	DI Water	250 ml.	AR	AR
N/A	0.5% $HN0_3$	250 ml.	AR	AR

Additional Tools Required for PM			
Part Number (if applicable)	**Description**	**Quantity**	**Serial #**
N1013000	0.2A Neutral density filter	1	MG0-704
N1013002	1.0A Neutral density filter	1	MG2-891
B3100652 Or N9307029	Electronic Flow Meter	1	
B0505495	Test Jig	1	
03030997	System 2 EDL Driver	1	030309-97E
N3050605	As System 2 EDL	1	17986
N3050121	Cu Lumina HCL	1	000003793D12
N3050109	Ba Lumina HCL	1	041123-010120
N3050139	K Lumina HCL	1	0000037B8E1D
N3050152	Ni Lumina HCL	1	
N3050119	Cr Lumina HCL	1	010324-0300050

Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

1. **General:**

   ☑ Review the instrument performance with the customer and document any recent problems.
   ☑ Inspect the customer log book and make any appropriate PM entries.
   ☑ Perform general inspection of system for cleanliness.

2. **PC Instrument Software:**

   ☑ Instrument Software user files/databases archived, packed, and/or deleted as needed.

3. **Mechanical:**

   ☑ Inspect and clean all fans and filters. Replace filters if necessary
   ☑ Inspect all gas and water lines for leaks and/or wear. Replace if needed. Thoroughly inspect all quick connects. Replace the Y connector, P/N 09921079, if needed.
   ☑ Clean exterior of the instrument.

   3.1 Flame Technique
   ☑ Inspect the burner head, burner chamber, and nebulizer. Clean if needed as stated in the Hardware Guide.
   ☑ Check burner head dimensions with the feeler gauge as stated in the Hardware Guide in the Maintenance chapter section on cleaning the burner head and checking sloth width. Replace if out of specification
   ☑ Check the condition of the end cap, burner head, and nebulizer O-rings. Replace if necessary.
   ☑ Check the drain system for signs of wear. Replace worn or damaged parts.
   ☑ Visually check for proper flame conditions when igniting the Air-C2H2 and N20-C2H2 flames (if applicable).

   3.2 THGA Technique
   ☑ Inspect the pole pieces and clean where the pole pieces contact the furnace. Replace the pole piece p-rings as needed, P/N's B0501018 & B0501250. Grease the O-rings as needed with Apiezon L grease, P/N 09905148
   ☑ Inspect the four insulation pads on the front contact housing of the THGA in furnace. If the pads are missing replace the THGA furnace or replace the insulator pads on the furnace.
   ☑ Inspect the graphite tube and clean the contact cylinders. Replace if necessary.
   ☑ Check internal and external gas flows with the Electronic Gas Flow Meter and the Gas Flow Test Probe as described in the Service Manual. Correct if necessary.
   ☑ Check furnace open/close function.
   ☑ Verify the operation of the GFTV Camera for proper operation and viewing alignment in the furnace camera Tube View window. Align if needed.
   ☑ Check the operation of the Halogen Light ASSY for the GFTV Camera. Replace if needed.
   ☑ Check the water level/quality in the recirculation (if applicable). Add distilled water if necessary.
   ☑ Check the cooling system fluid flow rate with the FCS In-Line Flow Meter for proper levels if needed. Refer to SDB# COSY008.STN

☑ Perform Cooling System maintenance if needed per SDB# COSY005.STN.
☑ Check auto sampler operation.
☑ Perform an auto sampler check valve test as described in the Service Manual.
☑ Lubricate the spindles of the auto sampler pumps and all moving parts of the tray mechanics as described in the Service Manual.
☑ Inspect the auto sampler sampling capillary as described in the Service Manual. Replace if necessary.

4. Electrical:

☑ Inspect PC boards. Clean if necessary.
☑ Carefully check all internal and external cable connections.
☑ Check instrument firmware revisions upgrade to current levels (if necessary)
☑ Run Diagnostics Test within the Advanced function of the Spectrometer page. Check the results in the service log folder in the Spectrometer BM Log Viewer.

