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ภาคผนวก ข

สำเนาใบรับรองการสอบเทียบเครื่องมือตรวจวัด

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คุณภาพอากาศจากปล่องระบาย

# HORIBA

## HORIBA (THAILAND) LIMITED

46/6 Rungrojthanakul Bld., 1<sup>st</sup>, 2<sup>nd</sup> 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	Calibration Date	4-Dec-23
Model	HORIBA PG-350	Background	1
Serial Number	V40KVOLD	Coefficient	0.9586
		Room Temperature	25 °C

#### Standard Gas Information

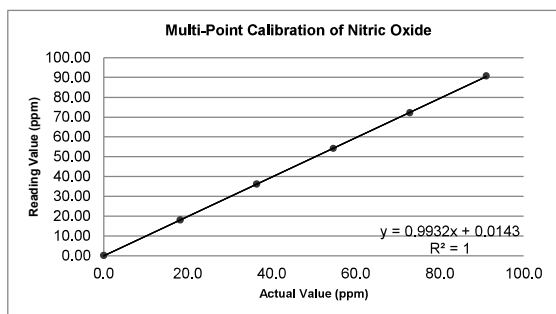
Zero Gas		Span Gas	
Cylinder Number	MLC89198	Cylinder Number	ND27163
Component	N2	Component	NO
Concentration	99.999 %	Concentration	91.06 ppm
Expiration Date	-	Expiration Date	25-Jan-30
		Measurement Range	100
		% Measurement Range	91.06

#### Multi-Point Gas Test Data

Level	Actual Value	Reading Value (ppm)				Difference	
		1	2	3	Average	ppm	%
0%	0.0	0.1	0.2	0.2	0.17	0.17	
20%	18.21	18.10	18.00	18.00	18.03	-0.18	0.98
40%	36.42	36.00	36.20	36.40	36.20	-0.22	0.61
60%	54.64	54.20	54.20	54.00	54.13	-0.50	0.92
80%	72.85	72.30	72.10	72.00	72.13	-0.71	0.98
100%	91.06	90.60	91.10	90.50	90.73	-0.33	0.36
					Average	0.77	
					Result	PASS	

Slope	0.9932	Interception	0.0143	Correlation Coefficient	1.0000
%Slope	-0.6830%	% Interception	0.0143%	% Correlation Coefficient	-0.0016%
Result	PASS	Result	PASS	Result	PASS

#### Multi-Point Gas Test Chart



Test By

Date

6-Dec-23

Approve By

Date

6-Dec-23

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### MULTI-POINT GAS TEST REPORT OF SULFUR DIOXIDE

#### Equipment Information

Manufacturer	Horiba	Calibration Date	4-Dec-23
Model	HORIBA PG-350	Background	1
Serial Number	V40KVOLD	Coefficient	1.2388
		Room Temperature	25 °C

#### Standard Gas Information

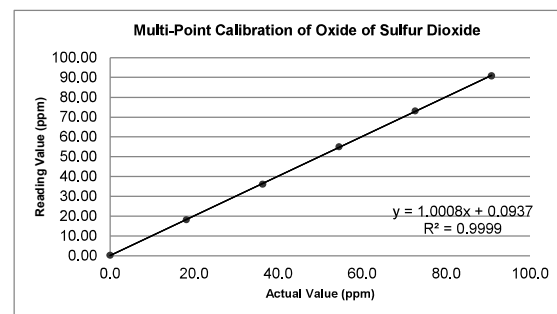
Zero Gas		Span Gas	
Cylinder Number	MLC89198	Cylinder Number	ND27163
Component	N2	Component	SO2
Concentration	99.999 %	Concentration	90.82 ppm
Expiration Date	-	Expiration Date	25-Jan-30
		Measurement Range	200
		% Measurement Range	45.41

#### Multi-Point Gas Test Data

Level	Actual Value	Reading Value (ppm)				Difference	
		1	2	3	Average	ppm	%
0%	0.0	0.2	0.2	0.4	0.27	0.27	
20%	18.16	18.10	18.20	18.00	18.10	-0.06	0.35
40%	36.33	36.80	35.20	36.20	36.07	-0.26	0.72
60%	54.49	55.00	54.80	55.10	54.97	0.47	0.87
80%	72.66	73.40	73.10	72.80	73.10	0.44	0.61
100%	90.82	90.70	90.70	90.80	90.73	-0.09	0.10
					Average	0.53	
					Result	PASS	

Slope	1.0008	Interception	0.0937	Correlation Coefficient	1.0000
%Slope	0.0776%	% Interception	0.0468%	% Correlation Coefficient	-0.0041%
Result	PASS	Result	PASS	Result	PASS

#### Multi-Point Gas Test Chart



Test By

Date

6-Dec-23

Approve By

Date

6-Dec-23

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### MULTI-POINT GAS TEST REPORT OF CARBON MONOXIDE

#### Equipment Information

Manufacturer	Horiba	Calibration Date	4-Dec-23
Model	HORIBA PG-350	Background	0
Serial Number	V40KV0LD	Coefficient	1.3513
		Room Temperature	25 °C

#### Standard Gas Information

Zero Gas		Span Gas	
Cylinder Number	MLC89198	Cylinder Number	ND27163
Component	N2	Component	CO
Concentration	99.999 %	Concentration	89.58 ppm
Expiration Date	-	Expiration Date	25-Jan-30

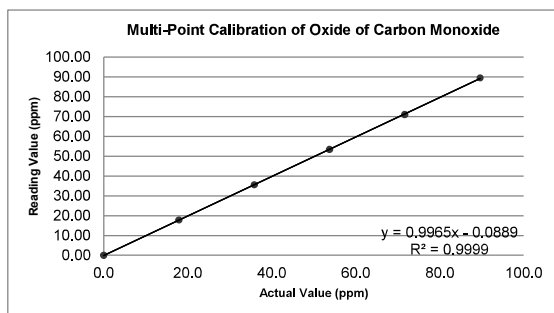
Measurement Range	200
% Measurement Range	44.79

#### Multi-Point Gas Test Data

Level	Actual Value	Reading Value (ppm)				Difference	
		1	2	3	Average	ppm	%
0%	0.0	0.1	0.0	0.0	0.03	0.03	
20%	17.92	17.80	17.70	17.80	17.77	-0.15	0.83
40%	35.83	35.40	35.60	35.80	35.60	-0.23	0.65
60%	53.75	53.40	53.30	53.40	53.37	-0.38	0.71
80%	71.66	71.10	71.00	70.80	70.97	-0.70	0.97
100%	89.58	89.60	89.10	89.90	89.53	-0.05	0.05
Average						0.64	
Result						PASS	

Slope	0.9965	Interception	-0.0889	Correlation Coefficient	1.0000
%Slope	-0.3498%	% Interception	-0.0444%	% Correlation Coefficient	-0.0025%
Result	PASS	Result	PASS	Result	PASS

#### Multi-Point Gas Test Chart



Test By

Date 6-Dec-23

Approve By

Date 6-Dec-23

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### MULTI-POINT GAS TEST REPORT OF CARBON DIOXIDE

#### Equipment Information

Manufacturer	Horiba	Calibration Date	4-Dec-23
Model	HORIBA PG-350	Background	2
Serial Number	V40KV0LD	Coefficient	1.0326
		Room Temperature	25 °C

#### Standard Gas Information

Zero Gas		Span Gas	
Cylinder Number	MLC89198	Cylinder Number	ND11246
Component	N2	Component	CO2
Concentration	99.999 %	Concentration	21.02 %
Expiration Date	-	Expiration Date	8-Aug-30

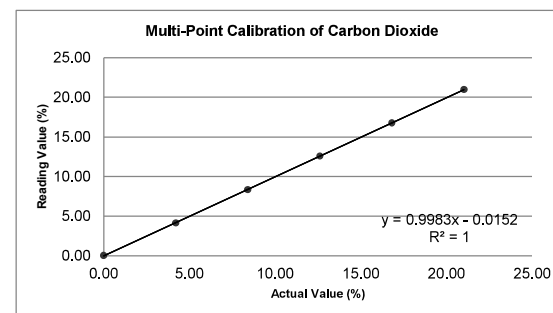
Measurement Range	30
% Measurement Range	70.07

#### Multi-Point Gas Test Data

Level	Actual Value	Reading Value (%)				Difference	
		1	2	3	Average	%	%
0%	0.00	0.01	0.03	0.05	0.03	0.03	
20%	4.20	4.20	4.15	4.11	4.15	-0.05	1.21
40%	8.41	8.30	8.30	8.40	8.33	-0.07	0.89
60%	12.61	12.60	12.59	12.58	12.59	-0.02	0.17
80%	16.82	16.80	16.78	16.71	16.76	-0.05	0.31
100%	21.02	21.01	20.96	21.00	20.99	-0.03	0.14
Average						0.54	
Result						PASS	

Slope	0.9983	Interception	-0.0152	Correlation Coefficient	1.0000
%Slope	-0.1722%	% Interception	-0.0508%	% Correlation Coefficient	-0.0009%
Result	PASS	Result	PASS	Result	PASS

#### Multi-Point Gas Test Chart



Test By

Date 6-Dec-23

Approve By

Date 6-Dec-23



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Website : http://www.horiba.com

