
ภาคผนวก ง

สำเนาใบรับรองการสอบเทียบเครื่องมือการตรวจวัด

HORIBA

HORIBA (THAILAND) LIMITED

46/8 Rungrojthanakul Bld., 1st, 2nd Fl., Ratchadapisek Rd., Hual Khwang, Hual Khwang, Bangkok 10310 THAILAND
Telephone: +66 (0) 2861 5995, +66 (0) 2734-4434 Facsimile: +66 (0) 2861 5200
Website : <http://www.horiba.com>

MULTI-POINT GAS TEST REPORT OF NITRIC OXIDE

Equipment Information

Manufacturer	Horiba
Model	HORIBA PG-350
Serial Number	V40KV0LD

Calibration Date	21-Nov-24
Background Coefficient	0
Room Temperature	23.3 °C

Standard Gas Information

Zero Gas	
Cylinder Number	17K686056
Component	N2
Concentration	99.999 %
Expiration Date	-

Span Gas	
Cylinder Number	ND58962
Component	NO
Concentration	89.94 ppm
Expiration Date	28-Sep-30

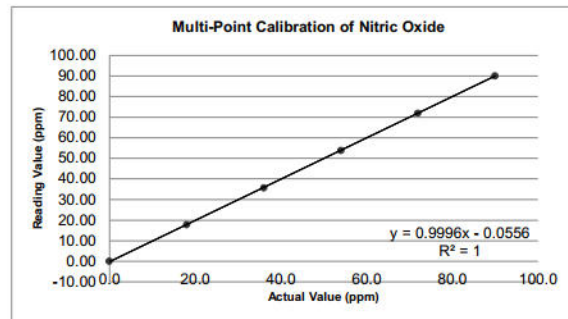
Measurement Range	100
% Measurement Range	89.94

Multi-Point Gas Test Data

Level	Actual Value	Reading Value (ppm)				Difference	
		1	2	3	Average	ppm	%
0%	0.0	0.1	0.1	0.1	0.10	0.10	
20%	17.99	17.80	18.00	17.90	17.90	-0.09	0.49
40%	35.98	36.00	35.50	35.70	35.73	-0.24	0.67
60%	53.96	54.10	53.50	53.80	53.80	-0.16	0.30
80%	71.95	71.70	72.00	71.90	71.87	-0.09	0.12
100%	89.94	89.80	90.00	90.10	89.97	0.03	0.03
Average						0.32	
Result						PASS	

Slope	0.9996	Interception	-0.0556	Correlation Coefficient	1.0000
%Slope	-0.0445%	% Interception	-0.0556%	% Correlation Coefficient	-0.0007%
Result	PASS	Result	PASS	Result	PASS

Multi-Point Gas Test Chart



Test By [REDACTED] Approve By [REDACTED]
Date 2-Dec-24 Date 2-Dec-24

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MULTI-POINT GAS TEST REPORT OF SULFUR DIOXIDE

Equipment Information

Manufacturer	Horiba
Model	HORIBA PG-350
Serial Number	V40KV0LD

Calibration Date	21-Nov-24
Background Coefficient	1
Coefficient	1.2894
Room Temperature	23.3 °C

Standard Gas Information

Zero Gas	
Cylinder Number	17K686056
Component	N2
Concentration	99.999 %
Expiration Date	-

Span Gas	
Cylinder Number	ND58962
Component	SO2
Concentration	89.58 ppm
Expiration Date	28-Sep-30

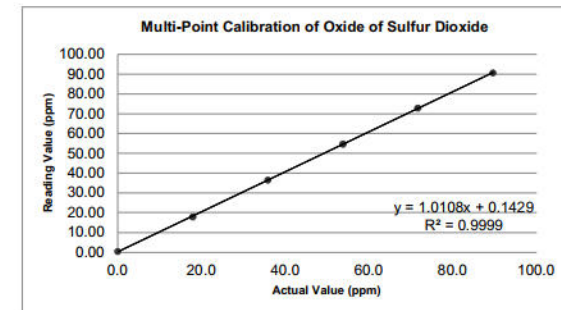
Measurement Range	200
% Measurement Range	44.79

Multi-Point Gas Test Data

Level	Actual Value	Reading Value (ppm)				Difference	
		1	2	3	Average	ppm	%
0%	0.0	0.4	0.2	0.4	0.33	0.33	
20%	17.92	18.20	17.60	17.80	17.87	-0.05	0.28
40%	35.83	37.00	36.20	36.10	36.43	0.60	1.68
60%	53.75	54.30	54.80	54.50	54.53	0.79	1.46
80%	71.66	72.80	73.10	72.60	72.83	1.17	1.63
100%	89.58	90.20	90.60	90.70	90.50	0.92	1.03
Average						1.21	
Result						PASS	

Slope	1.0108	Interception	0.1429	Correlation Coefficient	1.0000
%Slope	1.0802%	% Interception	0.0714%	% Correlation Coefficient	-0.0026%
Result	PASS	Result	PASS	Result	PASS

Multi-Point Gas Test Chart



Test By [REDACTED] Approve By [REDACTED]
Date 2-Dec-24 Date 2-Dec-24

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MULTI-POINT GAS TEST REPORT OF CARBON MONOXIDE

Equipment Information

Manufacturer	Horiba	Calibration Date	21-Nov-24
Model	HORIBA PG-350	Background	0
Serial Number	V40KV0LD	Coefficient	1.4511
		Room Temperature	23.3 °C

Standard Gas Information

Zero Gas		Span Gas	
Cylinder Number	17K686056	Cylinder Number	ND58962
Component	N2	Component	CO
Concentration	99.999 %	Concentration	89.58 ppm
Expiration Date	-	Expiration Date	28-Sep-30

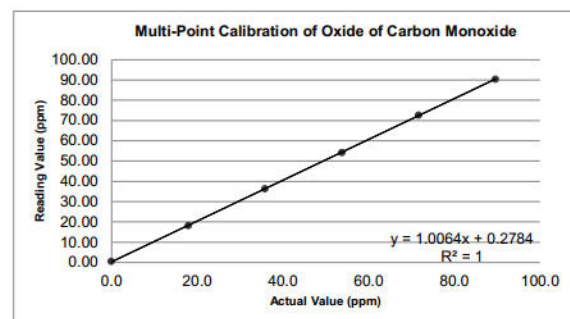
Measurement Range	200
% Measurement Range	44.79

Multi-Point Gas Test Data

Level	Actual Value	Reading Value (ppm)				Difference	
		1	2	3	Average	ppm	%
0%	0.0	0.5	0.6	0.4	0.50	0.50	
20%	17.92	18.00	18.10	18.20	18.10	0.18	1.03
40%	35.83	36.20	36.40	36.32	36.31	0.47	1.32
60%	53.75	54.20	54.11	54.34	54.22	0.47	0.87
80%	71.66	72.42	72.34	72.90	72.55	0.89	1.24
100%	89.58	90.10	90.80	90.50	90.47	0.89	0.99
						Average	1.09
						Result	PASS

Slope	1.0064	Interception	0.2784	Correlation Coefficient	1.0000
%Slope	0.6448%	% Interception	0.1392%	% Correlation Coefficient	-0.0012%
Result	PASS	Result	PASS	Result	PASS

Multi-Point Gas Test Chart



Test By

Date 2-Dec-24

Approve By

Date 2-Dec-24

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MULTI-POINT GAS TEST REPORT OF CARBON DIOXIDE

Equipment Information

Manufacturer	Horiba	Calibration Date	21-Nov-24
Model	HORIBA PG-350	Background	1
Serial Number	V40KV0LD	Coefficient	1.0585
		Room Temperature	23.3 °C

Standard Gas Information

Zero Gas		Span Gas	
Cylinder Number	17K686056	Cylinder Number	ND11246
Component	N2	Component	CO2
Concentration	99.999 %	Concentration	21.02 %
Expiration Date	-	Expiration Date	8-Aug-30

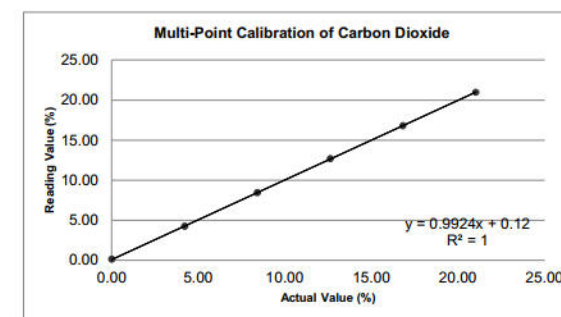
Measurement Range	30
% Measurement Range	70.07

Multi-Point Gas Test Data

Level	Actual Value	Reading Value (%)				Difference	
		1	2	3	Average	%	%
0%	0.00	0.12	0.14	0.16	0.14	0.14	
20%	4.20	4.21	4.32	4.23	4.25	0.05	1.17
40%	8.41	8.44	8.46	8.48	8.46	0.05	0.62
60%	12.61	12.70	12.67	12.65	12.67	0.06	0.49
80%	16.82	16.83	16.80	16.77	16.80	-0.02	0.10
100%	21.02	20.95	20.97	21.00	20.97	-0.05	0.22
						Average	0.52
						Result	PASS

Slope	0.9924	Interception	0.1200	Correlation Coefficient	1.0000
%Slope	-0.7612%	% Interception	0.4000%	% Correlation Coefficient	-0.0006%
Result	PASS	Result	PASS	Result	PASS

Multi-Point Gas Test Chart



Test By

Date 2-Dec-24

Approve By

Date 2-Dec-24

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MULTI-POINT GAS TEST REPORT OF OXYGEN

Equipment Information

Manufacturer	Horiba	Calibration Date	21-Nov-24
Model	HORIBA PG-350	Background	25
Serial Number	V40KV0LD	Coefficient	1.0259
		Room Temperature	23.3 °C

Standard Gas Information

Zero Gas		Span Gas	
Cylinder Number	17K686056	Cylinder Number	ND60790
Component	N2	Component	O2
Concentration	99.999 %	Concentration	20.87 %
Expiration Date	-	Expiration Date	20-Jan-30

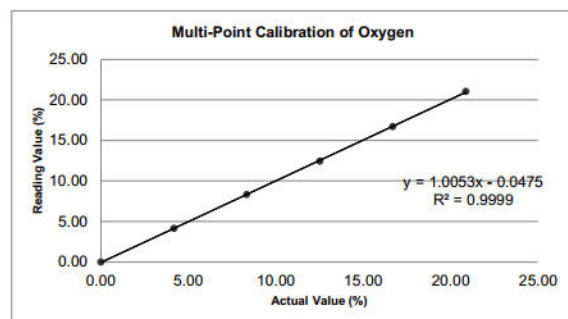
Measurement Range	25
% Measurement Range	83.48

Multi-Point Gas Test Data

Level	Actual Value	Reading Value (%)				Difference	
		1	2	3	Average	%	%
0%	0.00	0.01	0.00	0.00	0.01	0.01	
20%	4.17	4.12	4.11	4.21	4.15	-0.03	0.65
40%	8.35	8.33	8.35	8.30	8.33	-0.02	0.26
60%	12.52	12.44	12.46	12.43	12.44	-0.08	0.63
80%	16.70	16.67	16.74	16.71	16.71	0.01	0.06
100%	20.87	21.00	21.02	21.05	21.02	0.15	0.73
Average						0.47	
Result						PASS	

Slope	1.0053	Interception	-0.0475	Correlation Coefficient	1.0000
%Slope	0.5294%	% Interception	-0.1898%	% Correlation Coefficient	-0.0036%
Result	PASS	Result	PASS	Result	PASS

Multi-Point Gas Test Chart



Test By [Signature] Approve By [Signature]
Date 2-Dec-24 Date 2-Dec-24

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LOWER DETECTABLE LIMIT TESTING REPORT

Equipment Information

Manufacturer	Horiba	Calibration Date	21-Nov-24
Model	HORIBA PG-350	Room Temperature	23.3 °C
Serial Number	V40KV0LD		

Standard Gas Information

Zero Gas		Component	N2
Cylinder Number	17K686056	Concentration	99.999 %

Parameters	Measruement Range	Unit	Background	Coefficient
NO	100	ppm	1	0.9934
SO ₂	200	ppm	0	1.0684
CO	200	ppm	0	1.1705
CO ₂	30	%	0	1.004
O ₂	25	%	16	1.0078

TESTING REPORT RESULTS

Parameters	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	STDEV.
NO	0.20	0.20	0.30	0.20	0.10	0.30	0.20	0.30	0.10	0.10	0.082
SO ₂	0.30	0.20	0.30	0.40	0.40	0.40	0.50	0.60	0.50	0.40	0.115
CO	0.00	0.00	0.00	0.00	0.10	0.10	-0.10	0.10	-0.10	-0.10	0.082
CO ₂	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.02	0.01	0.02	0.007
O ₂	0.03	0.03	0.02	0.03	0.01	-0.01	-0.01	-0.02	-0.01	0.02	0.020

Conclusion

NO Lower detectable limit (LDL) value is	0.082	ppm
SO ₂ Lower detectable limit (LDL) value is	0.115	ppm
CO Lower detectable limit (LDL) value is	0.082	ppm
CO ₂ Lower detectable limit (LDL) value is	0.007	% Vol.
O ₂ Lower detectable limit (LDL) value is	0.020	% Vol.

Test By [Signature] Approve By [Signature]
Date 2-Dec-24 Date 2-Dec-24



Certificate of Conformity

BANGKOK INDUSTRIAL GAS CO.,LTD.
1 Park Silom Tower, 24th Floor, Convent Road
Silom, Bangrak, Bangkok 10500 Thailand
Tel : (662) 481-6789 Fax : (662) 481-6790

Customer Name : SGS (Thailand) Limited					Delivery Date : 03 Jul 2025		
Product : 1100060					Analysis Date :		
Product Name : CY N2 UHP 7M3 47S CGA580					Best if Use By : -		
Cylinder Type : 47 LITERS STEEL					Delivery Order : 3300010176		
Cylinder Valve : CGA 580					Inspection Lot : 40000005366		
Filling Pressure : 2000 PSIG @ 27°C					Gas Content : 7 M3		
COMPONENT	UNIT	LOWER LIMIT	UPPER LIMIT	NOMINAL VALUE	ACTUAL VALUE	ANALYTICAL ACCURACY	TEST METHOD

Purity	%	99.9990					
Oxygen	ppm(V)		<3.0000				
Moisture	ppm(V)		<3.0000				
Carbon Monoxide	ppm(V)		<1.0000				
Carbon Dioxide	ppm(V)		<1.0000				
Total Hydrocarbon as CH4	ppm(V)		<1.0000				

Batch : 010725N201
Sampling Cylinder :
Cylinder Serial Number : D892075,11D062106,D9143166,11D126047
Remark :

This certificate is issued electronically and is valid without a signature.



Meter Console Verification

Dry Gas Meter ID. : ENSS 046
Instrument Brand : Apex / Model 572
Date of Calibration : 12-Aug-2025
Calibrated By : SY

Wet gas meter Information

Wet gas Brand : Shinagawa
Wet gas Model : W-NK-2.5A
Wet gas S/N : 544122
Expire Date : 10-Jun-2027

Orifice Setting $\Delta H@$ (mm H ₂ O)	Wet gas		Metering System		Time (min)	Yi	$\Delta H@$
	V _w (L)	T _w (°C)	V _d (L)	T _m (°C)			
13	139.76	25.2	140.0	24.0	12.07	0.9932	46.505
13	139.18	25.0	140.0	24.5	12.11	0.9912	47.283
26	138.56	25.1	140.0	25.0	8.32	0.9869	46.820
26	138.24	25.1	140.0	25.0	8.32	0.9846	47.037
40	276.64	24.8	280.0	25.0	13.53	0.9848	47.800
40	276.54	24.6	280.0	25.5	13.46	0.9868	46.892
50	273.92	24.3	280.0	26.0	12.14	0.9791	47.047
50	273.22	24.1	280.0	26.0	12.14	0.9773	47.224
70	272.86	24.1	280.0	26.5	10.11	0.9757	45.946
70	272.28	24.1	280.0	27.0	10.06	0.9753	45.314
90	268.76	24.0	280.0	27.0	8.57	0.9611	47.014
90	268.66	23.9	280.0	27.0	8.58	0.9611	47.193
Average						0.9798	46.839

Remark :
 $Yi \leq \pm 0.02$ from average
 $Yi = 1.00 \pm 0.05$
 $\Delta H@ \leq \pm 5.08$ mm.H₂O from average
 $\Delta H@ = 46.7 \pm 6.4$ mm.H₂O

Checked By : 
(Chaowalit Srinan)

Position : Senior Inspector
Date : 12/8/2025

Approved By : 
(Thepsan Yommana)

Position : Technical Specialist Manager
Date : 14/08/2025



Temperature Display Verification

Dry Gas Meter ID. : ENSS 046
Instrument Brand : Apex / Model 572
Date of Calibration : 12-Aug-2025
Calibrated By : PK

Temperature Simulator Information

Simulator Brand : Handy Cal
Simulator Model : CA11E
Simulator S/N : T1L1015
Expire Date : 24-Jul-2026

Standard Value	Instrument Display				
	Stack	Probe	Filter	Aux	Exit
300	300	300	300	301	-
200	200	201	200	201	-
150	152	151	151	151	-
100	102	101	100	101	-
50	51	51	50	51	50
0	1	1	0	1	0
Difference	0.5%	1.0	1.0	1.0	0.0

Remark : Stack $\leq \pm 1.5\%$ Absolute
Probe $\leq \pm 3.0\text{ }^{\circ}\text{C}$
Filter $\leq \pm 3.0\text{ }^{\circ}\text{C}$
Aux $\leq \pm 3.0\text{ }^{\circ}\text{C}$
Exit $\leq \pm 3.0\text{ }^{\circ}\text{C}$

Checked By :

(Chaowalit Srinan)

Position : Senior Inspector

Date : 12/8/2025

Approved By :

(Thepsan Yommana)

Position : Technical Specialist Manager

Date : 14/08/2025



Prob Nozzle Diameter Calibration Data Sheet

Date : 04/01/2025
Personal : CS
Vernier (Digital) : Dial Caliper
Reference : ENSS 043
Nozzle ID : ENSS 089
Stainless Steel
Expire Date : 04/01/2026

Nozzle No.	Nozzle Diameter (mm)			Hi-Lo	D _{avg}
	D1	D2	D3	ΔD	
1	2.98	2.94	2.92	0.06	2.95
2	4.50	4.48	4.52	0.04	4.50
3	5.80	5.88	5.80	0.08	5.83
4	6.00	6.04	6.08	0.08	6.04
5	7.58	7.54	7.52	0.06	7.55
6	10.06	10.10	10.05	0.05	10.07
7	12.54	12.56	12.48	0.08	12.53

Remark : ΔD = Maximum distance between any two diameters, must be $\leq 0.100\text{ mm}$
 $D_{avg} = (D1+D2+D3)/3$