5. Optics:

☑ Inspect and clean the sample compartment windows, if needed.
☑ Inspect and clean the furnace windows, if needed.
☑ Inspect and clean the GFTV camera lens, if needed.
☑ Inspect optics. Clean or replace if necessary,

6. Gasses:

☑ Verify that the Gasses supplied to the instrument are within the pressure and purity specifications found in the PinAAcle 900 Series Pre-installation Checklist SDB.
☑ Verify that the air filter element is dry. Replace if necessary.

7. Flame Interlock Check:

Description: Check to ensure that all safety interlocks are closed.

Parameter	Specification	Test Results	Pass/Fail
Flame Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
Drain Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
Nebulizer Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
C_2H_2 Pressure Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
Air Pressure Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
Burner Head Sensor	Choosing Nitrous Oxide as the oxidant should trigger an interlock shuts down	Active	Passed

8. After PM Performance tests [Flame]:

8.1 Detector Linearity with Barium

Description: Ensures that the detector is linear in the Visible Range.

Parameter	Specification	Certificate Value at 553.6 nm (Abs.)	Test Results	Pass/Fail
1.0 A ND Filter	± 5% from Cert.	0.9874	0.9644	Passed
0.2 A ND Filter	± 5% from Cert.	0.1886	0.1727	Passed

8.2 Baseline Noise at 1.0 Absorbance with Barium

Description: Ensures that a high absorbance will not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0016	Passed

8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.001	0.0001	Passed

8.4 D_2 Background Compensation with Copper

Description: Verifies the instruments ability to compensate for Background absorption.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0069	Not Applicab

8.5 AA-BG Baseline Noise with Copper

Description: Ensures that background correction does not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0005	Not Applicab

8.6 AA-BG Baseline Noise with Arsenic

Description: Ensures that background correction does not produce excessive noise at a low wavelength.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0013	Not Applicab

8.7 Flame Sensitivity

Description: Instrument Sensitivity checked against Copper standard.

Standard Copper Sensitivity	Specification	Results (Abs.)	Pass/Fail
5 mg/L Sensitivity SS Neb (if applicable)	> 0.250 Abs.	N/A	Not Applicable
2 mg/L Sensitivity HS Neb (if applicable)	> 0.250 Abs.	0.3544	Passed

9. After PM Performance tests [THGA]:

9.1 Furnace Gas Flows

Description: Ensures the flow rates are within specification.

Parameter	Specification	Test Results	Pass/Fail
Internal Flow Rate	250 mL/min ± 25 mL/min	252	Passed
External Flow Rate	100 mL/min ± 10 mL/min	97	Passed

9.2 Chromium Baseline Noise

Description: Signal to noise check.

Parameter	Specification	Results	Pass/Fail
Baseline Noise	≤ 0.005 Abs.	-0.0010	Passed
Standard Deviation	≤ 0.005	0.0009	Passed

9.3 Chromium Characteristic Mass and Precision

Description: Calculate the characteristic mass using the characteristic mass tool and precision from the integrated absorbance values.

Parameter	Specification	Results	Pass/Fail
Cr m_0 Results	≤ 7.0 pg/0.0044 A-s	6.8	Passed
Precision	≤ 2.0 %	0.38	Passed

9.4 Copper Characteristic Mass and Zeeman Ratio

Description: Calculate the characteristic mass using the characteristic mass tool and check the Zeeman Ratio.

Parameter	Specification	Results	Pass/Fail
Cu m_0 Result	≤ 16.5 pg/0.0044 A-s	15.4	Not Applicable
Zeeman Ratio	0.52 ± 0.04	0.51	Not Applicable

10. Review:

☑ Review with the customer PM work performed.

☑ Review with the customer routine maintenance procedures.

☑ Discuss recommended customer supplied materials to have on hand.

☑ Attach PM sticker.

Additional Comments

Additional Comments Regarding the PM
Zeeman Ratio $= \frac{Atomic\ Signal\ (Peak\ area\ )}{Atomic\ Signal\ (Peak\ area\ ) + Background\ Signal\ (Peak\ area\ )}$ $= \frac{0.1442}{0.1442+0.1337}$ $= 0.518$

Review

The preventive maintenance checks and if applicable performance tests for PinAAcle 900T have been completed.