### MULTI-POINT GAS TEST REPORT OF OXYGEN

#### Equipment Information

Manufacturer	Horiba	Calibration Date	4-Dec-23
Model	HORIBA PG-350	Background	30
Serial Number	V40KV0LD	Coefficient	1.0183
		Room Temperature	25 °C

#### Standard Gas Information

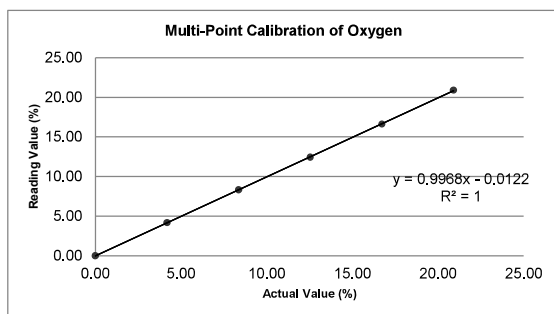
Zero Gas		Span Gas	
Cylinder Number	MLC89198	Cylinder Number	GN0018534
Component	N2	Component	O2
Concentration	99.999 %	Concentration	20.9 %
Expiration Date	-	Expiration Date	14-Feb-27
		Measurement Range	25
		% Measurement Range	83.6

#### Multi-Point Gas Test Data

Level	Actual Value	Reading Value (%)				Difference	
		1	2	3	Average	%	%
0%	0.00	0.00	0.01	0.00	0.00	0.00	
20%	4.18	4.20	4.17	4.16	4.18	0.00	0.08
40%	8.36	8.33	8.34	8.30	8.32	-0.04	0.44
60%	12.54	12.38	12.42	12.46	12.42	-0.12	0.96
80%	16.72	16.58	16.60	16.67	16.62	-0.10	0.62
100%	20.90	20.85	20.87	20.94	20.89	-0.01	0.06
					Average	0.43	
					Result	PASS	

Slope	0.9968	Interception	-0.0122	Correlation Coefficient	1.0000
%Slope	-0.3190%	% Interception	-0.0489%	% Correlation Coefficient	-0.0018%
Result	PASS	Result	PASS	Result	PASS

#### Multi-Point Gas Test Chart



Test By

Date

6-Dec-23

Approve By

Date

6-Dec-23

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### LOWER DETECTABLE LIMIT TESTING REPORT

#### Equipment Information

Manufacturer	Horiba	Calibration Date	4-Dec-23
Model	HORIBA PG-350	Room Temperature	25 °C
Serial Number	V40KV0LD		

#### Standard Gas Information

Zero Gas		Component	N2
Cylinder Number	MLC89198	Concentration	99.999 %

Parameters	Measruement Range	Unit	Background	Coefficient
NO	100	ppm	1	0.9586
SO <sub>2</sub>	200	ppm	1	1.2388
CO	200	ppm	0	1.3513
CO <sub>2</sub>	30	%	2	1.0326
O <sub>2</sub>	25	%	30	1.0183

#### TESTING REPORT RESULTS

Parameters	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>	8 <sup>th</sup>	9 <sup>th</sup>	10 <sup>th</sup>	STDEV.
NO	0.20	0.10	0.20	0.20	0.20	0.30	0.20	0.30	0.20	0.40	0.082
SO <sub>2</sub>	0.10	0.10	0.20	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.042
CO	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.10	0.032
CO <sub>2</sub>	0.02	0.02	0.02	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.006
O <sub>2</sub>	0.10	0.06	0.01	0.00	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	0.044

#### Conclusion

NO Lower detectable limit (LDL) value is	0.082	ppm
SO <sub>2</sub> Lower detectable limit (LDL) value is	0.042	ppm
CO Lower detectable limit (LDL) value is	0.032	ppm
CO <sub>2</sub> Lower detectable limit (LDL) value is	0.006	% Vol.
O <sub>2</sub> Lower detectable limit (LDL) value is	0.044	% Vol.

Test By

Date

6-Dec-23

Approve By

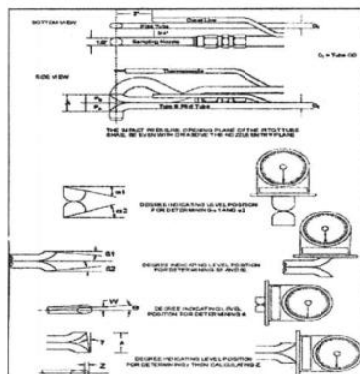
Date

6-Dec-23



# 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.44/A8470

Parameter	Value	Allowable Range	Check
Assembly Level?	Y	Yes or y	PASS
Ports Damaged?	N	No or n	PASS
$\alpha 1$	0.4	$-10^\circ < \alpha 1 < +10^\circ$	PASS
$\alpha 2$	-0.6	$-10^\circ < \alpha 1 < +10^\circ$	PASS
$\beta 1$	-0.6	$-5^\circ < \alpha 1 < +5^\circ$	PASS
$\beta 2$	0.5	$-5^\circ < \alpha 1 < +5^\circ$	PASS
$\gamma$	-2.2	N/A	-
$\theta$	-0.4	N/A	-
$D_t$	0.375	0.188" to 0.375"	PASS
A	0.888976	$2.10_t \leq A \leq 3.00_t$	PASS
A/2D <sub>t</sub>	1.185302	$1.05 \leq P_A/D_t \leq 1.5$	PASS
Z = A tan $\gamma$	-0.03415	Z $\leq 0.125$ "	PASS
W = A tan $\theta$	-0.00621	W $\leq 0.031$ "	PASS

I certify that pitot tube/probe No.44/A8470 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 Indinometer  
Manufacturer BASELINE  
Model 12-1057  
ID No. QC-1824

Expiration data 18-Dec-24  
ENSS No. ENSS 22159

Certified by [Signature]  
Date 8-Jan-24

Approved by [Signature]  
Date 8 Jan 24



## Meter Console Verification

Dry Gas Meter ID. : ENSS 046  
Instrument Brand : Apex / Model 572

Date of Calibration : 08/10/2023  
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 : August 30, 2025

Orifice Setting $\Delta H@$ (mm H <sub>2</sub> O)	Wet gas		Metering System		Time (min)	Yi	$\Delta H@$
	V <sub>w</sub> (L)	T <sub>w</sub> (°C)	V <sub>d</sub> (L)	T <sub>m</sub> (°C)			
13	137.32	22.5	140.0	23.0	11.95	0.9814	45.956
13	137.34	22.3	140.0	23.5	12.00	0.9837	46.203
26	135.54	22.2	140.0	24.0	8.28	0.9716	45.157
26	135.78	22.2	140.0	24.0	8.30	0.9735	45.163
40	270.30	22.1	280.0	24.0	13.87	0.9680	48.970
40	270.18	22.0	280.0	24.0	13.85	0.9677	48.879
50	269.20	22.0	280.0	24.0	12.12	0.9633	47.150
50	268.62	21.5	280.0	25.0	12.08	0.9662	46.760
70	265.68	21.9	280.0	25.0	10.03	0.9524	46.371
70	266.14	21.9	280.0	25.0	10.02	0.9540	46.057
90	265.64	21.9	280.0	25.0	8.83	0.9504	46.314
90	265.94	21.9	280.0	25.0	8.82	0.9515	46.035
Average						0.9653	46.585

Remark :  
Yi  $\leq \pm 0.02$  from average  
Yi =  $1.00 \pm 0.05$   
 $\Delta H@ \leq \pm 5.08$  mm.H<sub>2</sub>O from average  
 $\Delta H@ = 46.7 \pm 6.4$  mm.H<sub>2</sub>O

Checked By : [Signature]  
Position : Store Manager  
Date : 09/10/2023

Approved By : [Signature]  
Position : Technical Manager  
Date : 09/10/2023





### Temperature Display Verification

Dry Gas Meter ID. : ENSS 046 Date of Calibration : 8/10/2023  
Instrument Brand : Apex / Model 572 Calibrated By : MW

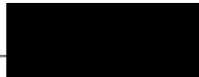
#### Temperature Simulator Information

Simulator Brand : Handy Cal Simulator S/N : T1L1015  
Simulator Model : CA11E Expire Date : 11/07/2024

Standard Value	Instrument Display				
	Stack	Probe	Filter	Aux	Exit
300	301	300	301	300	-
200	200	201	200	201	-
150	150	150	150	151	-
100	100	100	100	100	101
50	50	50	50	51	50
0	0	0	0	0	0
Difference	0.1%	1.0	1.0	1.0	1.0

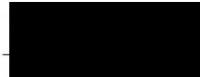
Remark : Stack  $\leq \pm 1.5\%$  Absolute Aux  $\leq \pm 3.0\text{ }^{\circ}\text{C}$   
Probe  $\leq \pm 3.0\text{ }^{\circ}\text{C}$  Exit  $\leq \pm 3.0\text{ }^{\circ}\text{C}$   
Filter  $\leq \pm 3.0\text{ }^{\circ}\text{C}$

Checked By :



Position : Store Manager  
Date : 09/10/2023

Approved By :



Position : Technical Manager  
Date : 09/10/2023



### Manometer Verification

Dry Gas Meter ID. : ENSS 046 Date of Calibration : 8/10/2023  
Instrument Brand : Apex / Model 572 Calibrated By : MW

#### Magnehelic gauge Information

Magnehelic Brand : Dwyer Industries, Inc. Magnehelic S/N : R060822A1109  
Magnehelic Model : 2000-100MM Expire Date : 2/10/2023