Checked By :

(Supervisor)

Position :

Date :

4/01/25

Approved By :

(Phatsakorn soonthornwiphat)

Position :

Date :

CEMs Manager

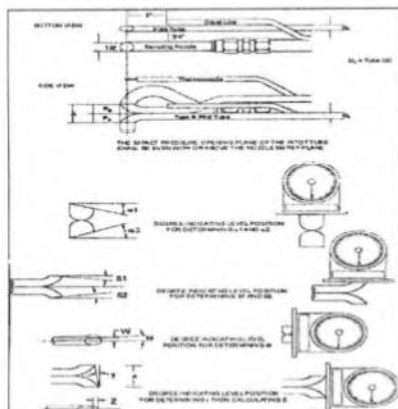
4/1/25



Certificate of Calibration

S-Type Geometric Pitot Tube Calibration

See the Code of Federal Regulations, Title 40, Part 60, Appendix A,
Method 2, Item 4



Pitot tube/Probe No. No.59/A10404

Parameter	Value	Allowable Range	Check
Assembly Level?	Y	Yes or y	PASS
Ports Damaged?	N	No or n	PASS
$\alpha 1$	1.1	$-10^\circ < \alpha 1 < +10^\circ$	PASS
$\alpha 2$	-2.1	$-10^\circ < \alpha 1 < +10^\circ$	PASS
$\beta 1$	-1.2	$-5^\circ < \alpha 1 < +5^\circ$	PASS
$\beta 2$	-1.5	$-5^\circ < \alpha 1 < +5^\circ$	PASS
γ	-1.6	N/A	-
θ	-1.9	N/A	-
D_t	0.375	0.188" to 0.375"	PASS
A	0.966142	$2.1D_t \leq A \leq 3.0D_t$	PASS
$A/2D_t$	1.288189	$1.05 \leq P_A/D_t \leq 1.5$	PASS
$Z = A \tan \gamma$	-0.02699	$Z \leq 0.125"$	PASS
$W = A \tan \theta$	-0.03205	$W \leq 0.031"$	PASS

I certify that pitot tube/probe No.59/A10404 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube certification factor of 0.84. See 40 CFR Pt. 60, App A, EPA Method 2

Standard Device

Device Name Digital Inclinator
Manufacturer BASELINE
Model 12-1057
ID No. [REDACTED]

Expiration data 12-Dec-25
ENSS No. ENSS 22159

Certified by [REDACTED]

Approved by [REDACTED]

Date 4/01/2025

Date 4/1/25



Airgas Specialty Gases
Airgas USA LLC
6141 Easton Road
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer: BANGKOK INDUSTRIAL
GAS CO LTD
Part Number: E04NI99E3HA0032
Cylinder Number: GN0035133
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12025

Reference Number: 160-403431355-1
Cylinder Volume: 247.0 CF
Cylinder Pressure: 2215 PSIG
Valve Outlet: 660
Certification Date: Sep 22, 2025

Expiration Date: Sep 22, 2028

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	45.00 PPM	45.56 PPM	G1	+/- 0.7% NIST Traceable	09/15/2025, 09/22/2025
CARBON MONOXIDE	45.00 PPM	45.52 PPM	G1	+/- 0.7% NIST Traceable	09/15/2025
NITRIC OXIDE	45.00 PPM	45.54 PPM	G1	+/- 0.7% NIST Traceable	09/15/2025, 09/22/2025
SULFUR DIOXIDE	45.00 PPM	45.20 PPM	G1	+/- 0.9% NIST Traceable	09/15/2025, 09/22/2025
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	160402854396106	CC83388	49.78 PPM CARBON MONOXIDE/NITROGEN	+/- 0.5%	Jan 24, 2032
SRM	4-K-33	CAL016939	49.07 PPM CARBON MONOXIDE/NITROGEN	±0.4	Apr 22, 2029
GMIS	DCK1201202233	CC750375	49.07 PPM NITRIC OXIDE/NITROGEN	+/- 0.5%	May 03, 2026
PRM	12404	APEX 1324257	50.04 PPM NITRIC OXIDE/NITROGEN	+/- 0.4%	Dec 22, 2023
GMIS	15310042024202	CC502382	9.897 PPM NITROGEN DIOXIDE/AIR	+/- 2.1%	Sep 18, 2027
PRM	C2392001.1	D153445	9.87 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Nov 22, 2024
GMIS	160403186449106	CC359439	51.58 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.9%	Jan 28, 2033
NTRM	160610-01	CC473196	49.02 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Mar 22, 2028

The SRM, NTRM, PRM, or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet iS50 FTIR AUP2010245 CO	FTIR	Sep 11, 2025
Nicolet iS50 FTIR AUP2010245 NO	FTIR	Sep 17, 2025
Nicolet iS50 FTIR AUP2010245 NO2	FTIR	Sep 04, 2025
Nicolet iS50 FTIR AUP2010245 SO2	FTIR	Aug 28, 2025



Triad Data Available Upon Request

NOTES: Gross Weight: 48.5 Kg
Net Weight: 8.1 Kg
PO# 4225003218



CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer:	BANGKOK INDUSTRIAL GAS CO LTD	Reference Number: 160-403431356-1
Part Number:	E04NI99E3HA0031	Cylinder Volume: 247.0 CF
Cylinder Number:	GN0034388	Cylinder Pressure: 2215 PSIG
Laboratory:	124 - Plumsteadville - PA	Valve Outlet: 660
PGVP Number:	A12025	Certification Date: Sep 22, 2025
Gas Code:	CO,NO,NOX,SO2,BALN	

Expiration Date: Sep 22, 2033

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	90.00 PPM	91.18 PPM	G1	+/- 0.6% NIST Traceable	09/15/2025, 09/22/2025
CARBON MONOXIDE	90.00 PPM	90.71 PPM	G1	+/- 0.6% NIST Traceable	09/15/2025
NITRIC OXIDE	90.00 PPM	91.14 PPM	G1	+/- 0.6% NIST Traceable	09/15/2025, 09/22/2025
SULFUR DIOXIDE	90.00 PPM	90.75 PPM	G1	+/- 0.9% NIST Traceable	09/15/2025, 09/22/2025
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	1604029545661	EB0087840	100.4 PPM CARBON MONOXIDE/NITROGEN	+/- 0.5%	Apr 04, 2032
PRM	C2219101	APE1514048	100.19 PPM NITRIC OXIDE/NITROGEN	± 0.3%	Feb 28, 2025
GMIS	01092025110	GN0021244	100.2 PPM NITRIC OXIDE/NITROGEN	+/- 0.4%	Jan 09, 2033
PRM	C2392001.1	D153445	9.87 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Nov 22, 2024
GMIS	15310042024202	CC502382	9.897 PPM NITROGEN DIOXIDE/AIR	+/- 2.1%	Sep 18, 2027
NTRM	170604-46	CC486718	98.32 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Jul 20, 2028
GMIS	160403186448120	XC022794B	101.6 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.9%	Apr 01, 2033

The SRM, NTRM, PRM, or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet iS50 FTIR AUP2010245 CO	FTIR	Sep 11, 2025
Nicolet iS50 FTIR AUP2010245 NO	FTIR	Sep 17, 2025
Nicolet iS50 FTIR AUP2010245 NO2	FTIR	Sep 04, 2025
Nicolet iS50 FTIR AUP2010245 SO2	FTIR	Aug 28, 2025



Triad Data Available Upon Request

NOTES:Gross Weight: 48.6 Kg
Net Weight: 8.1 Kg
PO# 4225003218



CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer: BANGKOK INDUSTRIAL
GAS CO LTD
Part Number: E02NI88E200000C
Cylinder Number: 5139908Y
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12023
Gas Code: O2,BALN
Reference Number: 160-402891090-1
Cylinder Volume: 216.6 CF
Cylinder Pressure: 2014 PSIG
Valve Outlet: 590
Certification Date: Nov 27, 2023

Expiration Date: Nov 27, 2031

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
OXYGEN	12.00 %	12.05 %	G1	+/- 0.4% NIST Traceable	11/27/2023
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	08010205	K001516	23.2 % OXYGEN/NITROGEN	+/- 0.4%	Jun 01, 2024

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS OXYMAT 6 - N1-W5-951 - O2	PARAMAGNETIC	Nov 08, 2023

Triad Data Available Upon Request

NOTES:Gross Weight: 59.3Kg
Net Weight: 7.2 Kg
PO# 5223006228



CERTIFICATE OF ANALYSIS
Grade of Product: EPA PROTOCOL STANDARD

Customer: BANGKOK INDUSTRIAL
GAS CO LTD
Part Number: E02NI79E20004DC
Cylinder Number: 4621366Y
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12023
Gas Code: O2,BALN
Reference Number: 160-402891088-1
Cylinder Volume: 218.0 CF
Cylinder Pressure: 2014 PSIG
Valve Outlet: 590
Certification Date: Nov 27, 2023

Expiration Date: Nov 27, 2031

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
OXYGEN	21.00 %	20.85 %	G1	+/- 0.5% NIST Traceable	11/27/2023
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	08010205	K001516	23.2 % OXYGEN/NITROGEN	+/- 0.4%	Jun 01, 2024

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS OXYMAT 6 - N1-W5-951 - O2	PARAMAGNETIC	Nov 08, 2023

Triad Data Available Upon Request

NOTES: Gross Weight: 59.0 Kg
Net Weight: 7.4 Kg
PO# 5223006228



รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.

รายชื่ออุปกรณ์ / เครื่องมือ : SO₂ Analyzer

รุ่นของอุปกรณ์ / เครื่องมือ : T100

วันที่ : 26 กุมภาพันธ์ 2568

บริษัทผู้ผลิต : Teledyne API

หมายเลขอุปกรณ์ / เครื่องมือ : 1385

TEST VALUES				
API MODEL T100			BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0	500.0
2	SO ₂ STABILITY	≤ 1 PPB	0.1	0.2
3	PRESSURE	25 - 35 in - Hg-A	27.7	27.5
4	SAMPLE FLOW	700 ± 10% cc/min	660.0	655
5	PMT	mV	65.0	34.0
6	NORM PMT	mV	70.5	39.0
7	UV LAMP	1000 - 4800 mV	3589.0	3486.7
8	LAMP RATIO	30 To 120 %	96.4	94.4
9	STRAY LIGHT	≤ 100 PPB	108.7	18.5
10	DARK PMT	-50 ± 200 % mV	68.0	80.8
11	DARK LAMP	-50 ± 200 % mV	1.1	1.1
12	SO ₂ SLOPE	1.0 ± 0.3	3.551	1.005
13	SO ₂ OFFSET	< 250 mV	61.2	36.3
14	HVPS	400 - 900 V	614	531
15	RX CELL TEMP	50 ± 1 °C	50.0	50.0
16	BOX TEMP	AMBIENT ± 5 °C	32.4	31.6
17	PMT TEMP	7 ± 2 °C	8.6	8.7
18	SO ₂ SAMPLE READING	PPB	16.2	1.1
19	OPTIC TEST	2000 ± 1000 mV	3335.9	2256.8
20	ELECTRICAL TEST	2000 ± 1000 mV	1871.2	1870.4
21	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.18/ 12.11 /16.31 /-15.31	5.18/ 12.11 /16.31 /-15.31
22	ZERO GAS	0.00 PPB	9.3	0.1
23	SPAN GAS	400.00 PPB	451.9	400.2

หมายเหตุ

- ทำการเปลี่ยน Sintered Filter 1 ชิ้น, Spring 1 ชิ้น, O-ring 2 ชิ้น
- ทำการ Calibrate Multi-Point

(คุณอนาคคม มหาอาจ)

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณอนาคคม มหาอาจ

โทรศัพท์ : 0-2515-8987

เลขที่ 388 ถนนวิภาวดีรังสิต แขวงจันทน์เกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME :SGS (Thailand) Co., Ltd.

EQUIPMENT NAME : SO₂ Analyzer

MANUFACTURER : Teledyne - API

MODEL : T100

SERIAL NUMBER : 1385

STANDARD GAS CONCENTRATION (PPM) : 53.56

CYLINDER NO : EB0169291

CYLINDER PRESSURE (PSIG) : 2000

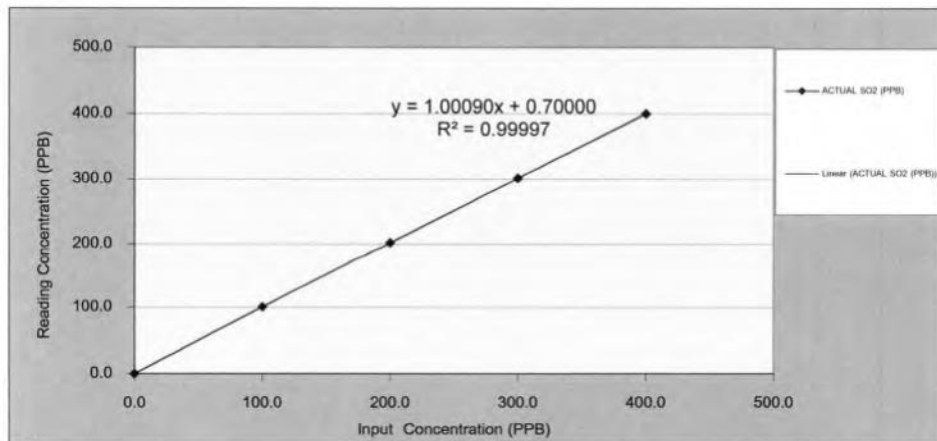
CERTIFIED DATE :Nov 08, 2023

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Nov 08, 2031

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL (PPB)	ACTUAL SO ₂ (PPB)	ERROR SO ₂ (PPB)	% ERROR SO ₂
ZERO	0.0	0.1	0.1	-
1	100.0	100.7	0.7	0.7
2	200.0	202.0	2.0	1.0
3	300.0	301.4	1.4	0.5
4	400.0	400.2	0.2	0.0
AVERAGE (%)				0.6



CALIBRATED BY : คุณณนาคม มหาอาจ

DATE :26 กุมภาพันธ์ 2568

ต้องการข้อมูลเพิ่มเติมทางเทคนิคเพิ่มเติม : คุณณนาคม มหาอาจ โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทระเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th



บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.

วันที่ : 19 มีนาคม 2568

รายชื่ออุปกรณ์ / เครื่องมือ : NO_x Analyzer

บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T200

หมายเลขอุปกรณ์ / เครื่องมือ : 2199

TEST VALUES					
API MODEL T200				BEFORE	AFTER
1	RANGE	50 - 20,000 PPB		500.0	500.0
2	STABILITY	≤ 1 PPB		0.1	0.1
3	SAMPLE FLOW	500 ± 10% cc/min		508	510
4	OZONE FLOW	80 ± 10% cc/min		87	87
5	PMT	mV		111.4	73.8
6	NORM PMT	mV		-5.4	1.8
7	A ZERO	-20 To 150 mV		12.3	74.7
8	HPVS	400 - 900 V		669	661
9	RX CELL TEMP	50 ± 1 °C		50.0	50.0
10	BOX TEMP	AMBIENT ± 5 °C		29.8	30.2
11	PMT TEMP	7 ± 2 °C		7.0	7.0
12	MOLY TEMP	315 ± 5 °C		314.0	316.0
13	RX CELL PRESSURE	<10 in - Hg-A		11.8	11.6
14	SAMPLE PRESSURE	25 - 35 in - Hg-A		28.9	29.3
15	NOX SLOPE	1.0 ± 0.3		0.980	1.004
16	NOX OFFSET	-50 To 150		26.3	-0.5
17	NO SLOPE	1.0 ± 0.3		0.934	0.965
18	NO OFFSET	-50 To 150		-2.7	-2.5
19	NO SAMPLE READING	PPB		-1.0	2.5
20	NO ₂ SAMPLE READING	PPB		-6.2	6.3
21	NO _x SAMPLE READING	PPB		-7.3	8.8
22	OPTIC TEST	2000 ± 1000 mV		1962.4	1961.2
23	ELECTRICAL TEST	2000 ± 1000 mV		2340.1	2238.3
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V		5.28 / 12.32 /15.88 /-15.07	5.28 / 12.32 /15.88 /-15.07
25	ZERO GAS	NO/NO _x 0.00/0.00 PPB		0.2 / -13.2	0.0 / 0.1
26	SPAN GAS	NO/NO _x 400.00/400.00 PPB		412.8 / 408.6	400.1 / 402.0

หมายเหตุ

- ทำการเปลี่ยน Sintered Filter 3 ชิ้น, Spring 3 ชิ้น, O-ring 6 ชิ้น

- ทำการ Calibrate Multi-point

(คุณณนาคม มหาอาจ)

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางเทคนิค กรุณาติดต่อ : คุณณนาคม มหาอาจ โทรศัพท์ : 0-2515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทระเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

MULTI-POINT CALIBRATION REPORT

CUSTOMER NAME : SCS (Thailand) Co., Ltd.

EQUIPMENT NAME : NO_x Analyzer

MANUFACTURER : Teledyne - API

MODEL : T200

SERIAL NO : 2199

STANDARD GAS CONCENTRATION (PPM) : 53.16

CYLINDER NO : EB0169291

CYLINDER PRESSURE (psig) : 1550

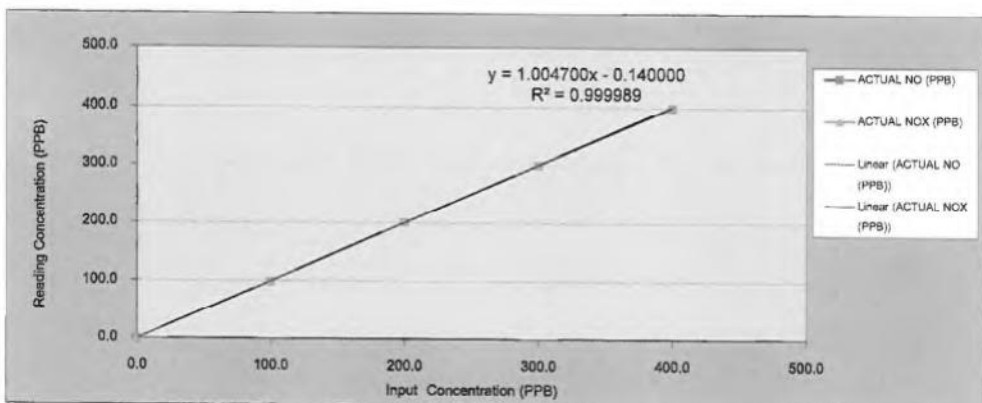
CERTIFIED DATE : Nov 08, 2023

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Nov 08, 2031

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS						
	IDEAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO	ACTUAL NO _x (PPB)	ERROR NO _x (PPB)	% ERROR NO _x
ZERO	0.0	0.0	0.0	-	0.1	0.1	-
1	100.0	98.8	-1.2	-1.2	99.8	-0.2	-0.2
2	200.0	201.0	1.0	0.5	201.4	1.4	0.7
3	300.0	300.2	0.2	0.1	300.7	0.7	0.2
4	400.0	400.1	0.1	0.0	402.0	2.0	0.5
AVERAGE (%)				0.5			0.4



CALIBRATED BY : คุณธนาคม มหาอาจ

DATE : 19 มีนาคม 2568

ต้องการข้อมูลเพิ่มเติมทางเทคนิคเพิ่มเติม : คุณธนาคม มหาอาจ โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทระเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

KINETICS

บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

AQM 22009

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.