This PinAAcle 900T Passes ☑ Fails ☐ the preventive maintenance.

Review of Preventive Maintenance:		
Authorized PerkinElmer Representative:	[redacted]	Date: 18 DEC 2025 (DD-MMM-YYYY)
Authorized Customer Representative:		Date: 18 DEC 2025 (DD-MMM-YYYY)

ระดับเสียงในสถานที่ทำงาน

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

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

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 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 : [redacted]

(Mr.Weerachai Deechaiyae)

Approved by : [redacted]

(Mr.Prawate Kluaypa)

Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 21 Feb. 2025

Date of Issue : 24 Feb. 2025

Ref : 20112680219007390O1

End of Certificate

The results relate only to the items tested/calibrated or value assigned.
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Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 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

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

Noise B_053/26

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-R50	ACO	6236	00192062	08 February 2026	93.9	93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.81 ± 0.10 dB	

Calibrated by : [redacted]
(Mr. Adul Dangklom)

Approved by : [redacted]
(Mr. Peera Detudom)

ระดับเสียงติดตัวบุคคล (Noise Dose)

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0514 **MTC No.** EEL. BP. 34/0868

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 : SVANTEK

Model : SV34

Serial No. : 83820

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 2633526.

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 : 14 Aug. 2025

Date of Calibration : 22 Aug. 2025

The results relate only to the items tested/calibrated or value assigned.
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Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 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. 21-68/0514 **MTC No.** EEL. BP. 34/0868

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 = 114 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 2
1/2 inch Bruel&Kjaer 4180	114.02	0.02	± 0.10	±0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1000.0	0.0	± 1.5	±2.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	0.21	± 0.50	±4.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by : [redacted]

(Mr.Weerachai Deechaiyae)

Approved by : [redacted]

(Mr.Prawate Kluaypa)

Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 22 Aug. 2025

Date of Issue : 25 Aug. 2025

Ref : 20112680814031690 11

End of Certificate

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

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

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

Noise Dose B_064/26

Noise Dose Meter Calibration Report

Acoustic Calibrator Data			
Brand	SVANTEK	Number	SV 03/60
Model	SV34	Serial No.	83820
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2025
		Due Date	22 August 2026

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-B20	SVANTEK	SV-104IS	106131	08 February 2026	114.0	114.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					114.02± 0.10 dB	

Calibrated by : [redacted]
(Mr. Adul Dangklom)

Approved by : [redacted]
(Mr. Peera Detudom)

คุณภาพอากาศในสถานประกอบการ

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature	25	± 3	°C
Pressure	1010	± 15	mmbar