Manometer data				
Test No.	Manometer Reference $\Delta P$ (mm.H2O);A	Manometer monitoring $\Delta P$ (mm.H2O);B	Difference	Reference/Monitoring A/B
1	2.0	2.0	0.00	1.00
2	6.0	5.8	0.00	1.03
3	10.0	9.8	0.40	1.02
4	16.0	15.8	0.20	1.01
5	20.0	19.8	0.20	1.01
Average			0.16	1.01

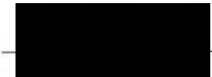
Remark : [ Reference(Avg) / Monitoring(Avg) ] must be = 0.95 to 1.05

Checked By :

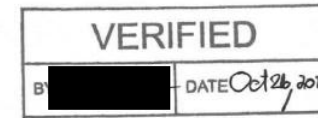


Position : Store Manager  
Date : 09/10/2023

Approved By :



Position : Technical Manager  
Date : 09/10/2023



คุณภาพอากาศในบรรยากาศ



Agilent Technologies (Thailand) Limited  
U CHU LIANG BLDG. 22/F UNIT A,D  
968 RAMA 4 ROAD, SILOM, BANGRAK  
Bangkok 10500 Thailand

Tel. +662 637 6363  
Fax: +662 632 4334  
Email: [ccc-smt@agilent.com](mailto:ccc-smt@agilent.com)  
Website: [www.agilent.com/chem](http://www.agilent.com/chem)

Service Confirmation Number: 6904997715  
Service Confirmation Date: 28.06.2023

#### Customer Contact:

SGS (Thailand) Limited  
Branch 00003  
1/209 1/211 Moo 1 T Bangchang  
A Banchang  
RAYONG 21130  
TAX ID : 0105532106079  
Saijai.Ruangsawat@sgs.com  
038-685 260-4

#### Invoice To:

SGS (Thailand) Limited  
Branch 00003  
1/209 1/211 Moo 1 T Bangchang A  
Banchang RAYONG 21130

#### Delivery Site:

SGS (Thailand) Limited  
Branch 00003  
1/209 1/211 Moo 1 T Bangchang  
A Banchang  
RAYONG 21130

#### Location:

Room  
Bldg  
Lab  
Dept

### SERVICE REPORT

<b>Customer Purchase Order Number:</b>	<b>Customer Number:</b> 70205138
<b>Service Request:</b>	<b>Service Request Date:</b>
<b>Service Order:</b> 6006193099	<b>Service Confirmation:</b> 6904997715

#### Direct Inquiries to:

Contact Name: Customer Contact Center  
Contact E-mail: [ccc-smt@agilent.com](mailto:ccc-smt@agilent.com)  
Contact Telephone: +662 637 6363  
Contact Fax: +662 632 4334

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THB:Krung Thai Bank PCL  
Siam Square Br.,416/1-2 Rama I Rd.,Pathumwan, BKK 10330  
Thailand

#### Service Instrument:

Model Number	Model Description	Serial Number	System Handle	Parent Asset
SYS-GM-5973T	GCMS 5973 Turbo System			
G2579A	5973 Inert MSD Perform Turbo EI Mainfrm	US30965023		SYS-GM-5973T
G1530N	6890N Network GC System	CN10305014	G2004002	SYS-GM-5973T

#### Service Items:



Item	Service/Part #	Description	Qty	Entitlement	Service Start	Service End
1000	PM	Preventive Maintenance	1.00	Agreement Entitlement - 100 % covered	27.06.2023	27.06.2023
1010	5188-6496	QuickPick Split Vent + Inlet PM Kit	1.00	Agreement Entitlement - 100 % covered		
1020	5188-6497	QuickPick Splitless Inlet/Vent PM Kit	1.00	Agreement Entitlement - 100 % covered		
1030	5191-5851	Agilent Vacuum Fluid 45 Platinum, 1Qt	1.00	Agreement Entitlement - 100 % covered		
1050	G1099-80039	Oil Mist Filter, 3/8 BSP Male Threads	1.00	Agreement Entitlement - 100 % covered		

#### Additional Information:

**Service Confirmation Number:** 6904997715

**Service Confirmation Date:** 28.06.2023

**Service Information:**

<b>Problem Description:</b> NR-C-PM-GM5973-5001151743		
<b>Service Provided:</b> PM 6890N/5973 MSD. Clean source and replace all consumable parts.		
<b>Service Overview Code:</b> Reason Code: Scheduled Service Diagnosis Code: Scheduled Service Resolution Code: Scheduled Service		
<b>Reported Hours:</b> 5.0	<b>Travel Hours:</b> 2.0	
<b>Customer Field Service Representative Name:</b> Eaknarin Puangsopa	<b>Customer Field Service Representative Signature:</b> 	<b>Date:</b> 28 Jun 2023
<b>Customer Name:</b> Kritsana Longbangplee	<b>Customer Signature:</b> 	<b>Date:</b> 28 Jun 2023
<b>Additional Comments:</b>		



บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

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

รายชื่ออุปกรณ์ / เครื่องมือ : NO<sub>x</sub> Analyzer

รุ่นของอุปกรณ์ / เครื่องมือ : T200

วันที่ : 29 มิถุนายน 2566

บริษัทผู้ผลิต : Teledyne API

หมายเลขอุปกรณ์ / เครื่องมือ : 2975

TEST VALUES			
API MODEL T200		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	STABILITY	≤ 1 PPB	0.1
3	SAMPLE FLOW	500 ± 10% cc/min	488
4	OZONE FLOW	80 ± 10% cc/min	78
5	PMT	mV	457.0
6	NORM PMT	mV	510.9
7	A ZERO	-20 To 150 MV	270.7
8	HPVS	400 - 900 V	795
9	RX CELL TEMP	50 ± 1 °C	50.0
10	BOX TEMP	AMBIENT ± 5 °C	34.7
11	PMT TEMP	7 ± 2 °C	7.5
12	MOLY TEMP	315 ± 5 °C	315.6
13	RX CELL PRESSURE	<10 in - Hg-A	9.6
14	SAMPLE PRESSURE	25 - 35 in - Hg-A	28.3
15	NOX SLOPE	1.0 ± 0.3	1.519
16	NOX OFFSET	-50 To 150	260.5
17	NO SLOPE	1.0 ± 0.3	1.320
18	NO OFFSET	-50 To 150	257.0
19	NO SAMPLE READING	PPB	156.0
20	NO2 SAMPLE READING	PPB	47.1
21	NOX SAMPLE READING	PPB	202.4
22	OPTIC TEST	2000 ± 1000 mV	1880.8
23	ELECTRICAL TEST	2000 ± 1000 mV	2096.0
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.28 / 12.21 / 15.73 / -15.17
25	ZERO GAS NO/NO <sub>x</sub>	0.00/0.00 PPB	134.2 / 153.1
26	SPAN GAS NO/NO <sub>x</sub>	400.00/400.00 PPB	652.5 / 739.8

#### หมายเหตุ

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

- ตรวจเช็คพบว่า A ZERO WARNING เนื่องจากหลอด PMTเสื่อมสภาพ ทำการเปลี่ยน หลอด CD PMT 1 หลอด

VERIFIED

BY

DATE

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณพรชัย หาดิวนารักษ์

โทรศัพท์ : 0-2515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทราภิรม 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<sub>x</sub> Analyzer

MANUFACTURER : Teledyne - API

MODEL : T200

SERIAL NO : 2975

STANDARD GAS CONCENTRATION (PPM) : 53.40

CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) : 1400

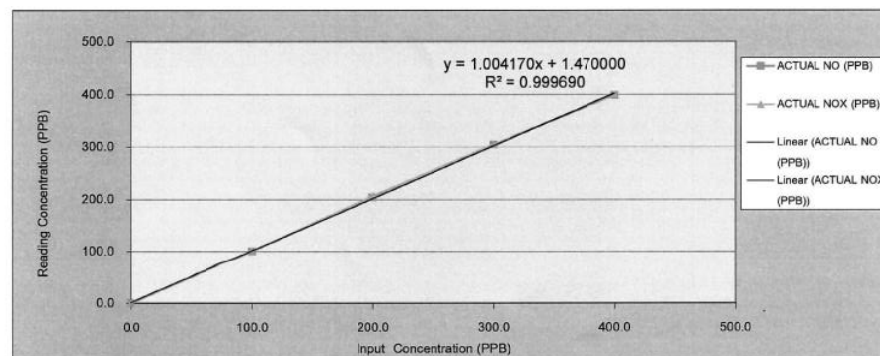
CERTIFIED DATE : Mar 10, 2021

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 <sub>x</sub> (PPB)	ERROR NO <sub>x</sub> (PPB)	% ERROR NO <sub>x</sub>
ZERO	0.0	0.1	0.1	-	0.1	0.1	-
1	100.0	100.5	0.5	0.5	100.5	0.5	0.5
2	200.0	204.2	4.2	2.1	206.2	6.2	3.1
3	300.0	304.1	4.1	1.4	304.6	4.6	1.5
4	400.0	399.1	-0.86	-0.1	400.1	0.1	0.0
AVERAGE (%)				1.0			1.3



CALIBRATED BY :

DATE : 29 มิถุนายน 2566

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิคเพิ่มเติม :

โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทราภิรม 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	Equipment	Model
Teledyne API	NOx Analyzer	T200
S/N	Quotation	
2975	Q-B2-2023-125-SV	

● Checking Date ●

29/6/2023

● Problem

- ตรวจเช็คพบว่าเครื่องมีอาการ A ZERO WARNING เนื่องจากหลอด CD PMT เสื่อมสภาพ



B2



contact us



● Correlation working / Remark

1. ทำการเปลี่ยน หลอด CD PMT
2. ทำการเปลี่ยนวัสดุสิ้นเปลือง Sintered Filter , O-ring , Spring
3. จากการทดสอบการลองใช้งานเครื่อง \*เครื่องสามารถทำงานปกติ

● Repair parts ●

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

ASSY, PMT, LOW DARK CURR/HI GAIN, NOx Ultra / PN:022890000 จำนวน 1 ชิ้น

Technician / Engineer

**CERTIFICATE OF ANALYSIS**

**Grade of Product: EPA Protocol**

Part Number:	E04NI99E15A0622	Reference Number:	160-402045691-1
Cylinder Number:	CC745169	Cylinder Volume:	144.4 CF
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
PGVP Number:	A12021	Valve Outlet:	660
Gas Code:	CO,NO,NOX,SO2,BALN	Certification Date:	Mar 10, 2021

Expiration Date: Mar 10, 2029

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/031, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty at 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.