วันที่ : 26 กุมภาพันธ์ 2568

รายชื่ออุปกรณ์ / เครื่องมือ : SO₂ Analyzer

บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T100

หมายเลขอุปกรณ์ / เครื่องมือ : 6201

TEST VALUES

API MODEL T100		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	SO ₂ STABILITY	≤ 1 PPB	0.00
3	PRESSURE	25 - 35 in - Hg-A	26.9
4	SAMPLE FLOW	700 ± 10% cc/min	675.0
5	PMT	mV	78.9
6	NORM PMT	mV	70.2
7	UV LAMP	1000 - 4800 mV	4344.7
8	LAMP RATIO	30 To 120 %	123.6
9	STRAY LIGHT	≤ 100 PPB	41.5
10	DARK PMT	-50 ± 200 % mV	xxx
11	DARK LAMP	-50 ± 200 % mV	4.5
12	SO ₂ SLOPE	1.0 ± 0.3	1.694
13	SO ₂ OFFSET	< 250 mV	49.0
14	HVPS	400 - 900 V	560
15	RX CELL TEMP	50 ± 1 °C	50.0
16	BOX TEMP	AMBIENT ± 5 °C	33.1
17	PMT TEMP	7 ± 2 °C	8.4
18	SO ₂ SAMPLE READING	PPB	0.018
19	OPTIC TEST	2000 ± 1000 mV	5003.0
20	ELECTRICAL TEST	2000 ± 1000 mV	3228.0
21	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.10/ 12.09 /15.48 /-15.15
22	ZERO GAS	0.00 PPB	4.750
23	SPAN GAS	400.00 PPB	460.218

หมายเหตุ

- ทำการเปลี่ยน Sintered Filter 1 ชิ้น, Spring 1 ชิ้น, O-ring 2 ชิ้น

- ทำการ Calibrate Multi-Point

(คุณธนาคม มหาอาจ)

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางเทคนิค กรุณาติดต่อ : คุณธนาคม มหาอาจ โทรศัพท์ : 0-2515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทระเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME :SGS (Thailand) Co., Ltd.

EQUIPMENT NAME : SO₂ Analyzer

MANUFACTURER : Teledyne - API

MODEL : T100

SERIAL NUMBER : 6201

STANDARD GAS CONCENTRATION (PPM) : 53.79

CYLINDER NO : EB0169291

CYLINDER PRESSURE (PSIG) : 1550

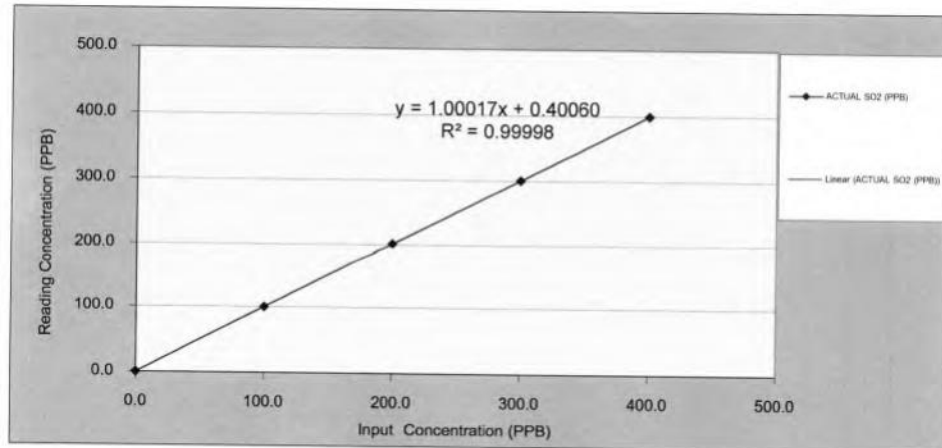
CERTIFIED DATE : Nov 08, 2023

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Nov 08, 2031

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL (PPB)	ACTUAL SO ₂ (PPB)	ERROR SO ₂ (PPB)	% ERROR SO ₂
ZERO	0.000	0.406	0.4	-
1	100.000	99.712	-0.3	-0.3
2	200.000	201.387	1.4	0.7
3	300.000	300.642	0.6	0.2
4	400.000	400.026	0.0	0.0
AVERAGE (%)				0.3



CALIBRATED BY : คุณณาคม มหาอาจ

DATE : 26 กุมภาพันธ์ 2568

ต้องการข้อมูลเพิ่มเติมทางเทคนิคเพิ่มเติม : คุณณาคม มหาอาจ โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทระเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : info@kinetics.co.th

KINETICS
Environmental science business Unit

Customer service report

บริษัท เอส ซี เอส (ประเทศไทย) จำกัด

Manufacturer

Teledyne API

Equipment

NOx Analyzer

Model

T200

S/N

7534

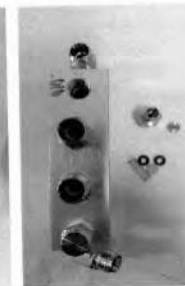
Quotation

● Checking Date ●

6/02/2568

● Problem

- O3 Flow Warning



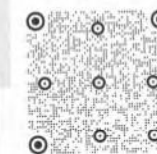
● Correlation working / Remark

- ทำการเปลี่ยน Flow Meter 1 ชิ้น, Sintered Filter 3 ชิ้น, Spring 3 ชิ้น O-ring 6 ชิ้น
- ทำการ Calibrate Multi-point

● Repair parts ●

Flow Meter 1 ชิ้น, Sintered Filter 3 ชิ้น, Spring 3 ชิ้น, O-ring 6 ชิ้น

B2



contact us

Technician / Engineer

Mr. Thanakom



บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.

รายชื่ออุปกรณ์ / เครื่องมือ : NO_x Analyzer

รุ่นของอุปกรณ์ / เครื่องมือ : T200

วันที่ : 6 กุมภาพันธ์ 2568

บริษัทผู้ผลิต : Teledyne API

หมายเลขอุปกรณ์ / เครื่องมือ : 7534

TEST VALUES			
API MODEL T200		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	STABILITY	≤ 1 PPB	0.09
3	SAMPLE FLOW	500 ± 10% cc/min	469
4	OZONE FLOW	80 ± 10% cc/min	80
5	PMT	mV	114.5
6	NORM PMT	mV	55.3
7	A ZERO	-20 To 150 MV	71.8
8	HPVS	400 - 900 V	642
9	RX CELL TEMP	50 ± 1 °C	50.0
10	BOX TEMP	AMBIENT ± 5 °C	30.0
11	PMT TEMP	7 ± 2 °C	7.1
12	MOLY TEMP	315 ± 5 °C	315.1
13	RX CELL PRESSURE	<10 in - Hg-A	4.1
14	SAMPLE PRESSURE	25 - 35 in - Hg-A	28.8
15	NOX SLOPE	1.0 ± 0.3	0.891
16	NOX OFFSET	-50 To 150	-31.4
17	NO SLOPE	1.0 ± 0.3	0.877
18	NO OFFSET	-50 To 150	-31.00
19	NO SAMPLE READING	PPB	11.0
20	NO2 SAMPLE READING	PPB	0.5
21	NOX SAMPLE READING	PPB	11.5
22	OPTIC TEST	2000 ± 1000 mV	2068.2
23	ELECTRICAL TEST	2000 ± 1000 mV	2405.6
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.17 / 12.00 / 15.38 / -15.16
25	ZERO GAS NO/NO _x	0.00/0.00 PPB	9.2 / 10.6
26	SPAN GAS NO/NO _x	400.00/400.00 PPB	480.1 / 482.0

หมายเหตุ

- O3 Flow Warning
- ทำการเปลี่ยน Flow Meter 1 ชิ้น, Sintered Filter 3 ชิ้น, Spring 3 ชิ้น, O-ring 6 ชิ้น
- ทำการ Calibrate Multi-Point

(คุณณาคม มหาอาจ)

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณณาคม มหาอาจ โทรศัพท์ : 0-2515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรมาน เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.

EQUIPMENT NAME : NO_x Analyzer

MANUFACTURER : Teledyne - API

MODEL : T200

SERIAL NO : 7534

STANDARD GAS CONCENTRATION (PPM) : 53.16

CYLINDER NO : EB0169291

CYLINDER PRESSURE (psig) : 2000

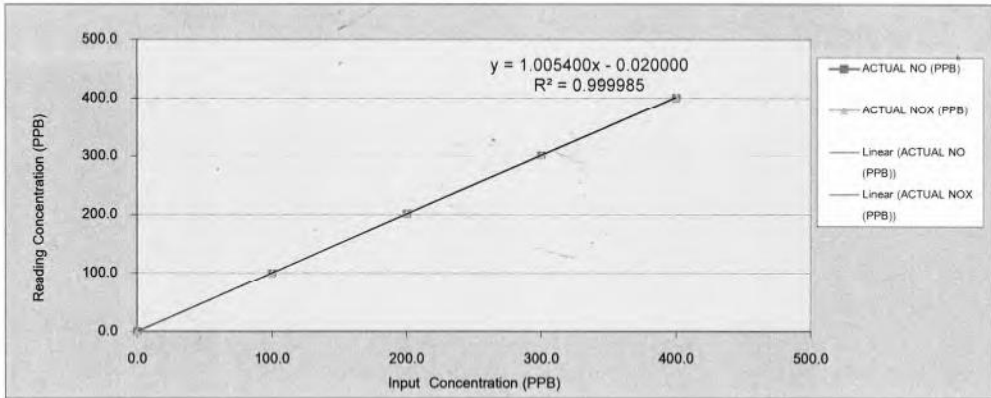
CERTIFIED DATE : Nov 08, 2023

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Nov 08 2031

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS						
	IDEAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO	ACTUAL NO _x (PPB)	ERROR NO _x (PPB)	% ERROR NO _x
ZERO	0.0	0.1	0.1	-	0.1	0.1	-
1	100.0	99.7	-0.3	-0.3	99.8	-0.2	-0.2
2	200.0	201.4	1.4	0.7	202.0	2.0	1.0
3	300.0	300.8	0.8	0.3	301.4	1.4	0.5
4	400.0	401.0	1.0	0.3	402.0	2.0	0.5
AVERAGE (%)				0.4			0.6



CALIBRATED BY : คุณณาคม มหาอาจ

DATE : 6 /02 /2568

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิคเพิ่มเติม : คุณณาคม มหาอาจ โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรมาน เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.

รายชื่ออุปกรณ์ / เครื่องมือ : NO_x Analyzer

รุ่นของอุปกรณ์ / เครื่องมือ : T200

วันที่ : 21 กุมภาพันธ์ 2568

บริษัทผู้ผลิต : Teledyne API

หมายเลขอุปกรณ์ / เครื่องมือ : 7535

TEST VALUES			
API MODEL T200		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	STABILITY	≤ 1 PPB	0.11
3	SAMPLE FLOW	500 ± 10% cc/min	488
4	OZONE FLOW	80 ± 10% cc/min	72
5	PMT	mV	114.9
6	NORM PMT	mV	20.5
7	A ZERO	-20 To 150 MV	119.9
8	HPVS	400 - 900 V	622
9	RX CELL TEMP	50 ± 1 °C	50.0
10	BOX TEMP	AMBIENT ± 5 °C	30.7
11	PMT TEMP	7 ± 2 °C	6.7
12	MOLY TEMP	315 ± 5 °C	316.0
13	RX CELL PRESSURE	<10 in - Hg-A	5.1
14	SAMPLE PRESSURE	25 - 35 in - Hg-A	28.6
15	NOX SLOPE	1.0 ± 0.3	1.244
16	NOX OFFSET	-50 To 150	26.7
17	NO SLOPE	1.0 ± 0.3	1.182
18	NO OFFSET	-50 To 150	-0.6
19	NO SAMPLE READING	PPB	-1.7
20	NO2 SAMPLE READING	PPB	-3.9
21	NOX SAMPLE READING	PPB	-5.8
22	OPTIC TEST	2000 ± 1000 mV	1804.6
23	ELECTRICAL TEST	2000 ± 1000 mV	2370.6
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.18 / 11.90 / 15.49 / -15.28
25	ZERO GAS NO/NO _x	0.00/0.00 PPB	-0.5 / -16.8
26	SPAN GAS NO/NO _x	400.00/400.00 PPB	385.7 / 387.1

หมายเหตุ

- ทำการเปลี่ยน Sintered Filter 3 ชิ้น, Spring 3 ชิ้น, O-ring 6 ชิ้น

- ทำการ Calibrate Multi-point

(คุณธนาคม มหาอาจ)

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณธนาคม มหาอาจ โทรศัพท์ : 0-2515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทระเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.

EQUIPMENT NAME : NO_x Analyzer

MANUFACTURER : Teledyne - API

MODEL : T200

SERIAL NO : 7535

STANDARD GAS CONCENTRATION (PPM) : 53.40

CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) : 1550

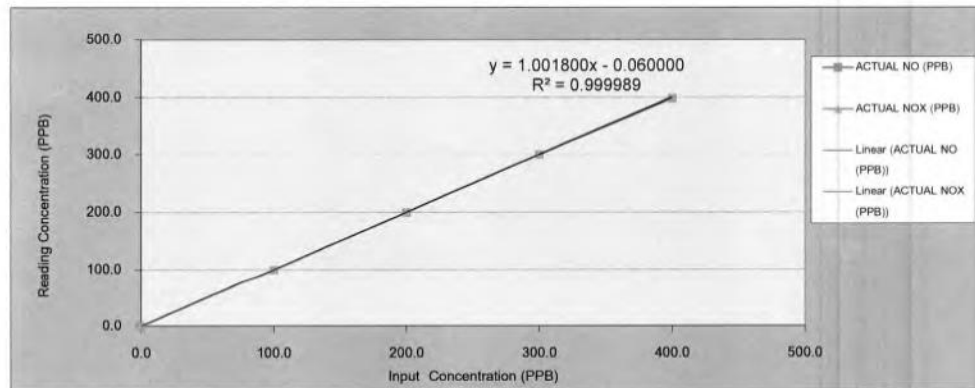
CERTIFIED DATE : Mar 10 ,2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10 ,2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS						
	IDEAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO	ACTUAL NO _x (PPB)	ERROR NO _x (PPB)	% ERROR NO _x
ZERO	0.0	0.0	0.0	-	0.1	0.1	-
1	100.0	99.8	-0.2	-0.2	100.5	0.5	0.5
2	200.0	199.4	-0.6	-0.3	199.4	-0.6	-0.3
3	300.0	299.8	-0.2	-0.1	300.5	0.5	0.2
4	400.0	398.7	-1.3	-0.3	401.0	1.0	0.3
AVERAGE (%)				0.2			0.3



CALIBRATED BY : คุณธนาคม มหาอาจ

DATE : 21 กุมภาพันธ์ 2568

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิคเพิ่มเติม : คุณธนาคม มหาอาจ โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทระเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

Customer service report

บริษัท เอส ซี เอส (ประเทศไทย) จำกัด

Manufacturer Teledyne API Equipment NOx Analyzer Model T200

S/N 7535 Quotation -

● Checking Date ●
21/02/2568

- Problem
- Preventive Maintenance



contact us

- Correlation working / Remark

1. ทำการเปลี่ยน Sintered Filter 3 ชิ้น , Spring 3 ชิ้น O-ring 6 ชิ้น
2. ทำการ Calibrate Multi-point

- Repair parts ●

Sintered Filter 3 ชิ้น , Spring 3 ชิ้น , O-ring 6 ชิ้น

รายงานผลการปรับเทียบระบบควบคุมอัตราการไหลอากาศบริสุทธิ์

MASS FLOW CONTROL ZERO AIR CALIBRATION REPORT

Calibration Instrument

เครื่องมือตรวจวัด : เครื่องปรับเทียบความถูกต้องของก๊าซ (Calibrator)
Instrument : T700
รุ่น : T700
ยี่ห้อ : TELEDYNE API
Manufacturer :
วันที่เข้าปรับเทียบ : 18 มีนาคม 2568
Date of Calibration :
หมายเลขเครื่อง : 3013
Serial No :
ย่านการตรวจวัด : 0 - 10 LPM
Measuring Rang :
ลูกค้า : SGS (THAILAND) LIMITED
Customer :

Result of Calibration

Flow Rate Volume (Multi Gas Calibrator Display)		Sensor Reading			
Flow Set (LPM)	Monitor (LPM)	Before		After	
		LPM	%Error	LPM	%Error
1.00	1.000	1.041	3.939	1.020	1.961
2.00	2.000	2.056	2.675	2.016	0.744
3.00	3.000	3.076	2.471	3.019	0.629
4.00	4.000	4.054	1.332	4.022	0.547
5.00	5.000	5.066	1.303	5.025	0.498
6.00	6.000	6.054	0.892	6.028	0.464
7.00	7.000	7.067	0.948	7.024	0.342
8.00	8.000	8.088	1.088	8.019	0.237
9.00	9.000	9.089	0.979	9.011	0.122
10.00	10.000	10.096	0.951	9.995	-0.050
AVERAGE DIFFERENCE (%)		1.6577		0.5494	
Interception		-0.0410		-0.0259	
Correlation		1.0000		1.0000	

Calibration Tolerance % Difference be should + / - 1 % of Full Scal
User Manual of Reference

Reference Standard Instrument

เครื่องมือสอบเทียบ : DayCal (High)
Instrument :
รุ่น : DCL-MH
Model :
ยี่ห้อ : BIOS
Manufacturer :
หมายเลขเครื่อง : 3222
Serial No :
ย่านการตรวจวัด : 30 l/min
Measuring Range :
เครื่องมือสอบเทียบ : DryCal (Low)
Instrument :
รุ่น : Defender 520-L
Model :
ยี่ห้อ : BIOS
Manufacturer :
หมายเลขเครื่อง : 122189
Serial No :
ย่านการตรวจวัด : 500ml/min
Measuring Range :

Result ☒ Accepted
☐ Not Accepted

ผู้ดำเนินการ :
Service By :
(ผู้รับใช้)
Service Engineer

ผู้ตรวจสอบ :
Approved By :
(ผู้ตรวจ)
Service Manager



บริษัท ไอแอลอีคอนซัลแทนท์ (ประเทศไทย) จำกัด
1035/66 ถนนรัชดาภิเษก แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10250
โทรศัพท์ : 023221852 อีเมล : info@iecth.com