Personal Pump Data				Calibration Data								
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3	y	R^2
B01	SKC	224-PCXR4	262101	05/01/2026	1,000	1,500	2,000	1,004	1,501	2,003	1.010x – 18.941	0.999
B02	SKC	224-PCXR4	626166	05/01/2026	1,000	1,500	2,000	1,000	1,500	2,002	1.012x - 23.432	0.999
B03	SKC	224-PCXR4	612968	05/01/2026	1,000	1,500	2,000	993	1,503	2,001	1.008x - 15.587	1.000
B04	SKC	224-PCXR4	602804	06/01/2026	1,000	1,500	2,000	1,001	1,498	1,996	0.997x + 2.672	1.000
B05	SKC	224-PCXR4	612693	07/01/2026	1,000	1,500	2,000	999	1,494	1,993	0.995x + 1.555	1.000
B06	SKC	224-PCXR4	262188	06/01/2026	1,000	1,500	2,000	1,002	1,501	2,004	1.007x - 12.528	1.000
B07	SKC	224-PCXR4	626262	06/01/2026	1,000	1,500	2,000	1,003	1,501	2,002	1.010x - 19.021	0.999
B08	SKC	224-PCXR4	626100	06/01/2026	1,000	1,500	2,000	1,005	1,500	2,006	1.006x - 8.619	1.000
B09	SKC	224-PCXR4	626479	05/01/2026	1,000	1,500	2,000	1,001	1,500	2,000	1.007x - 14.458	1.000
B10	SKC	224-PCXR4	091950	05/01/2026	1,000	1,500	2,000	998	1,503	2,000	1.001x – 5.945	1.000
B11	SKC	224-PCXR8	564315	05/01/2026	1,000	1,500	2,000	993	1,494	1,993	1.010x - 25.765	0.999
B12	SKC	224-PCXR4	034656	05/01/2026	1,000	1,500	2,000	995	1,497	1,998	0.996x - 4.790	0.999
B13	SKC	224-PCXR4	602073	05/01/2026	1,000	1,500	2,000	994	1,499	1,975	0.990x + 6.525	0.999
B14	SKC	224-PCXR4	626313	05/01/2026	1,000	1,500	2,000	993	1,499	1,994	1.001x - 7.291	1.000
B15	SKC	224-PCXR4	626474	05/01/2026	1,000	1,500	2,000	992	1,505	2,002	1.012x - 23.464	1.000
B16	SKC	224-PCXR4	626477	06/01/2026	1,000	1,500	2,000	993	1,496	1,991	0.996x + 0.945	1.000
B17	SKC	224-PCXR4	626860	06/01/2026	1,000	1,500	2,000	1,000	1,500	2,001	1.007x - 14.414	1.000
B18	SKC	224-PCXR4	691484	05/01/2026	1,000	1,500	2,000	994	1,502	2,002	1.015x - 30.763	0.999
B19	SKC	224-PCXR4	691599	05/01/2026	1,000	1,500	2,000	993	1,490	1,999	1.006x - 14.713	1.000
B20	SKC	224-PCXR4	691587	05/01/2026	1,000	1,500	2,000	991	1,500	1,997	1.005x - 13.565	1.000
B21	SKC	224-PCXR4	691531	05/01/2026	1,000	1,500	2,000	1,002	1,500	2,000	1.002x - 6.050	1.000
B22	SKC	224-PCXR4	691654	05/01/2026	1,000	1,500	2,000	1,008	1,498	1,995	1.000x - 6.158	0.999
B23	SKC	224-PCXR4	798393	06/01/2026	1,000	1,500	2,000	992	1,498	1,972	0.990x + 3.813	0.999
B24	SKC	224-PCXR4	626363	06/01/2026	1,000	1,500	2,000	1,003	1,493	2,002	1.001x - 5.201	1.000
B25	SKC	224-PCXR4	798489	06/01/2026	1,000	1,500	2,000	993	1,496	1,995	1.003x - 10.857	1.000
B26	SKC	224-PCXR4	798479	06/01/2026	1,000	1,500	2,000	994	1,505	2,002	1.012x - 23.253	1.000
B27	SKC	224-PCXR4	691673	06/01/2026	1,000	1,500	2,000	996	1,506	1,989	0.994x + 5.799	1.000
B28	SKC	224-PCXR4	691570	06/01/2026	1,000	1,500	2,000	995	1,502	1,998	0.999x - 5.193	1.000
B29	SKC	224-PCXR4	626472	05/01/2026	1,000	1,500	2,000	995	1,491	1,993	0.999x - 4.662	1.000
B30	SKC	224-PCXR4	691489	05/01/2026	1,000	1,500	2,000	1,003	1,500	1,998	1.002x – 6.804	1.000
B31	SKC	224-PCXR4	691509	05/01/2026	1,000	1,500	2,000	993	1,500	1,997	0.992x + 4.256	1.000
B32	SKC	224-PCXR4	091567	05/01/2026	1,000	1,500	2,000	994	1,487	1,972	0.990x - 2.389	0.999
B33	SKC	224-PCXR4	091756	05/01/2026	1,000	1,500	2,000	993	1,496	1,998	1.013x – 28.816	0.999
B34	SKC	224-PCXR4	612962	05/01/2026	1,000	1,500	2,000	994	1,502	2,003	1.011x - 21.717	1.000
B35	SKC	224-PCXR4	602682	06/01/2026	1,000	1,500	2,000	998	1,493	2,000	1.001x - 2.561	1.000
B36	SKC	224-PCXR4	626164	06/01/2026	1,000	1,500	2,000	993	1,497	1,994	1.003x - 8.755	1.000
B37	SKC	224-PCXR4	626256	06/01/2026	1,000	1,500	2,000	993	1,508	2,007	1.009x - 10.996	1.000
B38	SKC	224-PCXR4	626167	06/01/2026	1,000	1,500	2,000	993	1,502	2,000	1.013x - 28.162	0.999
B39	SKC	224-PCXR4	034637	06/01/2026	1,000	1,500	2,000	1,000	1,497	1,993	0.991x + 9.544	1.000
B40	SKC	224-PCXR4	798349	06/01/2026	1,000	1,500	2,000	1,000	1,499	1,994	0.998x - 0.160	1.000