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	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	G1	+/- 0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	+/- 0.6% NIST Traceable	03/03/2021, 03/10/2021
NITROGEN	Balance				03/04/2021

CALIBRATION STANDARDS				
Type	Lot ID	Cylinder No	Concentration	Uncertainty
NTRM	07060227	EB0079116	100.3 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%
PRM	12386	D685025	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%
GMIS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%
NTRM	16010203	KAL003087	97.69 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.9%
NTRM	08012341	KAL004716	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%

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	Feb 26, 2021
Nicolet IS60 FTR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet IS50 FTR AUP2010245 NO2	FTIR	Feb 22, 2021
Nicolet IS50 FTR AUP2010245 SO2	FTIR	Feb 18, 2021

Triad Data Available Upon Request

NOTES:

Gross Weight: 28.1 Kg

Net Weight: 4.6 Kg



Approved for Release





บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

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

รายชื่ออุปกรณ์ / เครื่องมือ : NO<sub>x</sub> Analyzer

รุ่นของอุปกรณ์ / เครื่องมือ : T200

วันที่ : 27 กุมภาพันธ์ 2566

บริษัทผู้ผลิต : Teledyne API

หมายเลขอุปกรณ์ / เครื่องมือ : 7533

TEST VALUES			
API MODEL T200		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	STABILITY	≤ 1 PPB	0.08
3	SAMPLE FLOW	500 ± 10% cc/min	503
4	OZONE FLOW	30 ± 10% cc/min	86
5	PMT	mV	27.5
6	NORM PMT	mV	0.6
7	A ZERO	-20 To 150 MV	28.0
8	HPVS	400 - 900 V	660
9	RX CELL TEMP	50 ± 1 °C	50.1
10	BOX TEMP	AMBIENT ± 5 °C	33.4
11	PMT TEMP	7 ± 2 °C	6.8
12	MOLY TEMP	315 ± 5 °C	315.2
13	RX CELL PRESSURE	<10 in - Hg-A	7.7
14	SAMPLE PRESSURE	25 - 35 in - Hg-A	28.9
15	NOX SLOPE	1.0 ± 0.3	1.295
16	NOX OFFSET	-50 To 150	6.0
17	NO SLOPE	1.0 ± 0.3	1.303
18	NO OFFSET	-50 To 150	-0.2
19	NO SAMPLE READING	PPB	19.5
20	NO2 SAMPLE READING	PPB	23.5
21	NOX SAMPLE READING	PPB	42.5
22	OPTIC TEST	2000 ± 1000 mV	1789.2
23	ELECTRICAL TEST	2000 ± 1000 mV	2040.1
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.12 /12.13/ 15.10/ -15.32
25	ZERO GAS NO/NO <sub>x</sub>	0.00/0.00 PPE	-6.9 /-7.7
26	SPAN GAS NO/NO <sub>x</sub>	400.00/400.00 PPB	394.8/ 393.0

หมายเหตุ

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



ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณพรชัย ผาติวนารักษ์ โทรศัพท์ : 0-2515-8987

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

MULTI POINT CALIBRATION REPORT

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

EQUIPMENT NAME : NO<sub>x</sub> Analyzer

MANUFACTURER : Teledyne - API

MODEL : T200

SERIAL NO : 7533

STANDARD GAS CONCENTRATION (PPM) : 53.40

CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) : 1550

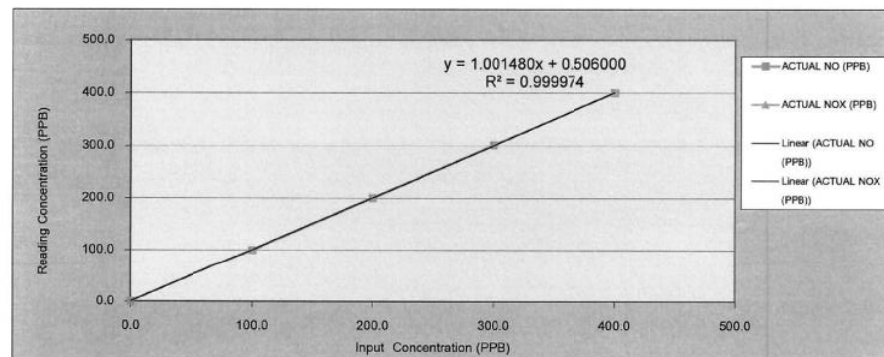
CERTIFIED DATE : Mar 10, 2021

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 <sub>x</sub> (PPB)	ERROR NO <sub>x</sub> (PPB)	% ERROR NO <sub>x</sub>
ZERO	0.0	0.0	0.0	0.0	0.0	0.1	0.0
1	100.0	99.8	-0.2	-0.2	100.8	0.8	0.8
2	200.0	200.0	-0.7	0.0	201.0	1.0	0.5
3	300.0	301.1	1.1	0.4	302.1	2.1	0.7
4	400.0	399.9	-0.1	0.0	400.1	0.1	0.0
AVERAGE (%)				0.0			0.0



CALIBRATED BY : คุณพรชัย ผาติวนารักษ์

DATE : 27 /02 /2566

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิคเพิ่มเติม : คุณพรชัย ผาติวนารักษ์ โทรศัพท์ : 02-515-8987

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

# **CERTIFICATE OF ANALYSIS** **Grade of Product: EPA Protocol**

Part Number: E04NI99E15A0622 Reference Number: 160-402045691-1  
Cylinder Number: CC745169 Cylinder Volume: 144.4 CF  
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2015 PSIG  
PGVP Number: A12021 Valve Outlet: 660  
Gas Code: CO,NO,NOX,SO2,BALN Certification Date: Mar 10, 2021

Expiration Date: Mar 10, 2029

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.  
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	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	G1	+/- 0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	+/- 0.6% NIST Traceable	03/04/2021
NITROGEN	Balance				

CALIBRATION STANDARDS				
Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	07080227	EB0079116	100.3 PPM NITRIC OXIDE/NITROGEN	+/- 1.0% Jul 23, 2023
PRM	12386	D685025	5.91 PPM AIR/NITROGEN DIOXIDE	2.0% Feb 20, 2020
GMIS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1% Aug 15, 2021
NTRM	16010203	KAL003087	57.69 PPM SULFUR DIOXIDE/NITROGEN	+/-0.8% Dec 23, 2021
NTRM	08012341	KAL004716	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6% Jun 07, 2024

The SRM, PRM or RQM 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	Feb 26, 2021
Nicolet IS50 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet IS50 FTIR AUP2010245 NO2	FTIR	Feb 22, 2021
Nicolet IS50 FTIR AUP2010245 SO2	FTIR	Feb 16, 2021

Triad Data Available Upon Request

## NOTES:

Gross Weight: 28.1 Kg  
Net Weight: 4.6 Kg



Approved for Release

Page 1 of 160-402045691-1

## รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

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

รายชื่ออุปกรณ์ / เครื่องมือ : NO<sub>x</sub> Analyzer

รุ่นของอุปกรณ์ / เครื่องมือ : T200

วันที่ : 7 กุมภาพันธ์ 2565

บริษัทผู้ผลิต : Teledyne API

หมายเลขอุปกรณ์ / เครื่องมือ : 7533

TEST VALUES			
	API MODEL T200	BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500
2	STABILITY	≤ 1 PPB	0.12
3	SAMPLE FLOW	500 ± 10% cc/min	496
4	OZONE FLOW	80 ± 10% cc/min	87
5	PMT	mV	9.8
6	NORM PMT	mV	-33.4
7	A ZERO	-20 To 150 MV	45.2
8	HPVS	400 - 900 V	660
9	RX CELL TEMP	50 ± 1 °C	50.1
10	BOX TEMP	AMBIENT ± 5 °C	33.4
11	PMT TEMP	7 ± 2 °C	6.8
12	MOLY TEMP	315 ± 5 °C	313.9
13	RX CELL PRESSURE	<10 in - Hg-A	4.1
14	SAMPLE PRESSURE	25 - 35 in - Hg-A	28.6
15	NOX SLOPE	1.0 ± 0.3	0.992
16	NOX OFFSET	-50 To 150	-5.4
17	NO SLOPE	1.0 ± 0.3	0.966
18	NO OFFSET	-50 To 150	-6.4
19	NO SAMPLE READING	PPB	-12.7
20	NO2 SAMPLE READING	PPB	8.8
21	NOX SAMPLE READING	PPB	-3.8
22	OPTIC TEST	2000 ± 1000 mV	2249
23	ELECTRICAL TEST	2000 ± 1000 mV	2039
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	-
25	ZERO GAS NO/NO <sub>x</sub>	0.00/0.00 PPB	-9.1 / -7.1
26	SPAN GAS NO/NO <sub>x</sub>	400.00/400.00 PPB	378.9 / 326.6