I&E CONSULTANT (THAILAND) CO., LTD.
1035/66 Srinakarin Road, Dinnut Suwanluang, Bangkok 10250
Tel. +66 2322 1852 email: info@iecth.com

รายงานผลการปรับเทียบระบบควบคุมอัตราการไหลอากาศบริสุทธิ์

MASS FLOW CONTROL STANDARD GAS CALIBRATION REPORT

Calibration Instrument

เครื่องมือตรวจวัด : เครื่องปรับเทียบความถูกต้องของก๊าซ (Calibrator)
Instrument : T700
รุ่น : T700
Model :
ยี่ห้อ : TELEDYNE API
Manufacturer :
หมายเลขเครื่อง : 3013
Serial No :
ช่วงการตรวจวัด : 0 - 100 CCPM
Measuring Range :
ลูกค้า : SGS (THAILAND) LIMITED
Customer :

วันที่เข้าปรับเทียบ : 18 มีนาคม 2568
Date of Calibration :

Result of Calibration

Flow Rate Volume (Multi Gas Calibrator Display)		Sensor Reading			
		Before		After	
Flow Set (CCPM)	Monitor (CCPM)	CCPM	%Error	CCPM	%Error
10.00	10.00	10.26	2.53	9.88	-1.21
20.00	20.00	21.31	6.15	19.95	-0.25
30.00	30.00	32.21	6.86	29.96	-0.13
40.00	40.00	41.44	3.47	40.02	0.05
50.00	50.00	53.38	6.33	49.89	-0.22
60.00	60.00	63.41	5.38	60.05	0.08
70.00	70.00	74.34	5.84	69.78	-0.32
80.00	80.00	85.11	6.00	79.77	-0.29
90.00	90.00	95.04	5.30	89.84	-0.18
100.00	100.00	104.77	4.55	99.91	-0.09
AVERAGE DIFFERENCE (%)		5.2425		-0.2558	
Interception		-0.1070		0.0285	
Correlation		0.9999		1.0000	

Calibration Tolerance : % Difference be should + / - 1 % of Full Scal
User Manual of Reference

Reference Standard Instrument

เครื่องมือสอบเทียบ : DeyCal (High)
Instrument :
รุ่น : DCL-MH
Model :
ยี่ห้อ : BIOS
Manufacturer :
หมายเลขเครื่อง : 3222
Serial No. :
ช่วงการตรวจวัด : 30 l/min
Measuring Range :
เครื่องมือสอบเทียบ : DryCal (Low)
Instrument :
รุ่น : Defender 520-L
Model :
ยี่ห้อ : BIOS
Manufacturer :
หมายเลขเครื่อง : 122189
Serial No. :
ช่วงการตรวจวัด : 500ml/min
Measuring Range :

Result : ☒ Accepted
☐ Not Accepted

ผู้ดำเนินการ :
Service By :

ผู้ตรวจสอบ :
Approved By :

THAI METEOROLOGICAL DEPARTMENT



4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue : 17 February, 2025

Certification No. 101/25

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Mode No. : 6152C Model No. : 6152C

Mfg Code : Display AZ170619037 Transmitter AZ170619033

Customer : SGS (Thailand) Limited.
100 Nanglinchee Road, Chongnonsi,
Yannawa, Bangkok 10120.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1012.5 hPa

NATIONAL STANDARD WIND TUNNEL : Wind Aloft Plotting Board

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119 : HOOK GAGE NO 1425

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94

: Thermoschneider No.9188 : testo, testo 645 Serial No. 02848057

STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220015

Calibrated by :

Mr. Watcharaporn Suwan

Mechanical Engineer





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 101/25

17 February, 2025

Page : 2 of 6

Standard Ultrasonic Anemometer	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
	m/sec	inches H2O	inches H2O	m/sec	m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	3.0	0.02
5.00	-	-	-	4.9	0.10
7.00	-	-	-	7.0	0.00
9.02	-	-	-	8.9	0.12
11.01	-	-	-	11.0	0.01
13.01	-	-	-	12.9	0.11
15.01	-	-	-	15.0	0.01
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.1	-0.08

Vane Angel Bench Stand Model 18112	
Young Meteorological Instruments	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Mr. Watcharapoi Subwat

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 101/25

17 February, 2025

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
755.42	757.3	-1.88
755.59	757.4	-1.81
755.84	757.7	-1.86
756.16	757.9	-1.74
756.71	758.4	-1.69
757.88	759.7	-1.82
758.60	760.3	-1.70
758.35	760.1	-1.75
758.10	759.9	-1.80
757.79	759.5	-1.71
757.42	759.3	-1.88
756.76	758.6	-1.84
757.07	758.3	-1.23
757.48	759.4	-1.92
757.99	759.8	-1.81
758.62	760.4	-1.78
759.29	761.1	-1.81
757.37	759.2	-1.83
758.06	759.9	-1.84
758.32	760.2	-1.88

Average

Calibrated by :

Mr. Watcharapoi Subwat

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 101/25

17 February, 2025

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading	Correction
	°C	°C
45.5	45.7	-0.2
30.4	30.5	-0.1
15.6	15.7	-0.1

Calibrated by :



Mr. Watcharapol Subwat
Mechanical Engineer



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 101/25

17 February, 2025

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
45.1	44	1.10
64.2	62	2.20
92.5	89	3.50

Calibrated by :



Mr. Watcharapol Subwat
Mechanical Engineer





Date of Issue 17 February, 2025

Certification No. 101/25

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ซีห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152C Mfg. Code. AZ170619033 ทำการสอบเทียบกับแก้ววัดฝนแบบ แก้วดวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in./TIP)



ลงชื่อ

(นายวัชรพล ทรัพย์วัฒน์)

วิศวกรชำนาญการ



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 17 February, 2025

Certification No. 102/25

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Mode No. : 6152C Model No. : 6152C

Mfg Code : Display AZ170619040 Transmitter AZ170619040

Customer : SGS (Thailand) Limited.
100 Nanglinchee Road, Chongnonsi,
Yannawa, Bangkok 10120.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1012.8 hPa

NATIONAL STANDARD WIND TUNNEL : Wind Aloft Plotting Board

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119 : HOOK GAGE NO 1425

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94

: Thermoschneider No.9188 : testo, testo 645 Serial No. 02848057

STANDARD BAROMETER

Calibrated by :

Mr. Watcharapol

Mechanical Engineer

Authorized Signatory

The Chief

Standard Instrument





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 102/25

17 February, 2025

Page : 2 of 6

Standard Ultrasonic Anemometer	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacumm	Velocity	Velocity	Correction
	m/sec	inches H ₂ O	inches H ₂ O	m/sec	m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	3.0	0.02
5.00	-	-	-	4.9	0.10
7.00	-	-	-	7.0	0.00
9.02	-	-	-	8.9	0.12
11.01	-	-	-	11.0	0.01
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.9	0.11
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.9	0.12

Vane Angel Bench Stand Model 18112	
Young Meteorological Instruments	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Mr. Watch

Mechanical Engineer



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 102/25

17 February, 2025

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
755.42	756.5	-1.08
755.59	756.8	-1.21
755.84	756.9	-1.06
756.16	757.3	-1.14
756.71	757.8	-1.09
757.88	759.0	-1.12
758.60	759.8	-1.20
758.35	759.5	-1.15
758.10	759.4	-1.30
757.79	759.0	-1.21
757.42	758.7	-1.28
756.76	757.9	-1.14
757.07	758.3	-1.23
757.48	758.7	-1.22
757.99	759.1	-1.11
758.62	759.7	-1.08
759.29	760.3	-1.01
757.37	758.5	-1.13
758.06	759.3	-1.24
758.32	759.5	-1.18

Average

-1.16

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 102/25

17 February, 2025

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading	Correction
	°C	°C
45.5	45.5	0.0
30.4	30.4	0.0
15.6	15.7	-0.1

Calibrated by

Mr. Watcharapol Subwat
Mechanical Engineer



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 102/25

17 February, 2025

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
45.1	48	-2.90
64.2	66	-1.80
92.5	93	-0.50

Calibrated by :

Mr. Watcharapol Subwat
Mechanical Engineer





Date of Issue 17 February, 2025

Certification No. 102/25

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ซีหื้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152C Mfg. Code. AZ170619040 ทำการสอบเทียบกับแก้ววัดฝนแบบ แก้วดวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in./TIP)



ลงชื่อ.....

(นายวัชรพล ทรัพย์วัฒน์)

วิศวกรชำนาญการ



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 17 February, 2025

Certification No. 103/25

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Mode No. : 6152C Model No. : 6152C

Mfg Code : Display AZ170619046 Transmitter AZ170619046

Customer : SGS (Thailand) Limited.
100 Nanglinchee Road, Chongnonsi,
Yannawa, Bangkok 10120.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1013.2 hPa

NATIONAL STANDARD WIND TUNNEL : Wind Aloft Plotting Board

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119 : HOOK GAGE NO 1425

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94

STANDARD : Theodor Friedrich No. 0128 : testo, testo 645 Serial No. 02848057
PTB220 No. V1220045

Calibrated by :

Mr. Watchara

Mechanical

(Authorised Signatory)

for the Chief

Sub-Standard Instrument





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Certification No. 103/25

17 February, 2025

Page : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
	inches H ₂ O	inches H ₂ O	m/sec	m/sec	m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	3.0	0.02
5.00	-	-	-	4.9	0.10
7.00	-	-	-	7.0	0.00
9.02	-	-	-	9.0	0.02
11.01	-	-	-	11.0	0.01
13.01	-	-	-	13.0	0.01
15.01	-	-	-	15.1	-0.09
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.1	-0.08

Vane Angel Bench Stand Model 18112 Young Meteorological Instruments	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Certification No. 103/25

17 February, 2025

Page : 3 of 6

Standard Barometer Pressure	Tested Barometer Pressure	Correction
755.42	756.7	-1.28
755.59	756.9	-1.31
755.84	757.0	-1.16
756.16	757.3	-1.14
756.71	757.9	-1.19
757.88	759.0	-1.12
758.60	759.7	-1.10
758.35	759.6	-1.25
758.10	759.3	-1.20
757.79	759.0	-1.21
757.42	758.8	-1.38
756.76	758.1	-1.34
757.07	758.3	-1.23
757.48	758.8	-1.32
757.99	759.2	-1.21
758.62	759.7	-1.08
759.29	760.5	-1.21
757.37	758.6	-1.23
758.06	759.4	-1.34
758.32	759.5	-1.18

Average

1.22

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 103/25

17 February, 2025

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading	Correction
	°C	°C
45.5	45.5	0.0
30.4	30.4	0.0
15.6	15.6	0.0

Calibrated by :



Mr. Watcharapol Subwat
Mechanical Engineer



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 103/25

17 February, 2025

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
45.1	45	0.10
64.2	63	1.20
92.5	90	2.50

Calibrated by :



Mr. Watcharapol Subwat
Mechanical Engineer





Date of Issue 17 February, 2025

Certification No. 103/25

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ชีพ้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152C Mfg. Code. AZ170619046 ทำการสอบเทียบกับแก้ววัดฝนแบบ แก้วดวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in./TIP)



ลงชื่อ..

(นายวัชรพล ทรัพย์วัฒน์)

วิศวกรชำนาญการ

ENAB 19183



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 1 April, 2025

Certification No. 195/25

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Type : Vantage Pro 2 Model No. : 6152C

Mfg Code : Display BD190415073 Transmitter BD190415073

Customer : SGS (Thailand) Limited.
238 TRR Tower, 19th-21st Floor, Naradhiwas Rajanagarindra Road,
Chong Nonsi, Yannawa, Bangkok 10120.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1010.4 hPa

NATIONAL STANDARD WIND TUNNEL : Vane Angel Bench Stand Model 18112

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119 : HOOK GAGE NO 1425

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94

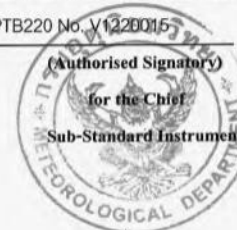
: Thermoschneider No.9188 : testo, testo 645 Serial No. 02848057

STANDARD BAROMETER : Type PTB220 No. V1220015

Calibrated by :

Mr. Watcharapol

Mechanical E





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Certification No. 195/25

1 April, 2025

Page : 2 of 6

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacumm	Velocity	Velocity	Correction
	m/sec	inches H ₂ O	m/sec	m/sec	m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.00	-	-	-	6.7	0.30
9.02	-	-	-	8.9	0.12
11.01	-	-	-	11.0	0.01
13.01	-	-	-	13.0	0.01
15.01	-	-	-	15.1	-0.09
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.3	0.72

Vane Angel Bench Stand Model 18112

Young Meteorological Instruments

WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Mr. Watcharaporn Subwat

Mechanical Engineer



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 0-2396-0156, 0-2399-0469

The Result of Calibration

Certification No. 195/25

1 April, 2025

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	(mmHg)
756.43	757.5	-1.07
756.82	757.9	-1.08
755.58	756.8	-1.22
754.01	755.2	-1.19
754.14	755.3	-1.16
755.39	756.4	-1.01
755.65	756.6	-0.95
755.72	756.7	-0.98
755.83	756.8	-0.97
755.96	757.0	-1.04
756.93	757.8	-0.87
758.38	759.4	-1.02
758.59	759.7	-1.11
758.30	759.5	-1.20
757.85	759.0	-1.15
757.59	758.6	-1.01
756.14	757.2	-1.06
756.28	757.4	-1.12
756.44	757.6	-1.16
756.99	758.2	-1.21

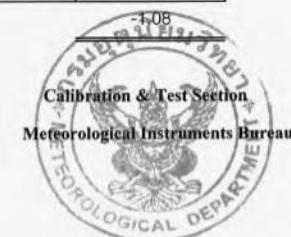
Average

-1.08

Calibrated by :

Mr. Wat

Mechanical Engineer





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 195/25

1 April, 2025

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.3	45.5	-0.2
30.3	30.4	-0.1
15.4	15.4	0.0

Calibrated by :

Mr. Watcharapol Subwat
Mechanical Engineer



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 195/25

1 April, 2025

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
86.24	89	-2.76
65.28	66	-0.72
45.16	44	1.16

Calibrated by :

Mr. [Redacted]
Mechanical Engineer





Date of Issue 1 April, 2025

Certification No. 195/25

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ชื่อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152C Mfg. Code. BD190415073 ทำการสอบเทียบกับแก้ววัดฝนแบบ แก้วดวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in./TIP)



ลงชื่อ

(นายวัชรพล ทรัพย์วัฒน์)

วิศวกรชำนาญการ

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA LLC
6141 Easton Road
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer: BANGKOK INDUSTRIAL
GAS CO LTD
Part Number: E04NI99E80ACP0C
Cylinder Number: LL164665
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12022
Gas Code: CO,NO,NOX,SO2,BALN
Reference Number: 160-402557716-1
Cylinder Volume: 83.0 CF
Cylinder Pressure: 2215 PSIG
Valve Outlet: 660
Certification Date: Oct 21, 2022

Expiration Date: Oct 21, 2025

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 800/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	45.00 PPM	45.01 PPM	G1	+/- 1.3% NIST Traceable	10/13/2022, 10/21/2022
NITRIC OXIDE	45.00 PPM	45.01 PPM	G1	+/- 1.2% NIST Traceable	10/13/2022, 10/21/2022
SULFUR DIOXIDE	45.00 PPM	45.11 PPM	G1	+/- 0.9% NIST Traceable	10/13/2022, 10/21/2022
CARBON MONOXIDE	4500 PPM	4511 PPM	G1	+/- 0.8% NIST Traceable	10/14/2022
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	210607-21	CC708065	48.41 PPM NITRIC OXIDE/NITROGEN	+/- 1.2%	Sep 21, 2025
PRM	12395	D887660	9.91 PPM NITROGEN DIOXIDE/AIR	+/- 2.0%	Feb 22, 2022
GMIS	124206889110	CC322674	4.474 PPM NITROGEN DIOXIDE/AIR	+/- 2.0%	Feb 25, 2025
NTRM	160102-32	KAL004062	97.69 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Nov 01, 2027
NTRM	08012355	KAL004734	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 N1KD579	NDIR	Sep 22, 2022
Nicolet iS50 FTIR AUP2010245 NO	FTIR	Oct 20, 2022
Nicolet iS50 FTIR AUP2010245 NO2	FTIR	Oct 06, 2022
Nicolet iS50 FTIR AUP2010245 SO2	FTIR	Sep 29, 2022

Triad Data Available Upon Request

NOTES:PO# 5222004798

Gross Weight: 17.2 Kg

Net Weight: 2.7 Kg

Cylinder: 80A



Approved for Release



ห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์ Blue Consultant Limited Partnership
32/751 ถนนประชาอุทิศ แขวงทุ่งครุ เขตทุ่งครุ กรุงเทพฯ 10140
โทร.0-2873-6045-6 โทรสาร 0-2873-6046
ห้องปฏิบัติการวิเคราะห์เอกชนใบอนุญาตลงวันที่ 22 สิงหาคม 2566

CALIBRATION REPORT

Equipment : NOx Analyzer Brand/Model: Teledyne-API/T200
Serial No. : 374 Date of Calibrate : July 11 , 2025

Reference Standard Cylinder No.: EB0128767
Certification Date: October 29, 2019 Expiry Date: October 29, 2027
Component: SO2: 55.62 ppm , NO: 57.21 ppm , CO : 4,551 ppm

Calibration Check (Before adjust)						
Serial No.	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)
	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx
374	4.4/2.0/6.4	0/0/0	4.4/2.0/6.4	401.5/2.1/403.1	400/0/400	1.5/2.1/3.1
Calibration Check (After adjust)						
Serial No.	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)
	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx
374	0/0/0	0/0/0	0/0/0	400/0/400	400/0/400	0/0/0

ในนามห้องปฏิบัติการห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์
...
(นางสาวนิคดา อนันต์สุวรรณชัย)
ผู้จัดการห้องปฏิบัติการ

ห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์ Blue Consultant Limited Partnership
32/751 ถนนประชาอุทิศ แขวงทุ่งครุ เขตทุ่งครุ กรุงเทพฯ 10140
โทร.0-2873-6045-6 โทรสาร 0-2873-6046
ห้องปฏิบัติการวิเคราะห์เอกชนใบอนุญาตลงวันที่ 22 สิงหาคม 2566

CALIBRATION REPORT

Equipment : SO2 Analyzer Brand/Model: Teledyne-API/T100, Thermo/43C
Serial No. : 3569, 43C-73378-373 Date of Calibrate : November 12, 2025

Reference Standard Cylinder No.: EB0128767
Certification Date: October 29, 2019 Expiry Date: October 29, 2027
Component: SO2: 55.62 ppm , NO: 57.21 ppm , CO : 4,551 ppm

Calibration Check (Before adjust)						
Serial No.	Zero			Span		
	Reading Value	Expected Value	Drift	Reading Value	Expected Value	Drift
	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
3569	-0.1	0	-0.1	399.3	400	-0.1
43C-73378-373	0.2	0	0.2	401.1	400	1.1
Calibration Check (After adjust)						
Serial No.	Zero			Span		
	Reading Value	Expected Value	Drift	Reading Value	Expected Value	Drift
	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
3569	0	0	0	400	400	0
43C-73378-373	0	0	0	400	400	0

ในนามห้องปฏิบัติการห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์
...
(นางสาวนิคดา อนันต์สุวรรณชัย)
ผู้จัดการห้องปฏิบัติการ

Certificate of Calibration

Customer

Name : SGS (Thailand) Limited. Certificate No : 25-ACT-034
Address : 238 TRR Tower, 19th-21st Floor, Naradhiwas Rajanagarindra Road, Request No : Req-2025-0591
Chong Nonsi, Yannawa, Bangkok 10120

Unit Under Calibration Details

Measurement item : Acoustic Calibrator Class : 1
Manufacturer : Cirrus Range : 94 dB / 1000 Hz
Model : CR:515 Instrument Status : Used
Serial Number : 80400
ID : ENSL 17148

Calibration Environment and Details

Temperature : (23 ±2 °C)
Humidity : (50 ± 20 %RH)
Barometric Pressure : (1013 ±10.0 hPa)
Received Date : 5 March 2025
Calibration Date : 7 March 2025
Location of Calibration : LAB 1 Acoustic
Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Sound Calibrator	SV 35A	58079	EEL	12 June 2025
THD Multimeter	2015	1047765	NIMT	4 February 2026

Traceability : This certificate provides traceability of measurement to recognized national standard, and to the realization of the international System of Units (SI).