Calibrated by : [redacted]

(Mr. Adul Dangklom)

Approved by : [redacted]

(Mr. Peera Detudom)

บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
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Personal Pump Calibration Report

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

Environmental Conditions

Temperature	25	± 3	°C
Pressure	1010	± 15	mmbar

Personal Pump Data				Calibration Data								
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3	y	R^2
B41	SKC	224-PCXR4	612669	05/01/2026	1,000	1,500	2,000	995	1,490	1,997	1.004x - 11.846	1.000
B42	SKC	224-PCXR4	626041	05/01/2026	1,000	1,500	2,000	996	1,510	1,999	0.999x - 0.630	1.000
B43	SKC	224-PCXR4	034636	05/01/2026	1,000	1,500	2,000	1,000	1,493	2,004	1.004x - 6.760	1.000
B44	SKC	224-PCXR8	529341	05/01/2026	1,000	1,500	2,000	995	1,512	1,995	1.000x - 4.571	0.999
B45	SKC	224-PCXR8	529594	05/01/2026	1,000	1,500	2,000	997	1,503	2,001	1.004x - 10.178	1.000
B46	SKC	224-PCXR8	566743	05/01/2026	1,000	1,500	2,000	997	1,491	2,007	1.013x - 21.797	1.000
B47	SKC	224-PCXR8	566747	06/01/2026	1,000	1,500	2,000	995	1,508	1,999	1.007x - 15.240	0.999
B48	SKC	224-PCXR8	566753	06/01/2026	1,000	1,500	2,000	998	1,493	1,992	0.997x - 0.746	1.000
B49	SKC	224-PCXR8	566780	06/01/2026	1,000	1,500	2,000	994	1,475	1,991	1.002x - 18.905	0.999
B50	SKC	224-PCXR8	500400	06/01/2026	1,000	1,500	2,000	990	1,498	1,992	0.991x + 4.770	0.999
B51	SKC	224-PCXR8	500363	06/01/2026	1,000	1,500	2,000	995	1,498	1,994	1.008x - 21.051	0.999
B52	SKC	224-PCXR8	093186	06/01/2026	1,000	1,500	2,000	1,001	1,494	1,995	0.993x + 6.362	1.000
B53	SKC	224-PCXR8	707670	06/01/2026	1,000	1,500	2,000	992	1,502	2,007	1.016x - 28.087	1.000
B54	SKC	224-PCXR3	509821	06/01/2026	1,000	1,500	2,000	1,000	1,497	2,002	1.009x - 18.056	1.000
B55	SKC	224-PCXR3	510710	05/01/2026	1,000	1,500	2,000	999	1,497	2,001	1.008x - 15.994	1.000
B56	SKC	224-PCXR3	511450	05/01/2026	1,000	1,500	2,000	996	1,510	2,001	1.005x - 11.080	0.999
B57	SKC	224-PCXR3	510798	05/01/2026	1,000	1,500	2,000	1,000	1,493	2,001	1.000x - 1.575	1.000
B58	SKC	224-PCXR3	509852	05/01/2026	1,000	1,500	2,000	997	1,473	1,995	1.000x - 11.132	0.999
B59	SKC	224-PCXR3	509862	05/01/2026	1,000	1,500	2,000	961	1,461	1,969	1.021x - 71.317	0.999
B60	SKC	224-PCXR3	512655	06/01/2026	1,000	1,500	2,000	971	1,469	2,001	1.027x - 56.285	0.999
B61	SKC	224-PCXR3	503915	06/01/2026	1,000	1,500	2,000	1,000	1,476	2,001	1.006x - 16.496	0.999
B62	SKC	224-PCXR3	505975	06/01/2026	1,000	1,500	2,000	997	1,503	2,001	1.004x - 10.186	1.000
B63	SKC	224-PCXR3	511432	06/01/2026	1,000	1,500	2,000	1,000	1,496	1,994	0.996x - 0.574	1.000
B64	SKC	224-PCXR3	508302	06/01/2026	1,000	1,500	2,000	1,000	1,500	1,997	1.000x - 4.850	1.000