หมายเหตุ

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บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

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

รายชื่ออุปกรณ์ / เครื่องมือ : SO<sub>2</sub> Analyzer

รุ่นของอุปกรณ์ / เครื่องมือ : T100

วันที่ : 20 พฤศจิกายน 2566

บริษัทผู้ผลิต : Teledyne API

หมายเลขอุปกรณ์ / เครื่องมือ : 2512

TEST VALUES			
API MODEL T100		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500
2	STABILITY	≤ 1 PPB	0.24
3	PRESSURE	25 - 35 in - Hg-A	28.5
4	SAMPLE FLOW	650 ± 10% cc/min	676.4
5	PMT	mV	100.8
6	NORM PMT	mV	53.4
7	UV LAMP	1200 - 4800 mV	3012.0
8	LAMP RATIO	30 To 120 %	91.3
9	STRAY LIGHT	≤ 100 PPB	47.2
10	DARK PMT	-50 ± 200 % mV	54.1
11	DARK LAMP	-50 ± 200 % mV	2.2
12	SO <sub>2</sub> SLOPE	1.0 ± 0.3	1.766
13	SO <sub>2</sub> OFFSET	< 250 mV	53.4
14	HVPS	430 - 900 V	577
15	RX CELL TEMP	50 ± 1 °C	50.0
16	BOX TEMP	AMBIENT ± 5 °C	30.2
17	PMT TEMP	7 ± 2 °C	8.5
18	SO <sub>2</sub> SAMPLE READING	PPB	-4.3
19	OPTIC TEST	2000 ± 1000 mV	-
20	ELECTRICAL TEST	2000 ± 1000 mV	-
21	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.20 / 12.21 / 16.11 / -15.39
22	ZERO GAS	0.00 PPB	-6.4
23	SPAN GAS	400.00 PPB	361.3

หมายเหตุ

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

VERIFIED

BY

DATE 20/11/2566

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณพรชัย ผาติวนารักษ์ 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 : SO<sub>2</sub> ANALYZER

MANUFACTURER : Teledyne - API

MODEL : T100

SERIAL NO : 2512

STANDARD GAS CONCENTRATION (PPM) : 53.79

CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) : 500

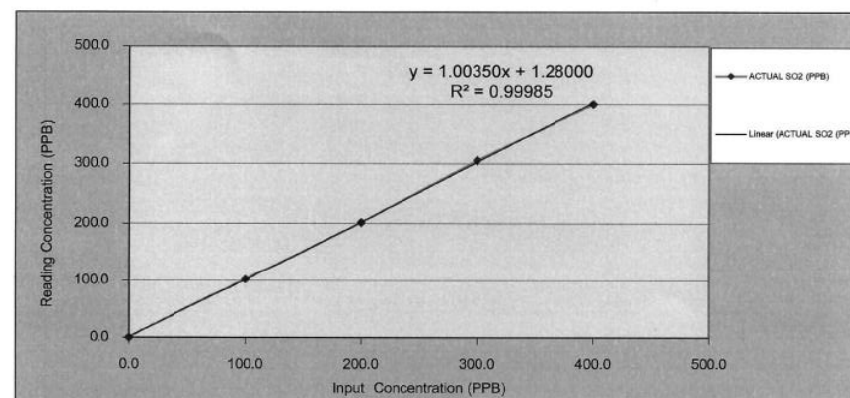
CERTIFIED DATE : Mar 10, 2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL (PPB)	ACTUAL SO <sub>2</sub> (PPB)	ERROR SO <sub>2</sub> (PPB)	% ERROR SO <sub>2</sub>
ZERO	0.0	0.2	0.2	-
1	100.0	102.3	2.3	2.3
2	200.0	201.7	1.7	0.8
3	300.0	305.2	5.2	1.7
4	400.0	400.5	0.5	0.1
AVERAGE (%)				1.3



CALIBRATED BY : คุณพรชัย ผาติวนารักษ์

DATE : 20 พฤศจิกายน 2566

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิคเพิ่มเติม : คุณพรชัย ผาติวนารักษ์ 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

## CERTIFICATE OF ANALYSIS

### Grade of Product: EPA Protocol

Part Number: E04NI99E15A0622 Reference Number: 160-402045691-1  
Cylinder Number: CC745169 Cylinder Volume: 144.4 CF  
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2015 PSIG  
PGVP Number: A12021 Valve Outlet: 660  
Gas Code: CO,NO,NOX,SO2,BALN Certification Date: Mar 10, 2021

Expiration Date: Mar 10, 2029

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.  
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	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	G1	+/- 0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	+/- 0.6% NIST Traceable	03/04/2021
NITROGEN	Balance				

CALIBRATION STANDARDS				
Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	07060227	EB0079118	100.3 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%
PRM	12386	D685025	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%
GMIS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%
NTRM	16010203	KAL003087	57.69 PPM SULFUR DIOXIDE/NITROGEN	+/-0.8%
NTRM	08012341	KAL004716	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%

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 NIKD579	NDIR	Feb 26, 2021
Nicolet IS50 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet IS50 FTIR AUP2010245 NO2	FTIR	Feb 22, 2021
Nicolet IS50 FTIR AUP2010245 SO2	FTIR	Feb 18, 2021

Triad Data Available Upon Request

#### NOTES:

Gross Weight: 28.1 Kg  
Net Weight: 4.6 Kg



Approved for Release

#### รายงานผลการสอบและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

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

วันที่ : 1 มีนาคม 2566

รายชื่ออุปกรณ์ / เครื่องมือ : SO<sub>2</sub> Analyzer

บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T100

หมายเลขอุปกรณ์ / เครื่องมือ : 6200

TEST VALUES			
API MODEL T100		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	SO <sub>2</sub> STABILITY	≤ 1 PPB	0.12
3	PRESSURE	25 - 35 in - Hg-A	29.6
4	SAMPLE FLOW	700 ± 10% cc/min	702.7
5	PMT	mV	5.3
6	NORM PMT	mV	13.5
7	UV LAMP	1000 - 4800 mV	3070.3
8	LAMP RATIO	30 To 120 %	75.9
9	STRAY LIGHT	≤ 100 PPB	6.5
10	DARK PMT	-50 ± 200 % mV	61.3
11	DARK LAMP	-50 ± 200 % mV	1.5
12	SO <sub>2</sub> SLOPE	1.0 ± 0.3	1.015
13	SO <sub>2</sub> OFFSET	< 250 mV	0.051
14	HVPS	400 - 900 V	511
15	RX CELL TEMP	50 ± 1 °C	50.0
16	BOX TEMP	AMBIENT ± 5 °C	32.5
17	PMT TEMP	7 ± 2 °C	8.3
18	SO <sub>2</sub> SAMPLE READING	PPB	1.514
19	OPTIC TEST	2000 ± 1000 mV	1443.7
20	ELECTRICAL TEST	2000 ± 1000 mV	1983.6
21	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.23/ 12.15 /15.28 /-15.20
22	ZERO GAS	0.00 PPB	-1.097
23	SPAN GAS	400.00 PPB	404.129

#### หมายเหตุ

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

VERIFIED

BY: [Signature] DATE: 10/03/2023

ลงนามเจ้าหน้าที่ (Signature)

## MULTI-POINT CALIBRATION REPORT

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

EQUIPMENT NAME : SO<sub>2</sub> Analyzer

MANUFACTURER : Teledyne - API

MODEL : T100

SERIAL NUMBER : 6200

STANDARD GAS CONCENTRATION (PPM) : 53.79

CYLINDER NO : CC745169

CYLINDER PRESSURE (PSIG) : 1550

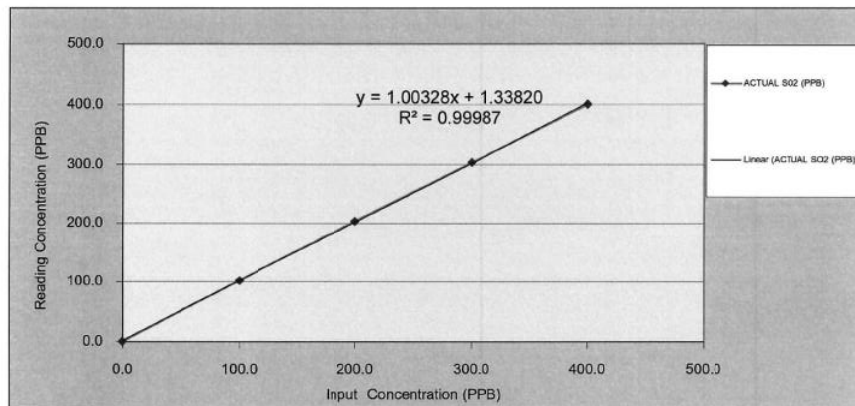
CERTIFIED DATE : Mar 10, 2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10, 2029

## CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL (PPB)	ACTUAL SO <sub>2</sub> (PPB)	ERROR SO <sub>2</sub> (PPB)	% ERROR SO <sub>2</sub>
ZERO	0.000	0.004	0.088	0.000
1	100.000	101.675	1.675	1.675
2	200.000	203.804	3.804	1.902
3	300.000	304.008	4.008	1.336
4	400.000	400.475	0.475	0.119
AVERAGE (%)				0.010



CALIBRATED BY :

DATE : 01 /03 /2566

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณพรชัย ผาดีวนารักษ์ โทรศัพท์ : 02-515-8967

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

**Airgas**  
 an Air Liquide company

 Airgas Specialty Gases  
 Airgas USA, LLC  
 6141 Easton Road  
 Bldg 2  
 Plumsteadville, PA 18949  
 Airgas.com

## CERTIFICATE OF ANALYSIS

## Grade of Product: EPA Protocol

Part Number: E04NI99E15A0622

Reference Number: 160-402045691-1

Cylinder Number: CC745169

Cylinder Volume: 144.4 CF

Laboratory: 124 - Plumsteadville - PA

Cylinder Pressure: 2015 PSIG

PGVP Number: A12021

Valve Outlet: 660

Gas Code: CO,NO,NOX,SO<sub>2</sub>,BALN

Certification Date: Mar 10, 2021

Expiration Date: Mar 10, 2029

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.

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	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	G1	+/- 0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	+/- 0.6% NIST Traceable	03/04/2021
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	07060227	EB0079116	100.3 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Jul 23, 2023
PRM	12386	D685025	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%	Feb 20, 2020
GMIS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	16010203	KAL003087	97.69 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Dec 23, 2021
NTRM	08012341	KAL004716	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 NIKD579	NDIR	Feb 26, 2021
Nicolet IS50 FTIR AUP201C245 NO	FTIR	Feb 11, 2021
Nicolet IS50 FTIR AUP201C245 NO2	FTIR	Feb 22, 2021
Nicolet IS50 FTIR AUP201C245 SO2	FTIR	Feb 18, 2021

Triad Data Available Upon Request

## NOTES:

Gross Weight: 28.1 Kg

Net Weight: 4.6 Kg



Approved for Release


**THAI METEOROLOGICAL DEPARTMENT**

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

**Calibration Certificate**

Issued by : Calibration &amp; Test Section : Meteorological Instruments Bureau

Date of Issue 8 March, 2023

Certification No. 076/23

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Type : Vantage Pro 2 Model No. : 6152C

Mfg Code : Display AZ170619023 Transmitter AZ170619023

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 : Thermal Anemometer 642 S/N 91563

: HOOK GAGE NO 1425 : Wind Aloft Plotting Board

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. 02848051

STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220016

Mechanical Engineer

(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. 076/23

8 March, 2023

Page : 2 of 6

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacumm	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	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	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.8	0.21
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.3	0.72

Wind Aloft Plotting Board.	
U.S. DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration &amp; Test Section

Meteorological Instruments Bureau







## THAI METEOROLOGICAL DEPARTMENT

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

### The Result of Calibration

Certification No. 076/23

8 March, 2023

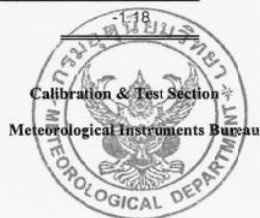
Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
761.92	763.0	-1.08
761.58	762.8	-1.22
761.88	763.2	-1.32
762.57	763.6	-1.03
764.09	765.1	-1.01
764.13	765.3	-1.17
762.06	763.2	-1.14
761.45	762.7	-1.25
761.32	762.5	-1.18
759.85	761.1	-1.25
760.22	761.5	-1.28
760.46	761.7	-1.24
760.82	762.0	-1.18
761.26	762.5	-1.24
761.42	762.7	-1.28
761.81	762.9	-1.09
761.96	763.0	-1.04
762.54	763.6	-1.06
762.69	763.8	-1.11
759.55	759.9	-1.35

Average



Mechanical Engineer



## THAI METEOROLOGICAL DEPARTMENT

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

### The Result of Calibration

Certification No. 076/23

8 March, 2023

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.5	45.5	0.0
30.4	30.4	0.0
15.8	15.9	-0.1

Calibrated by :



Mechanical Engineer





## THAI METEOROLOGICAL DEPARTMENT

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

### The Result of Calibration

8 March, 2023

Certification No. 076/23

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
35.75	82	3.75
54.53	62	2.53
46.79	46	0.79



Mechanical Engineer



Date of Issue 8 March, 2023

Certification No. 076/23

Page : 6 of 6

### ใบรับรอง

หนังสือฉบับนี้รับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152 C Mfg No. AZ170619023 ทำการสอบเทียบกับแก้วฝนแบบแก้วดวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ ( 0.01 in/ TIP)



วิศวกรชำนาญการ



ENG 17110



## 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 February, 2023

Certification No. 046/23

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Type : Vantage Pro 2 Model No. : 6152C

Mfg Code : Display AZ170619031 Transmitter A10119A022

Customer : SGS (Thailand) Limited.

100 Nanglinchee Road, Chongnonsi,

Yannawa, Bangkok 10120.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1014.8 hPa

NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642 S/N 91563

: HOOK GAGE NO 1425 : Wind Aloft Plotting Board

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

(Authorised Signatory)

for the Chief

Sub-Standard Instrument

Mechanical Engineer



## THAI METEOROLOGICAL DEPARTMENT

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

### The Result of Calibration

Certification No. 046/23

1 February, 2023

Page : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacuum inches H2O	Velocity m/sec	Velocity m/sec	Correction 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	-	-	-	9.0	0.02
11.01	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.8	0.21
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.8	0.22

Wind Aloft Plotting Board.

U.S. DEPARTMENT OF COMMERCE WEATHER BUREAU

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

Mechanical Engineer

Calibration & Test Section  
Meteorological Instruments Bureau



# THAI METEOROLOGICAL DEPARTMENT

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

## The Result of Calibration

Certification No. 046/23

1 February, 2023

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
757.81	758.7	-0.89
757.15	758.0	-0.85
757.64	758.5	-0.86
758.27	759.1	-0.83
758.66	759.5	-0.84
758.94	759.8	-0.86
759.11	760.0	-0.89
759.84	760.7	-0.86
759.95	760.8	-0.85
759.73	760.5	-0.77
759.96	760.8	-0.84
760.14	761.0	-0.86
760.42	761.2	-0.78
760.70	761.5	-0.80
762.03	762.9	-0.87
762.24	763.0	-0.76
761.79	762.5	-0.71
761.48	762.3	-0.82
759.71	760.5	-0.79
760.28	761.1	-0.82

Average

-0.83

Calibration & Test Section

Meteorological Instruments Bureau



Mechanical Engineer



# THAI METEOROLOGICAL DEPARTMENT

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

## The Result of Calibration

Certification No. 046/23

1 February, 2023

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.1	45.2	-0.1
30.5	30.7	-0.2
15.2	15.5	-0.3

Calibrated by :



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

1 February, 2023

Certification No. 046/23

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
86.52	83	3.52
62.14	60	2.14
46.25	44	2.25



Mechanical Engineer



Date of Issue 1 February, 2023

Certification No. 046/23

Page : 6 of 6

### ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152 C Mfg No. A10119A022 ทำการสอบเทียบกับแก้ว ฝนแบบแก้วดวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของ เครื่องมือ ( 0.01 in/ TIP)



วิศวกรชำนาญการ

ENAB 19140



## 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 February, 2023

Certification No. 042/23

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Type : Vantage Pro 2 Model No. : 6152C

Mfg Code : Display BD190415091 Transmitter BD190415091

Customer : SGS (Thailand) Limited.

100 Nanglinchee Road, Chongnonsi,

Yannawa, Bangkok 10120.