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k=2$, providing a level of confidence approximately 95 %.

Calibrated By :

Mr. Noppadon Luangart
Service Calibration Engineer

Approved By :

Mr. [REDACTED] Chavorn
Calibration Engineer Supervisor

Issue Date : 7 March 2025

(นางสาวนิตดา อนันต์สุวรรณชัย)
ผู้จัดการห้องปฏิบัติการ

Certificate No : 25-ACT-034

Request No : Req-2025-0591

Sound pressure level

Calibration Results : Without Adjustment

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty (± dB)	Acceptance limit Class 1 (± dB)	Result
	Measured	Deviated value	Measured	Deviated value			
94 dB / 1000 Hz	93.96	-0.04	-	-	0.13	0.25	Pass

Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)	Acceptance limit Class 1 (± %)	Result
	Measured (Hz)	Deviated value	Measured (Hz)	Deviated value			
94 dB / 1000 Hz	1000.3	0.03	-	-	0.01	0.70	Pass

Total Harmonic Distortion plus Noise of Sound pressure level (THD+N %)

Calibration Range (Hz)	Without Adjustment	Adjustment	Uncertainty (± %)	Acceptance limit Class 1 (± %)	Result
	Measured (%)	Measured (%)			
94 dB / 1000 Hz	1.45	-	0.40	2.5	Pass

Note :

Function	Maximum-permitted Uncertainty of measurement
Sound pressure level	0.15 dB
Frequency	0.20%
Total distortion+noise	0.50%

- Acceptance limit was IEC60942:2017 Class 1
- The calibration results exclude the calibrator pressure correction
- The calibration results exclude the microphone volume correction

Certificate No : 25-ACT-034

Request No : Req-2025-0591

Decision Rule for Statements of Conformity

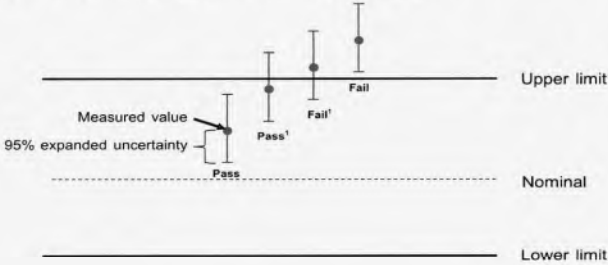
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass¹ = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail¹ = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Calibration

Certificate of Calibration

Customer

Name : SGS (Thailand) Limited. Certificate No : 25-ACT-092
Address : 238 TRR Tower, 19th-21st Floor, Naradhiwas Rajanagarindra Road, Request No : Req-2025-1224
Chong Nonsi, Yannawa, Bangkok 10120

Unit Under Calibration Details

Measurement item : Acoustic Calibrator Class : 1
Manufacturer : Cirrus Range : 94 dB / 1000 Hz
Model : CR-515 Instrument Status : Used
Serial Number : 88336
ID : ENSL 19173

Calibration Environment and Details

Temperature : (23 ± 2 °C)
Humidity : (50 ± 20 %RH)
Barometric Pressure : (1013 ± 10.0 hPa)
Received Date : 30 May 2025
Calibration Date : 10 June 2025
Location of Calibration : LAB 1 Acoustic
Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Sound Calibrator	SV 35A	58079	EEI	12 June 2025
THD Multimeter	2015	1047765	NIMT	4 February 2026

Traceability : This certificate provides traceability of measurement to recognized national standard, and to the realization of the international System of Units (SI).

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k=2$, providing a level of confidence approximately 95 %.

Calibrated By : 
Mr. Noppadon Luangart
Service Calibration Engineer

Approved By : 
Mr. Paen Mahavorn
Calibration Engineer Supervisor

Issue Date : 10 June 2025

Certificate No : 25-ACT-092

Request No : Req-2025-1224

Sound pressure level

Calibration Results : Without Adjustment

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty (± dB)
	Measured	Deviated value	Measured	Deviated value	
94 dB / 1000 Hz	94.00	0.00	-	-	0.12

Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)
	Measured (Hz)	Deviated value	Measured (Hz)	Deviated value	
94 dB / 1000 Hz	1000.0	0.00	-	-	0.01

Total Harmonic Distortion plus Noise of Sound pressure level (THD+N %)

Calibration Range (Hz)	Without Adjustment	Adjustment	Uncertainty (± %)
	Measured (%)	Measured (%)	
94 dB / 1000 Hz	2.20	-	0.17

Note :

- The calibration results exclude the calibrator pressure correction
- The calibration results exclude the microphone volume correction

End of Calibration

Certificate of Calibration

Customer

Name : SGS (Thailand) Limited. Certificate No : 25-SLM-126
Address : 238 TRR Tower, 19th-21st Floor, Naradhiwas Rajanagarindra Road, Request No : Req-2025-0701
Chong Nonsi, Yannawa, Bangkok 10120

Unit Under Calibration Details

Measurement item : : Sound Level Meter Microphone Class : 1
Manufacturer : RION Microphone Model : UC-59
Model : NL-52 Microphone S/N : 22736
Serial Number : 00710417 Preamplifier Model : NH-25
ID : ENSL 21179 Preamplifier S/N : 10960
Resolution : 0.1 dB Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
Humidity : 50 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 21 March 2025
Calibrated Date : 4 April 2025
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Standard Microphone	Bruel&Kjaer	4192	2294985	25 June 2025	NIMT
Audio Generator	Svantek	Svan401	131	15 October 2025	WK Electric

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %.

Calibrated By : 
Mr. Noppadon Luangart
Service Calibration Engineer

Approved By : 
Mr. Athavorn
Calibration Engineer Supervisor
Issue Date : 4 April 2025

Certificate No : 25-SLM-126
Request No : Req-2025-0701

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY (± dB)
FAST / A / 30-130	Level	UUC	ERR	UUC	ERR	
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)	
1000 Hz 94 dB	93.96	94.4	0.44	94.0	0.04	0.20

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR:515, SN. 80400

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / 30-130		
UUC Weighting	(dB)	(± dB)
A	14.7	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / 30-130		
UUC Weighting	(dB)	(± dB)
A	9.9	0.10
C	12.9	0.10
Z	16.8	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Responce curve			UNCERTAINTY (± dB)
FAST / 30-130	A	C	Z	
STD Setting	(dB)	(dB)	(dB)	(± dB)
125 Hz	0.4	0.5	0.5	0.60
1000 Hz	0.0	0.0	0.0	0.60
4000 Hz	-0.4	-0.3	-0.3	0.60
8000 Hz	-1.0	-1.0	-1.0	0.70

Certificate No : 25-SLM-126
 Request No : Req-2025-0701

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency			UNCERTAINTY
FAST / 30-130	Weighting Response curve			
STD Setting	A (dB)	C (dB)	Z (dB)	(± dB)
63 Hz	-0.2	-0.1	-0.1	0.20
125 Hz	-0.1	0.0	0.0	
250 Hz	-0.1	0.0	0.0	
500 Hz	0.0	0.0	0.0	
1000 Hz	0.0	0.0	0.0	
2000 Hz	0.0	0.1	0.0	
4000 Hz	0.0	0.0	0.0	
8000 Hz	0.1	0.1	0.0	
16000 Hz	-1.3	-1.3	0.0	

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY
FAST / 30-130	REF	UUC	ERR	
UUC Weighting	(dB)	(dB)	(dB)	($\pm$ dB)
A	114.00	114.0	0.0	0.20
C	114.00	114.0	0.0	
Z	114.00	114.0	0.0	

UUC Setting	STD	Measured		UNCERTAINTY
30-130 / A	REF	UUC	ERR	
UUC Time Response	(dB)	(dB)	(dB)	($\pm$ dB)
Fast	114.00	114.0	0.0	0.20
Slow	114.00	114.0	0.0	
Leq	114.00	114.0	0.0	

Certificate No : 25-SLM-126
 Request No : Req-2025-0701

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY
FAST / A / 30-130	UUC	
STD Setting	(dB)	($\pm$ dB)
Initial	114.0	0.10
Final	114.0	
Deviated	0.0	

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY
FAST / A / 30-130	REF	UUC	ERR	
STD dB	(dB)	(dB)	(dB)	($\pm$ dB)
139.00	139	138.9	-0.1	0.30
134.00	134	134.0	0.0	
129.00	129	128.9	-0.1	
124.00	124	123.9	-0.1	
119.00	119	119.0	0.0	
114.00	114	114.0	0.0	
109.00	109	109.0	0.0	
104.00	104	104.0	0.0	
99.00	99	99.0	0.0	
94.00	94	94.0	0.0	
89.00	89	89.0	0.0	
84.00	84	84.0	0.0	
79.00	79	79.0	0.0	
74.00	74	74.0	0.0	
69.00	69	69.0	0.0	
64.00	64	64.0	0.0	
59.00	59	59.0	0.0	
54.00	54	54.0	0.0	
49.00	49	49.0	0.0	
44.00	44	44.0	0.0	
39.00	39	39.0	0.0	
34.00	34	34.0	0.0	
29.00	29	29.0	0.0	
24.00	24	24.0	0.0	

Certificate No : 25-SLM-126
 Request No : Req-2025-0701

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY (± dB)
FAST / A	REF	UUC	ERR	
UUC Range	(dB)	(dB)	(dB)	
30-130	29.60	29.7	0.1	0.30
	114	114.0	0.0	

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY (± dB)
A / 30-130	Toneburst	Ref	UUC	ERR	
UUC Time Response	(ms)	(dB)	(dB)	(dB)	
Fast	200	126.0	126.0	0.0	0.20
	2	109.0	109.0	0.0	
	0.25	100.0	99.9	-0.1	
Slow	200	119.6	119.6	0.0	
	2	100.0	100.0	0.0	
	0.25	100.0	100.0	0.0	
SEL	200	120.0	120.0	0.0	
	2	100.0	100.0	0.0	
	0.25	91.0	90.9	-0.1	

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY (± dB)
FAST / C / 55-141	REF	UUC	ERR	
STD Setting	(dB)	(dB)	(dB)	
Complete cycle	136.4	135.8	-0.60	0.20
Positive half cycle	135.4	135.2	-0.20	
Negative half cycle	135.4	135.2	-0.20	

Certificate No : 25-SLM-126
 Request No : Req-2025-0701

12. Overload indication

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / A / 30-130	UUC	
STD Setting	(dB)	
Positive one-half cycle	139.5	
Negative one-half cycle	139.4	
Deviated	0.1	0.20

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / A / 30-130	UUC	
STD Setting	(dB)	
Initial	129.0	
Final	129.0	
Deviated	0.0	0.10

End of Certificate

Certificate of Calibration

Customer

Name : SGS (Thailand) Limited. Certificate No : 25-SLM-224
 Address : 238 TRR Tower, 19th-21st Floor, Naradhiwas Rajanagarindra Road, Request No : Req-2025-1544
 Chong Nonsi, Yannawa, Bangkok 10120

Unit Under Calibration Details

Measurement item : Sound Level Meter Microphone Class : 1
 Manufacturer : RION Microphone Model : UC-59
 Model : NL-53 Microphone S/N : 25578
 Serial Number : 00541048 Preamplifier Model : NH-25
 ID : ENSL 24101 Preamplifier S/N : 34001
 Resolution : 0.1 dB Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
 Humidity : 50 %RH ± 20 %RH
 Barometric Pressure : 1013 hPa ± 10 hPa
 Received Date : 7 July 2025
 Calibrated Date : 17 July 2025
 Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
 Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Multifunction Acoustic Calibrator	Brüel&Kjaer	4226	3412381	8 May 2026	NIMT
Audio Generator	Svantek	Svan401	131	15 October 2025	WK Electric

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %.

Calibrated By : 
 Mr. Nopphon Luangart
 Service Calibration Engineer

Approved By : 
 Mr. Pacit Mathavorn
 Calibration Engineer Supervisor
 Issue Date : 17 July 2025

Certificate No : 25-SLM-224

Request No : Req-2025-1544

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY (± dB)
FAST / A / 30-130	Level	UUC	ERR	UUC	ERR	
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)	
1000 Hz 94 dB	93.98	94.0	0.02	94.0	0.02	0.20

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR:515, SN. 88373

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / 30-130		
UUC Weighting	(dB)	(± dB)
A	16.1	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / 30-130		
UUC Weighting	(dB)	(± dB)
A	12.8	0.10
C	15.4	0.10
Z	19.4	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)
FAST / 30-130	A	C	Z	
STD Setting	(dB)	(dB)	(dB)	(± dB)
125 Hz	0.1	0.3	0.1	0.60
1000 Hz	0.0	0.0	0.0	0.60
4000 Hz	-0.2	-0.2	-0.2	0.60
8000 Hz	-0.4	-0.4	-0.4	0.70

Certificate No : 25-SLM-224
 Request No : Req-2025-1544

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency			UNCERTAINTY (± dB)
FAST / 30-130	Weighting Response curve			
STD Setting	A (dB)	C (dB)	Z (dB)	
63 Hz	-0.2	0.0	-0.1	0.20
125 Hz	-0.2	0.0	0.0	
250 Hz	-0.1	0.0	0.0	
500 Hz	-0.1	0.0	0.0	
1000 Hz	0.0	0.0	0.0	
2000 Hz	0.0	0.0	0.0	
4000 Hz	-0.1	0.0	-0.1	
8000 Hz	-0.1	-0.1	-0.1	
16000 Hz	-0.9	-0.9	0.0	

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY (± dB)
FAST / 30-130	REF	UUC	ERR	
UUC Weighting	(dB)	(dB)	(dB)	
A	114.00	114.0	0.0	0.20
C	114.00	114.0	0.0	
Z	114.00	114.0	0.0	

UUC Setting	STD	Measured		UNCERTAINTY (± dB)
30-130 / A	REF	UUC	ERR	
UUC Time Response	(dB)	(dB)	(dB)	
Fast	114.00	114.0	0.0	0.20
Slow	114.00	114.0	0.0	
Leq	114.00	114.0	0.0	

Certificate No : 25-SLM-224
 Request No : Req-2025-1544

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / A / 30-130	UUC	
STD Setting	(dB)	
Initial	114.0	
Final	114.0	
Deviated	0.0	0.10

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY (± dB)
FAST / A / 30-130	REF	UUC	ERR	
STD dB	(dB)	(dB)	(dB)	
138.00	138	138.0	0.0	0.30
134.00	134	134.0	0.0	
129.00	129	129.0	0.0	
124.00	124	124.0	0.0	
119.00	119	119.0	0.0	
114.00	114	114.0	0.0	
109.00	109	109.0	0.0	
104.00	104	104.0	0.0	
99.00	99	99.0	0.0	
94.00	94	94.0	0.0	
89.00	89	89.0	0.0	
84.00	84	84.0	0.0	
79.00	79	79.0	0.0	
74.00	74	74.0	0.0	
69.00	69	69.0	0.0	
64.00	64	64.0	0.0	
59.00	59	59.0	0.0	
54.00	54	54.0	0.0	
49.00	49	49.0	0.0	
44.00	44	44.0	0.0	
39.00	39	39.1	0.1	
34.00	34	34.2	0.2	
29.00	29	29.2	0.2	
24.00	24	24.1	0.1	

Certificate No : 25-SLM-224
Request No : Req-2025-1544

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY (± dB)
FAST / A	REF	UUC	ERR	
UUC Range	(dB)	(dB)	(dB)	
30-130	29.50	29.6	0.1	0.30
	114	114.0	0.0	

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY (± dB)
A / 30-130	Toneburst	Ref	UUC	ERR	
UUC Time Respo	(ms)	(dB)	(dB)	(dB)	
Fast	200	126.0	126.0	0.0	0.20
	2	109.0	109.0	0.0	
	0.25	100.0	99.9	-0.1	
Slow	200	119.6	119.6	0.0	
	2	100.0	100.0	0.0	
SEL	200	120.0	120.0	0.0	
	2	100.0	100.0	0.0	
	0.25	91.0	90.9	-0.1	

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY (± dB)
FAST / C / 55-141	REF	UUC	ERR	
STD Setting	(dB)	(dB)	(dB)	
Complete cycle	136.4	136.1	-0.30	0.20
Positive half cycle	135.4	135.1	-0.30	
Negative half cycle	135.4	135.1	-0.30	

Certificate No : 25-SLM-224
Request No : Req-2025-1544

12. Overload indication

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / A / 30-130	UUC	
STD Setting	(dB)	
Positive one-half cycle	139.4	
Negative one-half cycle	139.3	
Deviated	0.1	0.20

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / A / 30-130	UUC	
STD Setting	(dB)	
Initial	129.0	
Final	129.0	
Deviated	0.0	0.10

End of Certificate

Certificate of Calibration

Customer

Name : SGS (Thailand) Limited.
 Address : 238 TRR Tower, 19th-21st Floor, Naradhiwas Rajanagarindra Road,
 Chong Nonsi, Yannawa, Bangkok 10120

Certificate No : 25-SLM-227
 Request No : Req-2025-1547

Unit Under Calibration Details

Measurement item : Sound Level Meter
 Manufacturer : RION
 Model : NL-53
 Serial Number : 00541051
 ID : ENSL 24104
 Resolution : 0.1 dB
 Microphone Class : 1
 Microphone Model : UC-59
 Microphone S/N : 25581
 Preamplifier Model : NH-25
 Preamplifier S/N : 34004
 Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
 Humidity : 50 %RH ± 20 %RH
 Barometric Pressure : 1013 hPa ± 10 hPa
 Received Date : 7 July 2025
 Calibrated Date : 17 July 2025
 Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
 Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Multifunction Acoustic Calibrator	Brüel&Kjaer	4226	3412381	8 May 2026	NIMT
Audio Generator	SvanteK	Svan401	131	15 October 2025	WK Electric

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %.