B65	SKC	224-PCXR3	508310	05/01/2026	1,000	1,500	2,000	998	1,505	1,999	1.001x - 5.999	1.000
B66	SKC	224-PCXR3	509861	05/01/2026	1,000	1,500	2,000	1,003	1,501	2,006	1.009x - 15.631	0.999
B67	SKC	224-PCXR3	506295	05/01/2026	1,000	1,500	2,000	996	1,496	1,993	0.999x - 4.016	1.000
B68	SKC	224-PCXR3	505872	05/01/2026	1,000	1,500	2,000	1,003	1,491	2,001	0.995x + 5.309	1.000
B69	SKC	224-PCXR3	508375	06/01/2026	1,000	1,500	2,000	994	1,507	2,002	1.008x - 16.847	0.999
B70	SKC	224-PCXR3	510623	06/01/2026	1,000	1,500	2,000	993	1,506	2,003	1.010x - 18.889	1.000
B71	SKC	224-PCXR3	508367	07/01/2026	1,000	1,500	2,000	997	1,501	1,994	0.999x - 0.148	1.000
B72	SKC	224-PCXR3	505977	06/01/2026	1,000	1,500	2,000	1,000	1,503	2,003	1.004x - 8.252	1.000
B73	SKC	224-PCXR3	512606	06/01/2026	1,000	1,500	2,000	996	1,495	1,995	0.998x - 1.627	1.000
B74	SKC	224-PCXR3	505993	06/01/2026	1,000	1,500	2,000	995	1,506	1,999	1.008x - 17.629	0.999
B75	SKC	224-PCXR3	509820	05/01/2026	1,000	1,500	2,000	997	1,491	1,999	1.001x - 6.461	1.000
B76	SKC	224-PCXR3	509811	05/01/2026	1,000	1,500	2,000	1,000	1,472	2,004	1.008x - 18.391	1.000
B77	SKC	224-PCXR3	508301	05/01/2026	1,000	1,500	2,000	993	1,471	1,995	1.000x - 10.813	0.999
B78	SKC	224-PCXR3	510677	05/01/2026	1,000	1,500	2,000	999	1,477	2,000	1.003x - 12.304	0.999
B79	SKC	224-PCXR3	510920	06/01/2026	1,000	1,500	2,000	1,001	1,500	1,997	0.998x + 0.215	1.000

Calibrated by : [redacted]
(Mr. Adul Dangklom)

Approved by : [redacted]
(Mr. Peera Detudom)

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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

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
H-B01	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	506.0	991.5	1985.3	0.991x + 9.075	1.000
H-B02	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	496.1	998.2	1994.1	0.994x + 5.436	1.000
H-B03	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	499.0	987.7	2010.2	1.004x - 13.828	0.999
H-B04	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	505.4	999.9	2008.7	0.997x + 2.196	1.000
H-B05	Dwyer	VFB-65	07/01/2026	500	1,000	2,000	494.6	997.4	1987.1	0.990x + 10.392	1.000
H-B06	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	504.3	993.8	1981.8	1.005x - 9.139	0.999
H-B07	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	504.1	996.5	2018.3	1.001x - 0.092	1.000
H-B08	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	493.6	999.9	1987.8	1.000x - 1.064	0.999
H-B09	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	503.7	1006.2	2014.3	0.994x + 14.192	1.000
H-B10	Dwyer	VFB-65	05/01/2026	500	1,000	2,000	496.9	999.4	2012.4	0.998x + 1.930	1.000

Calibrated by : [redacted]
(Mr.Adul Dangklom)

Approved by : [redacted]
(Mr. Peera Detudom)