Calibration Condition : Temperature 25.1 °C Barometric Pressure 1013.5 hPa

NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642 S/N 91563

: HOOK GAGE NO 1425 : Wind Aloft Plotting Board

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

Mechanical Engineer

(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. 042/23

1 February, 2023

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Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	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	-	-	-	9.0	0.02
11.01	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	15.1	-0.09
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.1	-0.08

Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Mechanical Engineer

Calibration & Test Section  
Meteorological Instruments Bureau



# THAI METEOROLOGICAL DEPARTMENT

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

## The Result of Calibration

Certification No. 042/23

1 February, 2023

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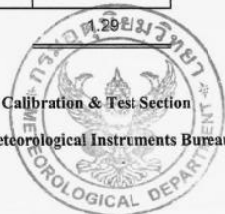
Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
757.81	756.6	1.21
757.15	756.0	1.15
757.64	756.5	1.14
758.27	757.0	1.27
758.66	757.4	1.26
758.94	757.8	1.14
759.11	758.0	1.11
759.84	758.6	1.24
759.95	758.6	1.35
759.73	758.4	1.33
759.96	758.6	1.36
760.14	758.8	1.34
760.42	759.1	1.32
760.70	759.4	1.30
762.03	760.7	1.33
762.24	760.9	1.34
761.79	760.4	1.39
761.48	760.1	1.38
759.71	758.3	1.41
760.28	758.9	1.38

Average

Calibration & Test Section

Meteorological Instruments Bureau

Mechanical Engineer



# THAI METEOROLOGICAL DEPARTMENT

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

## The Result of Calibration

Certification No. 042/23

1 February, 2023

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Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.1	45.4	-0.3
30.5	30.7	-0.2
15.2	15.1	0.1

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

1 February, 2023

Certification No. 042/23

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Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
86.52	82	4.52
62.14	60	2.14
46.25	45	1.25



Mechanical Engineer



Date of Issue 1 February, 2023

Certification No. 042/23

Page : 6 of 6

### ใบรับรอง

หนังสือฉบับนี้รับรองว่า เครื่องวัดฝน ชีห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152 C Mfg No. BD190415091 ทำการสอบเทียบกับแก้วฝนแบบแก้วดวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ ( 0.01 in/ TIP)



วิศวกรชำนาญการ


คุณภาพน้ำ

Mettler-Toledo (Thailand) Ltd.  
846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District  
Bangna District, Bangkok 10260  
+662 723 0382  
MT-TH.ServiceSupport@mt.com



# Accuracy Calibration Certificate

## Customer

Company: SGS (THAILAND) CO.,LTD.  
Address: 1/209,1/211 Moo 1, Ban Chang  
City: Ban Chang Contact: Hatairat Linjee  
Zip / Postal: 21130  
State / Province: Rayong  
Order Number: 

## Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument  
Model: XS205DU Asset Number: N/A  
Serial No.: B036065880 Terminal Model: SAT  
Building: LABORATORY Terminal Serial No.: B036065880  
Floor: 1 Terminal Asset No.: N/A  
Room: BalanceLab

Range	Max. Capacity	Readability (d)
1	81 g	0.00001 g
2	220 g	0.0001 g

## Procedure



Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)  
METTLER TOLEDO Work Instruction: CP/W002/20

This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.

The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.

In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	Temperature		Humidity	
As Found	Start: 20.1 °C	End: 19.9 °C	Start: 71.6 %	End: 60.2 %

As Found Calibration Date: 14-Mar-2023 Calibrator:   
As Left Calibration Date: N/A  
Issue Date: 15-Mar-2023  
Approved Signatory:   
Technical Manager / Head of Calibration Center

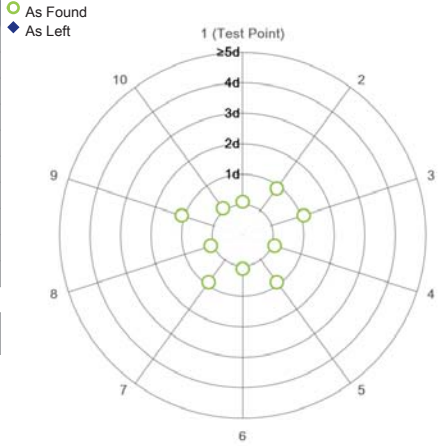
# Measurement Results

## Repeatability

Test Load: 70 g

	As Found	As Left
1	70.00005 g	N/A
2	70.00004 g	N/A
3	70.00006 g	N/A
4	70.00005 g	N/A
5	70.00004 g	N/A
6	70.00005 g	N/A
7	70.00004 g	N/A
8	70.00005 g	N/A
9	70.00006 g	N/A
10	70.00005 g	N/A

Standard Deviation	0.000007 g	N/A
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The "d" in the graph represents the readability of the range/interval in which the test was performed.

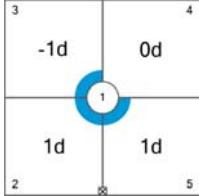
The results of this graph are based upon the absolute values of the differences from the mean value.

## Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	100.0000 g	N/A
2	100.0001 g	N/A
3	99.9999 g	N/A
4	100.0000 g	N/A
5	100.0001 g	N/A

Maximum Deviation	0.0001 g	N/A
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As Found

The "d" in the graph represents the readability of the range/interval in which the test was performed.

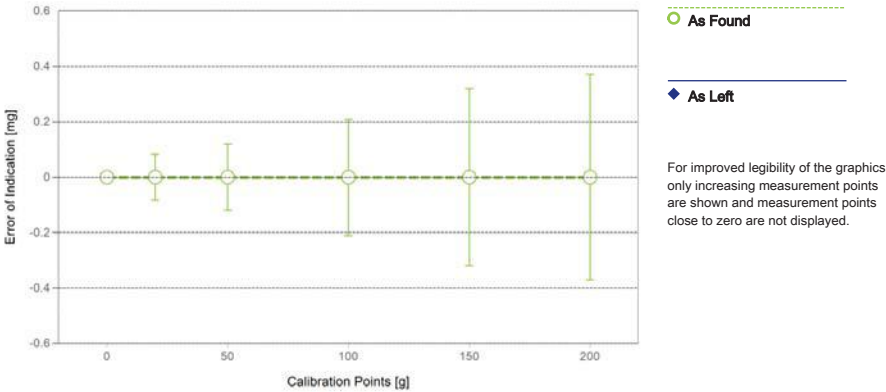


Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.00000 g	0.016 mg	2
2	0.01000 g	0.01000 g	0.00000 g	0.018 mg	2
3	0.10000 g	0.10000 g	0.00000 g	0.022 mg	2
4	0.99999 g	0.99998 g	-0.00001 g	0.032 mg	2
5	4.99998 g	4.99997 g	-0.00001 g	0.048 mg	2
6	9.99999 g	10.00000 g	0.00001 g	0.061 mg	2
7	20.00000 g	20.00000 g	0.00000 g	0.082 mg	2
8 <sup>1</sup>	50.00005 g	50.00005 g	0.00000 g	0.12 mg	2
9	100.0001 g	100.0001 g	0.0000 g	0.21 mg	2
10	150.0001 g	150.0001 g	0.0000 g	0.32 mg	2
11	200.0001 g	200.0001 g	0.0000 g	0.37 mg	2

<sup>1</sup>The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor  $k$  – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95 %.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.:	WS28	Date of Issue:	01-Apr-2022
Certificate Number:	178498	Calibration Due Date:	17-Sep-2023

Thermo Hygrometer

Equipment No.:	IN51	Date of Issue:	17-Feb-2023
Certificate Number:	SG-H-00144/66	Calibration Due Date:	15-Feb-2024

Remarks

FACT adjustment functionality activated  
Equipment condition: Good  
Next calibration according to customer's procedure  
Calibration data not decide by calibration laboratory

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with k=2 in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: 1.5 · 10<sup>-6</sup> / K

Temperature range on site for the evaluation of the measurement uncertainty in use: 5 K

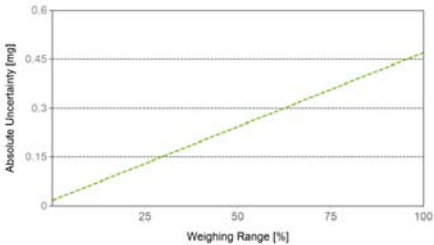
Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.00001 g	81 g	U <sub>1</sub> = 0.017 mg + 0.00560 mg/g · R	N/A
2	0.0001 g	220 g	U <sub>2</sub> = 0.06 mg + 0.00554 mg/g · R	N/A

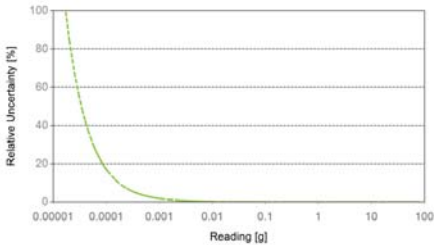
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found		As Left	
0.00220 g	0.017 mg	0.77%	N/A	N/A
0.02200 g	0.017 mg	0.078%	N/A	N/A
0.22000 g	0.018 mg	0.0083%	N/A	N/A
2.20000 g	0.029 mg	0.0013%	N/A	N/A
220.0000 g	1.3 mg	0.00058%	N/A	N/A



As Found



As Left

The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.

# GWP® Certificate



As  
Found



As  
Left



The weighing device meets the given process requirements.

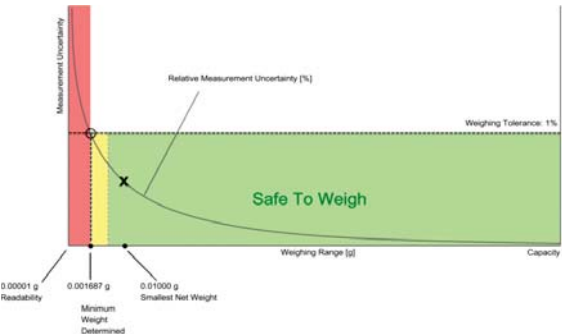
The weighing device meets the given process requirements.

Tests Performed: ☒ As Found ☐ As Left ☒ No adjustments/modifications made. As Left results correspond to As Found.

## Process Requirements

Weighing Tolerance: 1% | Smallest Net Weight: 0.01000 g | Safety Factor: 2

### Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.


# Minimum Weight

## As Found Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.016961 g	0.034113 g	0.051461 g	0.086758 g	0.178664 g
0.2%	0.008456 g	0.016961 g	0.025513 g	0.042763 g	0.086758 g
0.5%	0.003377 g	0.006761 g	0.010153 g	0.016961 g	0.034113 g
1%	0.001687 g	0.003377 g	0.005068 g	0.008456 g	0.016961 g
2%	0.000844 g	0.001687 g	0.002532 g	0.004222 g	0.008456 g
5%	0.000337 g	0.000675 g	0.001012 g	0.001687 g	0.003377 g

The minimum weight table applies to the fine range of the weighing device.