Calibrated By : 
 Mr. Noppadon Luangart
 Service Calibration Engineer

Approved By : 
 Calibration Engineer Supervisor
 Issue Date : 17 July 2025

Certificate No : 25-SLM-227
 Request No : Req-2025-1547

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY (± dB)
FAST / A / 30-130	Level (dB)	UUC	ERR	UUC	ERR	
Calibrator Setting		(dB)	(dB)	(dB)	(dB)	
1000 Hz 94 dB	93.98	94.0	0.02	94.0	0.02	0.20

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR:515, SN. 88373

2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 30-130		
UUC Weighting	(dB)	(± dB)
A	15.8	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 30-130		
UUC Weighting	(dB)	(± dB)
A	13.0	0.10
C	15.8	0.10
Z	19.8	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)
FAST / 30-130	A	C	Z	
STD Setting	(dB)	(dB)	(dB)	(± dB)
125 Hz	0.2	0.2	0.2	0.60
1000 Hz	0.0	0.0	0.0	0.60
4000 Hz	-0.2	-0.2	-0.2	0.60
8000 Hz	-0.5	-0.5	-0.5	0.70



Certificate No : 25-SLM-227
 Request No : Req-2025-1547

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency			UNCERTAINTY (± dB)
FAST / 30-130	Weighting Response curve			
STD Setting	A (dB)	C (dB)	Z (dB)	
63 Hz	-0.2	0.0	0.0	0.20
125 Hz	-0.1	0.0	0.0	
250 Hz	-0.1	0.0	0.0	
500 Hz	-0.1	0.0	0.0	
1000 Hz	0.0	0.0	0.0	
2000 Hz	0.0	0.0	0.0	
4000 Hz	0.0	0.0	0.0	
8000 Hz	-0.1	-0.1	-0.1	
16000 Hz	-0.9	-0.9	0.0	

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY ($\pm$ dB)
FAST / 30-130	REF	UUC	ERR	
UUC Weighting	(dB)	(dB)	(dB)	
A	114.00	114.0	0.0	0.20
C	114.00	114.0	0.0	
Z	114.00	114.0	0.0	

UUC Setting	STD	Measured		UNCERTAINTY ($\pm$ dB)
30-130 / A	REF	UUC	ERR	
UUC Time Response	(dB)	(dB)	(dB)	
Fast	114.00	114.0	0.0	0.20
Slow	114.00	114.0	0.0	
Leq	114.00	114.0	0.0	



Certificate No : 25-SLM-227
 Request No : Req-2025-1547

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ($\pm$ dB)
FAST / A / 30-130	UUC	
STD Setting	(dB)	
Initial	114.0	
Final	114.0	
Deviated	0.0	0.10

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY ($\pm$ dB)
FAST / A / 30-130	REF	UUC	ERR	
STD dB	(dB)	(dB)	(dB)	
138.00	138	138.0	0.0	0.30
134.00	134	134.0	0.0	
129.00	129	129.0	0.0	
124.00	124	124.0	0.0	
119.00	119	119.0	0.0	
114.00	114	114.0	0.0	
109.00	109	109.0	0.0	
104.00	104	104.0	0.0	
99.00	99	99.0	0.0	
94.00	94	94.0	0.0	
89.00	89	89.0	0.0	
84.00	84	84.0	0.0	
79.00	79	79.0	0.0	
74.00	74	74.0	0.0	
69.00	69	69.0	0.0	
64.00	64	64.0	0.0	
59.00	59	59.0	0.0	
54.00	54	54.0	0.0	
49.00	49	49.0	0.0	
44.00	44	44.0	0.0	
39.00	39	39.0	0.0	
34.00	34	34.0	0.0	
29.00	29	29.0	0.0	
24.00	24	23.9	-0.1	

Certificate No : 25-SLM-227
 Request No : Req-2025-1547

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY
FAST / A	REF	UUC	ERR	
UUC Range	(dB)	(dB)	(dB)	(± dB)
30-130	29.70	29.7	0.0	0.30
	114	114.0	0.0	

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY
A / 30-130	Toneburst	Ref	UUC	ERR	
UUC Time Response	(ms)	(dB)	(dB)	(dB)	(± dB)
Fast	200	126.0	126.1	+0.1	0.20
	2	109.0	109.0	0.0	
	0.25	100.0	99.9	-0.1	
Slow	200	119.6	119.6	0.0	
	2	100.0	100.0	0.0	
SEL	200	120.0	120.1	+0.1	
	2	100.0	100.0	0.0	
	0.25	91.0	90.9	-0.1	

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY
FAST / C / 55-141	REF	UUC	ERR	
STD Setting	(dB)	(dB)	(dB)	(± dB)
Complete cycle	136.4	136.0	-0.40	0.20
Positive half cycle	135.4	135.1	-0.30	
Negative half cycle	135.4	135.1	-0.30	

Certificate No : 25-SLM-227
 Request No : Req-2025-1547

12. Overload indication

UUC Setting	Measured	UNCERTAINTY
FAST / A / 30-130	UUC	
STD Setting	(dB)	(± dB)
Positive one-half cycle	139.3	
Negative one-half cycle	139.5	
Deviated	-0.2	0.20

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY
FAST / A / 30-130	UUC	
STD Setting	(dB)	(± dB)
Initial	129.0	
Final	129.0	
Deviated	0.0	0.10

End of Certificate



Cert. No. : ACL25202

Pages : 1 of 8

Calibration Certificate

ENSL 25117

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-53 / Microphone UC-59 / Preamplifier NH-25
Serial No.: 00452072 / 26172 / 55052
ID No.: -

Condition As Found : GOOD

Customer : SGS (THAILAND) LIMITED.
238 TRR TOWER, 19th-21st FLOOR,
NARADHIWAS RAJANAGARINDRA ROAD,
CHONG NONSI, YANNAWA, BANGKOK 10120
THAILAND.

Location : -
Ambient Temperature : (23.0 $\pm$ 3) °C
Pressure : (101.3 $\pm$ 3) kPa
Relative Humidity : (50.0 $\pm$ 20) %

Received Date : 22 MAY 2025
Calibration Date : 27 MAY 2025
Date of Issue : 29 MAY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by : 
(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. : ACL25202

Job No. : VC68AC0104

Pages : 2 of 8

Calibration Procedure : CP-AC-02

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0011-25	11-FEB-26
Waveform Generator	33511B	MY52302742	EF-0012-25	11-FEB-26
Digital Multimeter	34461A	MY60024273	CA2025120EA	18-MAR-26
Programmable Attenuator	MA1-1070	62100114	EF-0006-25	11-FEB-26
Condenser Microphone	4180	2977900	AA-1002-25	19-FEB-26
Measuring Amplifier	NA-42KAI	34560495	AA-3002-25	19-FEB-26

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

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

3.1 National Institute of Metrology (Thailand).

3.2 Electrical And Electronics Institute (EEI).

Cert. No. : ACL25202
Job No. : VC68AC0104
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No. : ACL25202
Job No. : VC68AC0104
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Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A - weight	11.7
C - weight	15.6
Flat	20.9

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.0
1000	0.2	0.2	0.2	± 0.7
8000	-0.4	-0.4	-0.4	+ 1.5, - 2.5

Cert. No. : ACL25202
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4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.1	0.1	0.1	±1.0
125	0.1	0.1	0.0	±1.0
250	0.0	0.0	0.0	±1.0
500	0.0	0.0	0.0	±1.0
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	-0.1	0.0	0.0	+ 1.5, - 2.5
16000	0.0	-0.8	-0.7	+ 2.5, -16.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.1

Cert. No. : ACL25202
Job No. : VC68AC0104
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7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±0.8
136.0	136.0	0.0	±0.8
135.0	135.0	0.0	±0.8
134.0	134.0	0.0	±0.8
133.0	133.0	0.0	±0.8
132.0	132.0	0.0	±0.8
131.0	131.0	0.0	±0.8
129.0	129.0	0.0	±0.8
124.0	124.0	0.0	±0.8
119.0	119.0	0.0	±0.8
114.0	114.0	0.0	±0.8
109.0	109.0	0.0	±0.8
104.0	104.0	0.0	±0.8
99.0	99.0	0.0	±0.8
94.0	94.0	0.0	±0.8
89.0	88.9	-0.1	±0.8
84.0	83.9	-0.1	±0.8
79.0	78.9	-0.1	±0.8
74.0	73.9	-0.1	±0.8
69.0	68.9	-0.1	±0.8
64.0	63.9	-0.1	±0.8
59.0	58.9	-0.1	±0.8
54.0	53.9	-0.1	±0.8
49.0	48.9	-0.1	±0.8
44.0	43.9	-0.1	±0.8
39.0	38.9	-0.1	±0.8
34.0	33.9	-0.1	±0.8
30.0	29.9	-0.1	±0.8
29.0	28.9	-0.1	±0.8
28.0	27.9	-0.1	±0.8
27.0	26.8	-0.2	±0.8
26.0	25.8	-0.2	±0.8
25.0	24.9	-0.1	±0.8

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Job No. : VC68AC0104
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8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±0.8

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	28.9	-0.1	±0.8

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.0 ; -3.0
	2	8	117.0	117.0	0.0	1.0 ; -1.5
	200	800	134.0	134.0	0.0	±0.5
Slow	2	8	108.0	108.0	0.0	1.0 ; -3.0
	200	800	127.6	127.6	0.0	±0.5
SEL	0.25	1	99.0	98.9	-0.1	1.0 ; -3.0
	2	8	108.0	108.0	0.0	1.0 ; -1.5
	200	800	128.0	128.0	0.0	±0.5

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Job No. : VC68AC0104
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10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{cpeak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±2.0
One	133.4	133.4	0.0	±2.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±1.0
Positive half cycle	135.4	135.2	-0.2	±1.0
Negative half cycle	135.4	135.2	-0.2	±1.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.1

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate



Cert. No. : ACL25202

Pages : 1 of 8

Calibration Certificate

ENSL 25117

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-53 / Microphone UC-59 / Preamplifier NH-25
Serial No.: 00452072 / 26172 / 55052
ID No.: -

Condition As Found : GOOD

Customer : SGS (THAILAND) LIMITED.
238 TRR TOWER, 19th-21st FLOOR,
NARADHIWAS RAJANAGARINDRA ROAD,
CHONG NONSI, YANNAWA, BANGKOK 10120
THAILAND.

Location : -
Ambient Temperature : (23.0 $\pm$ 3) °C
Pressure : (101.3 $\pm$ 3) kPa
Relative Humidity : (50.0 $\pm$ 20) %

Received Date : 22 MAY 2025
Calibration Date : 27 MAY 2025
Date of Issue : 29 MAY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by : 
(Wichok Ekpongpradit)

Cert. No. : ACL25202

Job No. : VC68AC0104

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Calibration Procedure : CP-AC-02

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0011-25	11-FEB-26
Waveform Generator	33511B	MY52302742	EF-0012-25	11-FEB-26
Digital Multimeter	34461A	MY60024273	CA2025120EA	18-MAR-26
Programmable Attenuator	MA1-1070	62100114	EF-0006-25	11-FEB-26
Condenser Microphone	4180	2977900	AA-1002-25	19-FEB-26
Measuring Amplifier	NA-42KAI	34560495	AA-3002-25	19-FEB-26

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

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

3.1 National Institute of Metrology (Thailand).

3.2 Electrical And Electronics Institute (EEI).

Cert. No. : ACL25202
Job No. : VC68AC0104
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No. : ACL25202
Job No. : VC68AC0104
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Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A - weight	11.7
C - weight	15.6
Flat	20.9

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.0
1000	0.2	0.2	0.2	± 0.7
8000	-0.4	-0.4	-0.4	+ 1.5, - 2.5

Cert. No. : ACL25202
Job No. : VC68AC0104
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.1	0.1	0.1	±1.0
125	0.1	0.1	0.0	±1.0
250	0.0	0.0	0.0	±1.0
500	0.0	0.0	0.0	±1.0
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	-0.1	0.0	0.0	+ 1.5, - 2.5
16000	0.0	-0.8	-0.7	+ 2.5, -16.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.1

Cert. No. : ACL25202
Job No. : VC68AC0104
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±0.8
136.0	136.0	0.0	±0.8
135.0	135.0	0.0	±0.8
134.0	134.0	0.0	±0.8
133.0	133.0	0.0	±0.8
132.0	132.0	0.0	±0.8
131.0	131.0	0.0	±0.8
129.0	129.0	0.0	±0.8
124.0	124.0	0.0	±0.8
119.0	119.0	0.0	±0.8
114.0	114.0	0.0	±0.8
109.0	109.0	0.0	±0.8
104.0	104.0	0.0	±0.8
99.0	99.0	0.0	±0.8
94.0	94.0	0.0	±0.8
89.0	88.9	-0.1	±0.8
84.0	83.9	-0.1	±0.8
79.0	78.9	-0.1	±0.8
74.0	73.9	-0.1	±0.8
69.0	68.9	-0.1	±0.8
64.0	63.9	-0.1	±0.8
59.0	58.9	-0.1	±0.8
54.0	53.9	-0.1	±0.8
49.0	48.9	-0.1	±0.8
44.0	43.9	-0.1	±0.8
39.0	38.9	-0.1	±0.8
34.0	33.9	-0.1	±0.8
30.0	29.9	-0.1	±0.8
29.0	28.9	-0.1	±0.8
28.0	27.9	-0.1	±0.8
27.0	26.8	-0.2	±0.8
26.0	25.8	-0.2	±0.8
25.0	24.9	-0.1	±0.8

Cert. No. : ACL25202
Job No. : VC68AC0104
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±0.8

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	28.9	-0.1	±0.8

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.0 ; -3.0
	2	8	117.0	117.0	0.0	1.0 ; -1.5
	200	800	134.0	134.0	0.0	±0.5
Slow	2	8	108.0	108.0	0.0	1.0 ; -3.0
	200	800	127.6	127.6	0.0	±0.5
SEL	0.25	1	99.0	98.9	-0.1	1.0 ; -3.0
	2	8	108.0	108.0	0.0	1.0 ; -1.5
	200	800	128.0	128.0	0.0	±0.5

Cert. No. : ACL25202
Job No. : VC68AC0104
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{cpeak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±2.0
One	133.4	133.4	0.0	±2.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±1.0
Positive half cycle	135.4	135.2	-0.2	±1.0
Negative half cycle	135.4	135.2	-0.2	±1.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.1

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

Cert. No. : ACL25203
Pages : 1 of 8

Calibration Certificate

ENSL 25992

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-53 / Microphone UC-59 / Preamplifier NH-25
Serial No.: 00452073 / 26173 / 55053
ID No.: -

Condition As Found : GOOD

Customer : SGS (THAILAND) LIMITED.
238 TRR TOWER, 19th-21st FLOOR,
NARADHIWAS RAJANAGARINDRA ROAD,
CHONG NONSI, YANNAWA, BANGKOK 10120
THAILAND.

Location : -
Ambient Temperature : (23.0 $\pm$ 3) °C
Pressure : (101.3 $\pm$ 3) kPa
Relative Humidity : (50.0 $\pm$ 20) %

Received Date : 22 MAY 2025
Calibration Date : 27 MAY 2025
Date of Issue : 29 MAY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by : 
(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. : ACL25203
Job No. : VC68AC0104
Pages : 2 of 8

Calibration Procedure : CP-AC-02

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0011-25	11-FEB-26
Waveform Generator	33511B	MY52302742	EF-0012-25	11-FEB-26
Digital Multimeter	34461A	MY60024273	CA2025120EA	18-MAR-26
Programmable Attenuator	MAT-1070	62100114	EF-0006-25	11-FEB-26
Condenser Microphone	4180	2977900	AA-1002-25	19-FEB-26
Measuring Amplifier	NA-42KAI	34560495	AA-3002-25	19-FEB-26

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

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

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Electrical And Electronics Institute (EEI).

Cert. No. : ACL25203
Job No. : VC68AC0104
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No. : ACL25203
Job No. : VC68AC0104
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.8

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A - weight	12.6
C - weight	16.6
Flat	23.9

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.3	0.3	± 1.0
1000	0.2	0.2	0.2	± 0.7
8000	-0.5	-0.5	-0.5	+ 1.5, - 2.5

Cert. No. : ACL25203
Job No. : VC68AC0104
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.1	0.0	0.1	±1.0
125	0.0	0.1	0.0	±1.0
250	0.0	0.0	0.0	±1.0
500	0.0	0.0	0.0	±1.0
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	-0.1	-0.1	0.0	+ 1.5, - 2.5
16000	0.0	-0.8	-0.8	+ 2.5, -16.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.1

Cert. No. : ACL25203
Job No. : VC68AC0104
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±0.8
136.0	136.0	0.0	±0.8
135.0	135.0	0.0	±0.8
134.0	134.0	0.0	±0.8
133.0	133.0	0.0	±0.8
132.0	132.0	0.0	±0.8
131.0	131.0	0.0	±0.8
129.0	129.0	0.0	±0.8
124.0	124.0	0.0	±0.8
119.0	119.0	0.0	±0.8
114.0	114.0	0.0	±0.8
109.0	109.0	0.0	±0.8
104.0	104.0	0.0	±0.8
99.0	99.0	0.0	±0.8
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	34.0	0.0	±0.8
30.0	30.0	0.0	±0.8
29.0	29.0	0.0	±0.8
28.0	28.0	0.0	±0.8
27.0	27.0	0.0	±0.8
26.0	26.0	0.0	±0.8
25.0	24.9	-0.1	±0.8

Cert. No. : ACL25203
Job No. : VC68AC0104
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±0.8

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	28.9	-0.1	±0.8

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	108.0	0.0	1.0 ; -3.0
	2	8	117.0	117.0	0.0	1.0 ; -1.5
	200	800	134.0	134.1	0.1	±0.5
Slow	2	8	108.0	108.0	0.0	1.0 ; -3.0
	200	800	127.6	127.6	0.0	±0.5
SEL	0.25	1	99.0	99.0	0.0	1.0 ; -3.0
	2	8	108.0	108.1	0.1	1.0 ; -1.5
	200	800	128.0	128.1	0.1	±0.5

Cert. No. : ACL25203
Job No. : VC68AC0104
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±2.0
One	133.4	133.4	0.0	±2.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±1.0
Positive half cycle	135.4	135.2	-0.2	±1.0
Negative half cycle	135.4	135.2	-0.2	±1.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.6	0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.1

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$
or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

Cert. No. : ACL25206
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-53 / Microphone UC-59 / Preamplifier NH-25
Serial No.: 00452076 / 26811 / 55056
ID No.: -

Condition As Found : GOOD

Customer : SGS (THAILAND) LIMITED.
238 TRR TOWER, 19th-21st FLOOR,
NARADHIWAS RAJANAGARINDRA ROAD,
CHONG NONSI, YANNAWA, BANGKOK 10120
THAILAND.

Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 22 MAY 2025
Calibration Date : 27 MAY 2025
Date of Issue : 29 MAY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by : 
(Wichok Ekpongpradit)

Cert. No. : ACL25206
Job No. : VC68AC0104
Pages : 2 of 8

Calibration Procedure : CP-AC-02

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference
Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0011-25	11-FEB-26
Waveform Generator	33511B	MY52302742	EF-0012-25	11-FEB-26
Digital Multimeter	34461A	MY60024273	CA2025120EA	18-MAR-26
Programmable Attenuator	MAT-1070	62100114	EF-0006-25	11-FEB-26
Condenser Microphone	4180	2977900	AA-1002-25	19-FEB-26
Measuring Amplifier	NA-42KAI	34560495	AA-3002-25	19-FEB-26

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

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

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Electrical And Electronics Institute (EEI).

Cert. No. : ACL25206
Job No. : VC68AC0104
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.3	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No. : ACL25206
Job No. : VC68AC0104
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.4

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A - weight	11.9
C - weight	17.5
Flat	24.9

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	± 1.0
1000	0.1	0.1	0.1	± 0.7
8000	-0.8	-0.7	-0.7	+ 1.5, - 2.5

Cert. No. : ACL25206
Job No. : VC68AC0104
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.1	0.0	0.1	±1.0
125	0.0	0.0	0.0	±1.0
250	0.0	0.0	-0.1	±1.0
500	0.0	0.0	-0.1	±1.0
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±1.0
4000	-0.1	-0.1	-0.1	±1.0
8000	-0.1	-0.1	-0.1	+ 1.5, - 2.5
16000	-0.1	-0.8	-0.8	+ 2.5, -16.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.1

Cert. No. : ACL25206
Job No. : VC68AC0104
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±0.8
136.0	136.0	0.0	±0.8
135.0	135.0	0.0	±0.8
134.0	134.0	0.0	±0.8
133.0	133.0	0.0	±0.8
132.0	132.0	0.0	±0.8
131.0	131.0	0.0	±0.8
129.0	129.0	0.0	±0.8
124.0	124.0	0.0	±0.8
119.0	119.0	0.0	±0.8
114.0	114.0	0.0	±0.8
109.0	109.0	0.0	±0.8
104.0	104.0	0.0	±0.8
99.0	99.0	0.0	±0.8
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	34.0	0.0	±0.8
30.0	30.0	0.0	±0.8
29.0	29.0	0.0	±0.8
28.0	28.0	0.0	±0.8
27.0	27.0	0.0	±0.8
26.0	26.0	0.0	±0.8
25.0	25.0	0.0	±0.8

Cert. No. : ACL25206
Job No. : VC68AC0104
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±0.8

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±0.8

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.0 ; -3.0
	2	8	117.0	117.0	0.0	1.0 ; -1.5
	200	800	134.0	134.0	0.0	±0.5
Slow	2	8	108.0	108.0	0.0	1.0 ; -3.0
	200	800	127.6	127.6	0.0	±0.5
SEL	0.25	1	99.0	98.9	-0.1	1.0 ; -3.0
	2	8	108.0	108.0	0.0	1.0 ; -1.5
	200	800	128.0	128.0	0.0	±0.5

Cert. No. : ACL25206
Job No. : VC68AC0104
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±2.0
One	133.4	133.4	0.0	±2.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±1.0
Positive half cycle	135.4	135.1	-0.3	±1.0
Negative half cycle	135.4	135.2	-0.2	±1.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.5	-0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.1

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$
or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

Cert. No. : ACL25207
Pages : 1 of 8

Calibration Certificate

ENS2 25176

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-53 / Microphone UC-59 / Preamplifier NH-25
Serial No.: 00452077 / 26812 / 55057
ID No.: -

Condition As Found : GOOD

Customer : SGS (THAILAND) LIMITED.
238 TRR TOWER, 19th-21st FLOOR,
NARADHIWAS RAJANAGARINDRA ROAD,
CHONG NONSI, YANNAWA, BANGKOK 10120
THAILAND.

Location : -
Ambient Temperature : (23.0 $\pm$ 3) °C
Pressure : (101.3 $\pm$ 3) kPa
Relative Humidity : (50.0 $\pm$ 20) %

Received Date : 22 MAY 2025
Calibration Date : 27 MAY 2025
Date of Issue : 29 MAY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by :

(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. : ACL25207
Job No. : VC68AC0104
Pages : 2 of 8

Calibration Procedure : CP-AC-02

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0011-25	11-FEB-26
Waveform Generator	33511B	MY52302742	EF-0012-25	11-FEB-26
Digital Multimeter	34461A	MY60024273	CA2025120EA	18-MAR-26
Programmable Attenuator	MAT-1070	62100114	EF-0006-25	11-FEB-26
Condenser Microphone	4180	2977900	AA-1002-25	19-FEB-26
Measuring Amplifier	NA-42KAI	34560495	AA-3002-25	19-FEB-26

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

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

3.1 National Institute of Metrology (Thailand).

3.2 Electrical And Electronics Institute (EEI).

Cert. No. : ACL25207
Job No. : VC68AC0104
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No. : ACL25207
Job No. : VC68AC0104
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A - weight	11.9
C - weight	15.8
Flat	21.2

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.4	0.4	± 1.0
1000	0.2	0.3	0.2	± 0.7
8000	-1.0	-1.0	-1.0	+ 1.5, - 2.5

Cert. No. : ACL25207
Job No. : VC68AC0104
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.1	0.1	0.1	±1.0
125	0.1	0.1	0.1	±1.0
250	0.1	0.0	0.0	±1.0
500	0.0	0.1	0.0	±1.0
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.1	±1.0
4000	0.0	0.0	0.0	±1.0
8000	0.0	0.0	0.0	+ 1.5, - 2.5
16000	0.0	-0.7	-0.7	+ 2.5, -16.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.1	0.1	± 0.1

Cert. No. : ACL25207
Job No. : VC68AC0104
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±0.8
136.0	136.0	0.0	±0.8
135.0	135.0	0.0	±0.8
134.0	134.0	0.0	±0.8
133.0	133.0	0.0	±0.8
132.0	132.0	0.0	±0.8
131.0	131.0	0.0	±0.8
129.0	129.0	0.0	±0.8
124.0	124.0	0.0	±0.8
119.0	119.0	0.0	±0.8
114.0	114.0	0.0	±0.8
109.0	109.0	0.0	±0.8
104.0	104.0	0.0	±0.8
99.0	99.0	0.0	±0.8
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.9	-0.1	±0.8
30.0	29.9	-0.1	±0.8
29.0	28.9	-0.1	±0.8
28.0	27.9	-0.1	±0.8
27.0	26.9	-0.1	±0.8
26.0	25.9	-0.1	±0.8
25.0	24.9	-0.1	±0.8

Cert. No. : ACL25207
Job No. : VC68AC0104
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±0.8

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±0.8

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.0 ; -3.0
	2	8	117.0	117.0	0.0	1.0 ; -1.5
	200	800	134.0	134.0	0.0	±0.5
Slow	2	8	108.0	108.0	0.0	1.0 ; -3.0
	200	800	127.6	127.6	0.0	±0.5
SEL	0.25	1	99.0	98.9	-0.1	1.0 ; -3.0
	2	8	108.0	108.0	0.0	1.0 ; -1.5
	200	800	128.0	128.0	0.0	±0.5

Cert. No. : ACL25207
Job No. : VC68AC0104
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±2.0
One	133.4	133.4	0.0	±2.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±1.0
Positive half cycle	135.4	135.1	-0.3	±1.0
Negative half cycle	135.4	135.1	-0.3	±1.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.6	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.1

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$
or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

Cert. No. : ACL25209

Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-53 / Microphone UC-59 / Preamplifier NH-25
Serial No.: 00452079 / 26814 / 55059
ID No.: -

ENSL 25118

Condition As Found : GOOD

Customer : SGS (THAILAND) LIMITED.
238 TRR TOWER, 19th-21st FLOOR,
NARADHIWAS RAJANAGARINDRA ROAD,
CHONG NONSI, YANNAWA, BANGKOK 10120
THAILAND.

Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 22 MAY 2025
Calibration Date : 27 MAY 2025
Date of Issue : 29 MAY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by :

(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. : ACL25209

Job No. : VC68AC0104

Pages : 2 of 8

Calibration Procedure : CP-AC-02

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0011-25	11-FEB-26
Waveform Generator	33511B	MY52302742	EF-0012-25	11-FEB-26
Digital Multimeter	34461A	MY60024273	CA2025120EA	18-MAR-26
Programmable Attenuator	MA1-1070	62100114	EF-0006-25	11-FEB-26
Condenser Microphone	4180	2977900	AA-1002-25	19-FEB-26
Measuring Amplifier	NA-42KAI	34560495	AA-3002-25	19-FEB-26

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

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

3.1 National Institute of Metrology (Thailand).

3.2 Electrical And Electronics Institute (EEI).

Cert. No. : ACL25209
Job No. : VC68AC0104
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No. : ACL25209
Job No. : VC68AC0104
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A - weight	12.0
C - weight	15.8
Flat	21.3

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	+ 1.0
1000	0.1	0.1	0.1	± 0.7
8000	-1.2	-1.2	-1.2	+ 1.5, - 2.5

Cert. No. : ACL25209
Job No. : VC68AC0104
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.2	0.1	0.2	±1.0
125	0.1	0.1	0.1	±1.0
250	0.1	0.1	0.0	±1.0
500	0.0	0.1	0.0	±1.0
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	0.0	0.0	0.0	+ 1.5, - 2.5
16000	0.0	-0.7	-0.7	+ 2.5, -16.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.1	0.1	± 0.1

Cert. No. : ACL25209
Job No. : VC68AC0104
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±0.8
136.0	136.0	0.0	±0.8
135.0	135.0	0.0	±0.8
134.0	134.0	0.0	±0.8
133.0	133.0	0.0	±0.8
132.0	132.0	0.0	±0.8
131.0	131.0	0.0	±0.8
129.0	129.0	0.0	±0.8
124.0	124.0	0.0	±0.8
119.0	119.0	0.0	±0.8
114.0	114.0	0.0	±0.8
109.0	109.0	0.0	±0.8
104.0	104.0	0.0	±0.8
99.0	99.0	0.0	±0.8
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	53.9	-0.1	±0.8
49.0	48.9	-0.1	±0.8
44.0	43.9	-0.1	±0.8
39.0	38.9	-0.1	±0.8
34.0	33.9	-0.1	±0.8
30.0	29.9	-0.1	±0.8
29.0	28.9	-0.1	±0.8
28.0	27.9	-0.1	±0.8
27.0	26.9	-0.1	±0.8
26.0	25.9	-0.1	±0.8
25.0	24.9	-0.1	±0.8

Cert. No. : ACL25209
Job No. : VC68AC0104
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±0.8

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±0.8

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.0 ; -3.0
	2	8	117.0	117.0	0.0	1.0 ; -1.5
	200	800	134.0	134.0	0.0	±0.5
Slow	2	8	108.0	108.0	0.0	1.0 ; -3.0
	200	800	127.6	127.6	0.0	±0.5
SEL	0.25	1	99.0	98.9	-0.1	1.0 ; -3.0
	2	8	108.0	108.0	0.0	1.0 ; -1.5
	200	800	128.0	128.0	0.0	±0.5

Cert. No. : ACL25209
Job No. : VC68AC0104
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±2.0
One	133.4	133.4	0.0	±2.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±1.0
Positive half cycle	135.4	135.1	-0.3	±1.0
Negative half cycle	135.4	135.1	-0.3	±1.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.5	-0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	136.9	0.1	±0.1

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$
or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

CERTIFICATE OF CALIBRATION

Certificate No.: C0-1402008/25

Page 1 **of total** 2 **pages**

Customer SGS (THAILAND) LIMITED (HEAD OFFICE)
238 TRR Tower, 19th - 21st Floor, Naradhiwas Rajanagarindra Road,
Chongnonsi, Yanawa, Bangkok 10120

Equipment pH Meter
Manufacturer EUTECH **Model** PCTestr 35
Serial No. 3173519 **ID No.** ENWA24142
Description Range : 0 - 14 pH, Resolution : 0.1 pH

Environmental Conditions Ambient Temperature: (20 ± 2) °C
Relative Humidity: (50 ± 10) %
Atmospheric Pressure: -

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 14 February 2025

Calibration Date 15 February 2025

Date of Issue 17 February 2025

Condition of Artifacts Used conditions but can be calibrated

Checked by [Redacted]
Act as Technical Manager

Approved by [Redacted]
Representative of Managing Director

() (Krisyosl K.) () (Sakda Y.)
() (Patiphan K.) (✓) (Onnapa P.)
() (Pongsak H.) () (Nitiphong K.)
() (Kanung C.) () (Nonthachai K.)
() (Pramong P.) () (Noppol P.)

(Dr. Ekachai Puttitwong)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.

Certificate No.: C0-1402008/25

Page 2 **of total** 2 **pages**
Reference Method:

- The calibration method used was CP-178 based on an in-house method.

- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard:

Type	pH Value	Lot No.	Due Date	Traceability
pH Standard Solution	4.01	300824	Aug. 5, 2025	NIMT
	7.00	230524	Jul. 21, 2025	
	10.01	030924	Jul. 21, 2025	

Type	Serial No.	Certificate No.	Due Date	Traceability
Digital Thermometer with Sensor	1709138 / 4605984-005	10-0806001/24	Jun. 7, 2025	THC

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- NIMT, National Institute of Metrology (Thailand).

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:
Calibration of pH Electrode

pH Standard Solution (pH)	Measured Value		Uncertainty (± pH)
	(pH)	(mV)	
4.01	4.0	-	0.059
7.00	7.0	-	0.059
10.01	10.0	-	0.059

Note : Adjust Curve to Buffer Solution pH (4,7,10)

Temperature stability of micro bath : 25 ± 0.2°C

The above reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -

Calibrated by Onnapa

CERTIFICATE OF CALIBRATION

Certificate No.: T0-1402028/25 **Page 1 of total 2 pages**

Customer SGS (THAILAND) LIMITED (HEAD OFFICE)
238 TRR Tower, 19th - 21st Floor, Naradhiwas Rajanagarindra Road,
Chongnonsi, Yanawa, Bangkok 10120

Equipment pH Meter
Manufacturer EUTECH **Model** PCTestr 35
Serial No. 3173519 **ID No.** ENWA24142
Description Temperature range : 20 °C to 50 °C, Resolution of UUC : 0.1 °C

Environmental Conditions Ambient Temperature: (23 ± 3) °C
Relative Humidity: (50 ± 15) %
Atmospheric Pressure: -

Calibration Location Blue Devils Laboratory (TL)

Received Date 14 February 2025

Calibration Date 15 February 2025

Date of Issue 17 February 2025

Condition of Artifacts Used conditions but can be calibrated

Checked by 
Act as Technical Manager

Approved by 
Representative of Managing Director

() (Krisyosl K.) () (Sakda Y.)
() (Patiphan K.) () (Onnapa P.)
(✓) (Pongsak H.) () (Nitiphong K.)
() (Kanung C.) () (Nonthachai K.)
() (Pramong P.) () (Noppol P.)

(Dr. Ekachai Puttitwong)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.

Certificate No.: T0-1402028/25

Page 2 of total 2 pages

Reference Method:

- The calibration method used was CP-096 based on an in-house method.
- The temperature scale used was an ITS-90.
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard Instruments:

Type	Serial No.	Cert. No.	Due Date	Traceability
Thermometer Readout	B7C853	I0-2810001/24	Oct. 28, 2025	THC
Platinum Resistance Thermometer	4854	C0A30047	Oct. 22, 2025	FLUKE
Liquid Bath	XO111019	I0-2405001/23	May 25, 2025	THC

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- THC, Thai Heart Calibration Co., Ltd.
- FLUKE, Fluke Corporation, U.S.A.

Measurement Results: (X) Without Adjustment

Dimension of probe : Diameter 3 mm. Sensor Type : RTD (PT100)

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
70	20.00	20.0	0.00	0.065
70	30.00	30.0	0.00	0.065
70	50.00	50.0	0.00	0.065

UUC : Unit Under Calibration

The above reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -

Calibrated by Phakkawan

CERTIFICATE OF CALIBRATION

Certificate No.: C0-0702003/25 Page 1 of total 3 pages

Customer SGS (THAILAND) LIMITED (HEAD OFFICE)
238 TRR Tower, 19th - 21st Floor, Naradhiwas Rajanagarindra Road,
Chongnonsi, Yanawa, Bangkok 10120

Equipment pH Meter
Manufacturer EUTECH **Model** PCTestr 35
Serial No. 3173614 **ID No.** ENWA24143
Description Range : 0 - 14 pH, Resolution : 0.1 pH

Environmental Conditions Ambient Temperature: (20 ± 2) °C
Relative Humidity: (50 ± 10) %
Atmospheric Pressure: -

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 7 February 2025

Calibration Date 7 February 2025

Date of Issue 8 February 2025

Condition of Artifacts Used conditions but can be calibrated

Checked by [Redacted]

Act as Technical Manager

Approved by [Redacted]

Representative of Managing Director

() (Krisyosl K.) () (Sakda Y.)
() (Patiphan K.) (✓) (Onnapa P.)
() (Pongsak H.) () (Nitiphong K.)
() (Kanung C.) () (Nonthachai K.)
() (Pramong P.) () (Noppol P.)

(Dr. Ekachai Puttitwong)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.

Certificate No.: C0-0702003/25

Page 2 of total 3 pages

Reference Method:

- The calibration method used was CP-178 based on an in-house method.

- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard:

Type	pH Value	Lot No.	Due Date	Traceability
pH Standard Solution	4.01	300824	Aug. 5, 2025	NIMT
	7.00	230524	Jul. 21, 2025	
	10.01	030924	Jul. 21, 2025	

Type	Serial No.	Certificate No.	Due Date	Traceability
Digital Thermometer with Sensor	1709138 / 4605984-005	10-0806001/24	Jun. 7, 2025	THC

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- NIMT, National Institute of Metrology (Thailand).

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

Calibration of pH Electrode

pH Standard Solution (pH)	Measured Value		Uncertainty (± pH)
	(pH)	(mV)	
4.01	4.0	-	0.059
7.00	7.0	-	0.059
10.01	10.0	-	0.059

Note : Adjust Curve to Buffer Solution pH (4,7,10)

Temperature stability of micro bath : 25 ± 0.2°C

The above reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

Calibrated by

Kittipong

Certificate No.: C0-0702003/25

Page 3 **of total** 3 **pages**
Reference Method:

- The calibration method used was CP-096 based on an in-house method.
- The temperature scale used was an ITS-90.
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard Instruments:

Type	Serial No.	Cert. No.	Due Date	Traceability
Thermometer Readout	B7C853	I0-2810001/24	Oct. 28, 2025	THC
Platinum Resistance Thermometer	4854	C0A30047	Oct. 22, 2025	FLUKE
Liquid Bath	XO111019	I0-2405001/23	May 25, 2025	THC

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- THC, Thai Heart Calibration Co., Ltd.
- FLUKE, Fluke Comporation, U.S.A.

Measurement Results: (X) Without Adjustment

Dimension of probe : Diameter 2 mm. Sensor Type : RTD (PT100)

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
70	20.00	19.9	0.10	0.065
70	30.00	30.0	0.00	0.065
70	50.00	50.0	0.00	0.065

UUC : Unit Under Calibration

The above reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -

Calibrated by


Pongsak

REV.02 02/24/21

CERTIFICATE OF CALIBRATION

Certificate No.: C0-1402009/25

Page 1 **of total** 2 **pages**

Customer SGS (THAILAND) LIMITED (HEAD OFFICE)
238 TRR Tower, 19th - 21st Floor, Naradhiwas Rajanagarindra Road,
Chongnonsi, Yanawa, Bangkok 10120

Equipment pH Meter
Manufacturer EUTECH **Model** PCTestr 35
Serial No. 3190571 **ID No.** ENWA24146
Description Range : 0 - 14 pH, Resolution : 0.1 pH

Environmental Conditions Ambient Temperature: (20 ± 2) °C
Relative Humidity: (50 ± 10) %
Atmospheric Pressure: -

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 14 February 2025

Calibration Date 15 February 2025

Date of Issue 17 February 2025

Condition of Artifacts Used conditions but can be calibrated

Checked by
Approved by

Act as Technical Manager

Representative of Managing Director

() (Krisyosl K.) () (Sakda Y.)
() (Patiphan K.) (/) (Onnapa P.)
() (Pongsak H.) () (Nitiphong K.)
() (Kanung C.) () (Nonthachai K.)
() (Pramong P.) () (Noppol P.)

(Dr. Ekachai Puttitwong)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.

Certificate No.: C0-1402009/25

Page 2 **of total** 2 **pages**
Reference Method:

- The calibration method used was CP-178 based on an in-house method.
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard:

Type	pH Value	Lot No.	Due Date	Traceability
pH Standard Solution	4.01	300824	Aug. 5, 2025	NIMT
	7.00	230524	Jul. 21, 2025	
	10.01	030924	Jul. 21, 2025	

Type	Serial No.	Certificate No.	Due Date	Traceability
Digital Thermometer with Sensor	1709138 / 4605984-005	10-0806001/24	Jun. 7, 2025	THC

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- NIMT, National Institute of Metrology (Thailand).
- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:
Calibration of pH Electrode

pH Standard Solution (pH)	Measured Value		Uncertainty (± pH)
	(pH)	(mV)	
4.01	4.0	-	0.059
7.00	7.0	-	0.059
10.01	10.0	-	0.059

Note : Adjust Curve to Buffer Solution pH (4,7,10)

Temperature stability of micro bath : 25 ± 0.2°C

The above reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -

Calibrated by Onnapa

REV.02 02/24/21

FE-169

CERTIFICATE OF CALIBRATION

Certificate No.: T0-1402029/25

Page 1 **of total** 2 **pages**
Customer

SGS (THAILAND) LIMITED (HEAD OFFICE)
238 TRR Tower, 19th - 21st Floor, Naradhiwas Rajanagarindra Road,
Chongnonsi, Yanawa, Bangkok 10120

Equipment

pH Meter

Manufacturer

EUTECH

Model

PCTestr 35

Serial No.

3190571

ID No.

ENWA24146

Description

Temperature range : 20 °C to 50 °C, Resolution of UUC : 0.1 °C

Environmental Conditions

Ambient Temperature: (23 ± 3) °C
Relative Humidity: (50 ± 15) %
Atmospheric Pressure: -

Calibration Location

Blue Devils Laboratory (TL)

Received Date

14 February 2025

Calibration Date

15 February 2025

Date of Issue

17 February 2025

Condition of Artifacts

Used conditions but can be calibrated

Checked by

Act as Technical Manager

Approved by

Representative of Managing Director

() (Krisyosl K.) () (Sakda Y.)
() (Patiphan K.) () (Onnapa P.)
(✓) (Pongsak H.) () (Nitiphong K.)
() (Kanung C.) () (Nonthachai K.)
() (Pramong P.) () (Noppol P.)

(Dr. Ekachai Puttitwong)

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FE-169

REV.02 02/24/21

Certificate No.: T0-1402029/25

Page 2 of total 2 pages
Reference Method:

- The calibration method used was CP-096 based on an in-house method.
- The temperature scale used was an ITS-90.
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard Instruments:

Type	Serial No.	Cert. No.	Due Date	Traceability
Thermometer Readout	B7C853	I0-2810001/24	Oct. 28, 2025	THC
Platinum Resistance Thermometer	4854	C0A30047	Oct. 22, 2025	FLUKE
Liquid Bath	XO111019	I0-2405001/23	May 25, 2025	THC

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- THC, Thai Heart Calibration Co., Ltd.
- FLUKE, Fluke Comporation, U.S.A.

Measurement Results:

(X) Without Adjustment

Dimension of probe : Diameter 3 mm. Sensor Type : RTD (PT100)

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
70	20.00	20.0	0.00	0.065
70	30.00	30.0	0.00	0.065
70	50.00	50.0	0.00	0.065

UUC : Unit Under Calibration

The above reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -

CERTIFICATE OF CALIBRATION

Certificate No.: C0-2702013/25

Page 1 of total 2 pages
Customer

SGS (THAILAND) LIMITED (HEAD OFFICE)
238 TRR Tower, 19th - 21st Floor, Naradhiwas Rajanagarindra Road,
Chongnonsi, Yanawa, Bangkok 10120

Equipment

pH Meter

Manufacturer

EUTECH

Model

PCTestr 35

Serial No.

3198807

ID No.

ENWA 24147

Description

Range : 0 - 14 pH, Resolution : 0.1 pH

Environmental Conditions

Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: -

Calibration Location

Jayhawks Laboratory (CL&GL)

Received Date

27 February 2025

Calibration Date

27 February 2025

Date of Issue

3 March 2025

Condition of Approval: This certificate is valid under the conditions stated above but can be calibrated under other conditions if approved by the customer.

Checked by
Approved by

Act as Technical Manager

Representative of Managing Director

() (Krisyosl K.) () (Sakda Y.)
() (Patiphan K.) (✓) (Onnapa P.)
() (Pongsak H.) () (Nitiphong K.)
() (Kanung C.) () (Nonthachai K.)
() (Pramong P.) () (Noppol P.)

(Dr. Ekachai Puttitwong)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.

Certificate No.: C0-2702013/25

Page 2 **of total** 2 **pages**
Reference Method:

- The calibration method used was CP-178 based on an in-house method.

- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard:

Type	pH Value	Lot No.	Due Date	Traceability
pH Standard Solution	4.01	300824	Aug. 5, 2025	NIMT
	7.00	230524	Aug. 25, 2025	
	10.01	030924	Aug. 25, 2025	

Type	Serial No.	Certificate No.	Due Date	Traceability
Digital Thermometer with Sensor	1709138 / 4605984-005	I0-0806001/24	Jun. 7, 2025	THC

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- NIMT, National Institute of Metrology (Thailand).
- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:
Calibration of pH Electrode

pH Standard Solution (pH)	Measured Value		Uncertainty (± pH)
	(pH)	(mV)	
4.01	4.0	-	0.059
7.00	7.0	-	0.059
10.01	10.0	-	0.059

Note : Adjust Curve to Buffer Solution pH (4,7,10)

Temperature stability of micro bath : 25 ± 0.2°C

The above reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -

Calibrated by Athipat
REV.02 02/24/21

CERTIFICATE OF CALIBRATION

Certificate No.: T0-2702044/25

Page 1 **of total** 2 **pages**
Customer

SGS (THAILAND) LIMITED (HEAD OFFICE)
238 TRR Tower, 19th - 21st Floor, Naradhiwas Rajanagarindra Road,
Chongnonsi, Yanawa, Bangkok 10120

Equipment

Digital Thermometer with Probe

Manufacturer

EUTECH

Model

PCTestr 35

Serial No.

3198807

ID No.

ENWA 24147

Description

Temperature range : 20 °C to 50 °C, Resolution of UUC : 0.1 °C

Environmental Conditions

Ambient Temperature: (23 ± 3) °C
Relative Humidity: (50 ± 15) %
Atmospheric Pressure: -

Calibration Location

Blue Devils Laboratory (TL)

Received Date

27 February 2025

Calibration Date

28 February 2025

Date of Issue

3 March 2025

Condition of Artifacts

Used conditions but can be calibrated

Checked by

Act as Technical Manager

Approved by

Representative of Managing Director

() (Krisyosl K.) () (Sakda Y.)
() (Patiphan K.) () (Onnapa P.)
(/) (Pongsak H.) () (Nitiphong K.)
() (Kanung C.) () (Nonthachai K.)
() (Pramong P.) () (Noppol P.)

(Dr. Ekachai Puttitwong)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.

Certificate No.: T0-2702044/25

Page 2 of total 2 pages
Reference Method:

- The calibration method used was CP-096 based on an in-house method.
- The temperature scale used was an ITS-90.
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard Instruments:

Type	Serial No.	Cert. No.	Due Date	Traceability
Thermometer Readout	B7C853	I0-2810001/24	Oct. 28, 2025	THC
Platinum Resistance Thermometer	4854	C0A30047	Oct. 22, 2025	FLUKE
Liquid Bath	XO111019	I0-2405001/23	May 25, 2025	THC

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- THC, Thai Heart Calibration Co., Ltd.
- FLUKE, Fluke Comporation, U.S.A.

Measurement Results: (X) Without Adjustment

Dimension of probe : Diameter 2 mm. Sensor Type : RTD (PT100)

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
70	20.00	20.0	0.00	0.065
70	30.00	30.0	0.00	0.065
70	50.00	50.0	0.00	0.065

UUC : Unit Under Calibration

The above reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -

Calibrated by Pongsak

REV.02 02/24/21

Certificate of Calibration
Customer

Name : SGS (Thailand) Limited.
Address : 238 TRR Tower, 19th-21st Floor, Naradhiwas Rajanagarindra Road,
Chong Nonsi, Yannawa, Bangkok 10120

Certificate No : 25-TPM-074

Request No : Req-2025-0133

Page : 1/2

Unit Under Calibration Details

Calibration Parameter : Temperature
Instrument Name : Area Heat Stress Monitor
Manufacturer : 3M
Model : QT-34
Serial Number : TEM030023
Resolution : 0.1 °C
ID Number : ENWP 087
Range Calibration : 25 °C to 45 °C
Type of Sensor : RTD
Sensor Diameter (mm) : 4.5
Calibration Position (mm) : 67.5
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 3 °C
Humidity : 55 %RH ± 15 %RH
Received Date : 16 January 2025
Calibrated Date : 6 February 2025
Calibration Procedure : In-house method CP-TPM-01 by Comparison with Standard Thermometer.

Reference Standard

Digital Thermometer with Sensor, Manufacturer: GINGO/GINGO, Model: GT11/ RTD100, SN: 08000057, ID: 02-TPM Which was calibrated on 1 March 2024, Calibration Certificate No. : QR24-0478

Traceability

This Certificate is traceable to SI Unit through Quality Reborn Co., Ltd., NSC-ONSC Accreditation No.: Calibration 0292

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k=2$, providing a level of confidence approximately 95 %.

Approved By :

Technical Manager

Issue Date :

6 February 2025

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FM-708-TPM-01 Rev.01 Issue date 13/02/20

Calibration Note

UUC Adjustment : Not Adjust

Certificate No : 25-TPM-074

Request No : Req-2025-0133

Page : 2/2

Result of Calibration :

UUC Sensor	Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
WET	25.033	25.0	0.0	0.13
	35.037	35.0	0.0	0.13
	45.039	45.0	0.0	0.13
DRY	25.032	24.9	+ 0.1	0.13
	35.035	34.9	+ 0.1	0.13
	45.041	45.0	0.0	0.13
GLOBE	25.033	25.0	0.0	0.13
	35.035	35.0	0.0	0.13
	45.038	45.0	0.0	0.13

End of Certificate

Calibrated By : 

Mr. Sutichon Jirapukdeesakul

Certificate of Calibration

Customer

Name : SGS (Thailand) Limited.

Address : 100 Nanglinchee Road, Chongnonsi, Yannawa Bangkok
10120

Certificate No : 24-TPM-412

Request No : Req-2024-1993

Page : 1/2

Unit Under Calibration Details

Calibration Parameter : Temperature

Instrument Name : Area Heat Stress Monitor

Manufacturer : 3M

Model : QT-34

Serial Number : TEM030027

Resolution : 0.1 °C

ID Number : ENWP 091

Range Calibration : 25 °C to 45 °C

Type of Sensor : RTD

Sensor Diameter (mm) : 4.5

Calibration Position (mm) : 67.5

Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 3 °C

Humidity : 55 %RH ± 15 %RH

Received Date : 27 August 2024

Calibrated Date : 9 September 2024

Calibration Procedure : In-house method CP-TPM-01 by Comparison with Standard Thermometer.

Reference Standard : Digital Thermometer with Sensor, Manufacturer: GINGO/GINGO, Model: GT11/ RTD100, SN: 08000057, ID: 02-TPM Which was calibrated on 1 March 2024, Calibration Certificate No.: QR24-0478

Traceability : This Certificate is traceable to SI Unit through Quality Reborn Co., Ltd., NSC-ONSC Accreditation No.: Calibration 0292

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k=2$, providing a level of confidence approximately 95 %.

Approved By : 

Mr. Noppa  Technical Manager

Issue Date : 9 September 2024



Calibration Note

UUC Adjustment : Not Adjust

Certificate No : 24-TPM-412

Request No : Req-2024-1993

Page : 2/2

Result of Calibration :

UUC Sensor	Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
WET	25.033	25.1	- 0.1	0.13
	35.036	35.1	- 0.1	0.13
	45.040	45.1	- 0.1	0.13
DRY	25.033	25.0	0.0	0.13
	35.036	35.0	0.0	0.13
	45.039	45.0	0.0	0.13
GLOBE	25.034	25.0	0.0	0.13
	35.036	35.0	0.0	0.13
	45.039	45.0	0.0	0.13

End of Certificate

Calibrated By : 
Mr. S. S. Sakul



Certificate of Calibration

Customer

Name : SGS (Thailand) Limited.
Address : 238 TRR Tower, 19th-21st Floor, Naradhiwas Rajanagarindra Road,
Chong Nonsi, Yannawa, Bangkok 10120

Certificate No : 25-TPM-075

Request No : Req-2025-0132

Page : 1/2

Unit Under Calibration Details

Calibration Parameter : Temperature
Instrument Name : Area Heat Stress Monitor
Manufacturer : 3M
Model : QT-34
Serial Number : TEM030028
Resolution : 0.1 °C
ID Number : ENWP 092
Range Calibration : 25 °C to 45 °C
Type of Sensor : RTD
Sensor Diameter (mm) : 4.5
Calibration Position (mm) : 67.5
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 3 °C
Humidity : 55 %RH ± 15 %RH
Received Date : 16 January 2025
Calibrated Date : 6 February 2025
Calibration Procedure : In-house method CP-TPM-01 by Comparison with Standard Thermometer.

Reference Standard

Digital Thermometer with Sensor, Manufacturer: GINGO/GINGO, Model: GT11/ RTD100, SN: 08000057, ID: 02-TPM Which was calibrated on 1 March 2024, Calibration Certificate No. : QR24-0478

Traceability

This Certificate is traceable to SI Unit through Quality Reborn Co., Ltd., NSC-ONSC Accreditation No.: Calibration 0292

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k=2$, providing a level of confidence approximately 95 %.

Approved By : 
Mr. Noppadon Luangart
Technical Manager

Issue Date : 6 February 2025



Calibration Note

UUC Adjustment : Not Adjust

Certificate No : 25-TPM-075

Request No : Req-2025-0132

Page : 2/2

Result of Calibration :

UUC Sensor	Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
WET	25.033	25.1	- 0.1	0.13
	35.037	35.1	- 0.1	0.13
	45.039	45.1	- 0.1	0.13
DRY	25.032	24.9	+ 0.1	0.13
	35.035	34.9	+ 0.1	0.13
	45.041	44.9	+ 0.1	0.13
GLOBE	25.033	24.9	+ 0.1	0.13
	35.035	34.9	+ 0.1	0.13
	45.038	44.9	+ 0.1	0.13

End of Certificate

Calibrated By :

Mr.

Certificate of Calibration

Certificate No.: WK2502-400-350

Page 1 of 2

Customer : SGS (Thailand) Limited (Head Office)
 238 TRR Tower, 19th – 21st Floor, Naradhiwas Rajanagarindra Road,
 Chong Nonsi, Yannawa, Bangkok 10120

Instrument : DIGITAL LIGHT METER
Manufacturer : EXTECH
Model : 407026
Serial No. : A.056459
Identity No. : ENWP22214
Range : See to data
Resolution : See to data
Calibration Method : CP-WK-PR04

Ambient Temperature : (23 ± 2) °C
Humidity : (50 ± 15) %RH
Received Date : 10-Feb-25
Calibrated Date : 17-Feb-25
Issued Date : 18-Feb-25
Calibrated Location : In Lab

Reference standard instruments :

Instrument	Serial No.	Certificate No.	Due Date	Traceability to
Standard Light Meter	S.008960	23PH676	28-Feb-25	TPA

TPA : Technology Promotion Association (Thailand-Japan)
 This result calibrate was found accurate as shown on date place of calibrate only
 This certificate is traceability to the International System of Unit (SI)

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

Calibrated by : Mr.Chotiwat Thanakulphan

Approved by :

Mr. [Redacted]

Authorized Signatory

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Calibration Results

Certificate No. : WK2502-400-350

Page 2 of 2

Calibration Result of the Accuracy

Function : Light Measurement

Unit : lux				
Range	STD Setting	UUC Reading	Error	Uncertainty (± lux)
2000	0	0	0	0.82
	50	49	-1	1.6
	250	251	1	6.5
	500	508	8	13
	1000	1021	21	26
	1950	1964	14	47
20000	2000	2010	10	48
	3000	2980	-20	72
	4000	3960	-40	96
	5000	4930	-70	0.12 klux

(X) Without Adjustment () After Adjustment

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**** End of Certificate****