 Pass: The determined minimum weight meets the requirement for the smallest net weight.

## As Left Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.016961 g	0.034113 g	0.051461 g	0.086758 g	0.178664 g
0.2%	0.008456 g	0.016961 g	0.025513 g	0.042763 g	0.086758 g
0.5%	0.003377 g	0.006761 g	0.010153 g	0.016961 g	0.034113 g
1%	0.001687 g	0.003377 g	0.005068 g	0.008456 g	0.016961 g
2%	0.000844 g	0.001687 g	0.002532 g	0.004222 g	0.008456 g
5%	0.000337 g	0.000675 g	0.001012 g	0.001687 g	0.003377 g

The minimum weight table applies to the fine range of the weighing device.

 Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with k = 2 and based on the linear formula of the measurement uncertainty of the weighing device in use.







The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.




### Notes on minimum weight values in above table:

- If "N/A" is shown above, no appropriate value could be calculated.
- METTLER TOLEDO is not responsible for the definition of the process requirements.

# Measurement Results













## Results Summary

	Repeatability	Eccentricity	Error of Indication
As Found			
As Left			

-  = Passed  
 = Failed  
 = Safety Factor not met

## Repeatability













Test Load: 70 g

Tolerance	Control Limit	As Found		As Left	
		Std. Deviation	Result	Std. Deviation	Result
0.1%	0.000005 g	0.000007 g		0.000007 g	
0.2%	0.000010 g				
0.5%	0.000025 g				
1%	0.000050 g				
2%	0.000100 g				
5%	0.000250 g				

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

## Eccentricity

Test Load: 100 g

Tolerance	Control Limit	As Found		As Left	
		Deviation	Result	Deviation	Result
0.1%	0.0500 g	0.0001 g		0.0001 g	
0.2%	0.1000 g				
0.5%	0.2500 g				
1%	0.5000 g				
2%	1.0000 g				
5%	2.5000 g				

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

Error of Indication

As Found

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A
20.00000 g	0.00000 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g
50.00005 g	0.00000 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g
100.0001 g	0.0000 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	0.0000 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0001 g	0.0000 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

As Left

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A
20.00000 g	0.00000 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g
50.00005 g	0.00000 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g
100.0001 g	0.0000 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	0.0000 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0001 g	0.0000 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

## Verification COD Reactor

Equipment Name	Dri-Block Heater-Digital	Temperature Ver	150±2 °C
Serial No.	000827-A	Model	DB 200/3
Reference Standard	Thermocouple Type K	Certificate No.	21/4272
Calibration Date	10/03/2023	Next Cal. Date	10/03/2024

### Left

Hole 1				Hole 2				Hole 3			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	151.1	-0.36	150.7	1	150.6	-0.36	150.2	1	151.4	-0.36	151.0
2	150.8	-0.36	150.4	2	151.7	-0.36	151.3	2	151.3	-0.36	150.9
3	151.2	-0.36	150.8	3	151.1	-0.36	150.7	3	151.7	-0.36	151.3
Mean			150.67	Mean			150.77	Mean			151.11
SD			0.208	SD			0.551	SD			0.208
%RSD			0.138	%RSD			0.365	%RSD			0.138

Hole 4				Hole 5				Hole 6			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	151.7	-0.36	151.3	1	150.5	-0.36	150.1	1	151.5	-0.36	151.1
2	151.6	-0.36	151.2	2	151.3	-0.36	150.9	2	151.4	-0.36	151.0
3	151.5	-0.36	151.1	3	150.6	-0.36	150.2	3	150.5	-0.36	150.1
Mean			151.24	Mean			150.44	Mean			150.77
SD			0.100	SD			0.436	SD			0.551
%RSD			0.066	%RSD			0.290	%RSD			0.365

Hole 7				Hole 8				Hole 9			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	151.3	-0.36	150.9	1	151.7	-0.36	151.3	1	150.5	-0.36	150.1
2	151.0	-0.36	150.6	2	150.5	-0.36	150.1	2	151.2	-0.36	150.8
3	151.3	-0.36	150.9	3	151.4	-0.36	151.0	3	150.8	-0.36	150.4
Mean			150.84	Mean			150.84	Mean			150.47
SD			0.173	SD			0.624	SD			0.351
%RSD			0.115	%RSD			0.414	%RSD			0.233

Hole 10				Hole 11				Hole 12			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	151.6	-0.36	151.2	1	151.5	-0.36	151.1	1	150.7	-0.36	150.3
2	151.6	-0.36	151.2	2	151.2	-0.36	150.8	2	151.6	-0.36	151.2
3	150.8	-0.36	150.4	3	151.5	-0.36	151.1	3	151.2	-0.36	150.8
Mean			150.97	Mean			151.04	Mean			150.81
SD			0.462	SD			0.173	SD			0.451
%RSD			0.306	%RSD			0.115	%RSD			0.299

Verified By

Approved By

Confidential - Not to be photocopied except by permission of the Laboratory Quality Manager or nominee.

## Verification COD Reactor

Equipment Name	Dri-Block Heater Digital	Temperature Ver	150±2 °C
Serial No.	000827-A	Model	DB 200/3
Reference Standard	Thermocouple Type K	Certificate No.	21/4272
Calibration Date	10/03/2023	Next Cal. Date	10/03/2024

### Middle

Hole 1				Hole 2				Hole 3			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	151.2	-0.36	150.8	1	150.7	-0.36	150.3	1	151.1	-0.36	150.7
2	151.5	-0.36	151.1	2	151.7	-0.36	151.3	2	151.6	-0.36	151.2
3	151.6	-0.36	151.2	3	150.8	-0.36	150.4	3	150.9	-0.36	150.5
Mean			151.07	Mean			150.71	Mean			150.84
SD			0.208	SD			0.551	SD			0.361
%RSD			0.138	%RSD			0.365	%RSD			0.239

Hole 4				Hole 5				Hole 6			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	151.5	-0.36	151.1	1	151.6	-0.36	151.2	1	150.5	-0.36	150.1
2	150.7	-0.36	150.3	2	151.2	-0.36	150.8	2	150.6	-0.36	150.2
3	151.6	-0.36	151.2	3	151.2	-0.36	150.8	3	151.2	-0.36	150.8
Mean			150.91	Mean			150.97	Mean			150.41
SD			0.493	SD			0.231	SD			0.379
%RSD			0.327	%RSD			0.153	%RSD			0.252

Hole 7				Hole 8				Hole 9			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	151.5	-0.36	151.1	1	151.5	-0.36	151.1	1	151.2	-0.36	150.8
2	150.5	-0.36	150.1	2	151.7	-0.36	151.3	2	150.9	-0.36	150.5
3	150.8	-0.36	150.4	3	151.1	-0.36	150.7	3	151.4	-0.36	151.0
Mean			150.57	Mean			151.07	Mean			150.81
SD			0.513	SD			0.306	SD			0.252
%RSD			0.341	%RSD			0.202	%RSD			0.167

Hole 10				Hole 11				Hole 12			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	151	-0.36	150.6	1	151.5	-0.36	151.1	1	151.2	-0.36	150.8
2	150.6	-0.36	150.2	2	150.6	-0.36	150.2	2	150.5	-0.36	150.1
3	151.5	-0.36	151.1	3	151.0	-0.36	150.6	3	151.1	-0.36	150.7
Mean			150.67	Mean			150.67	Mean			150.57
SD			0.451	SD			0.451	SD			0.379
%RSD			0.299	%RSD			0.299	%RSD			0.251

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## Verification COD Reactor

Equipment Name	Dri-Block Heater Digital	Temperature Ver	150±2 °C
Serial No.	000827/A	Model	DB 200/3
Reference Standard	Thermocouple Type K	Certificate No.	21/4272
Calibration Date	10/03/2023	Next Cal. Date	10/03/2024

Right

Hole 1				Hole 2				Hole 3			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	149.9	-0.36	149.5	1	150.3	-0.36	149.9	1	151.0	-0.36	150.6
2	151.1	-0.36	150.7	2	151.0	-0.36	150.6	2	151.0	-0.36	150.6
3	150.9	-0.36	150.5	3	149.9	-0.36	149.5	3	150.4	-0.36	150.0
Mean			150.27	Mean			150.04	Mean			150.44
SD			0.643	SD			0.557	SD			0.346
%RSD			0.428	%RSD			0.371	%RSD			0.230

Hole 4				Hole 5				Hole 6			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	150.8	-0.36	150.4	1	150.0	-0.36	149.6	1	150.5	-0.36	150.1
2	151.0	-0.36	150.6	2	150.0	-0.36	149.6	2	150.8	-0.36	150.4
3	150.9	-0.36	150.5	3	150.7	-0.36	150.3	3	149.8	-0.36	149.4
Mean			150.54	Mean			149.87	Mean			150.01
SD			0.100	SD			0.404	SD			0.513
%RSD			0.066	%RSD			0.270	%RSD			0.342

Hole 7				Hole 8				Hole 9			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	150.8	-0.36	150.4	1	151.1	-0.36	150.7	1	150.2	-0.36	149.8
2	150.9	-0.36	150.5	2	150.7	-0.36	150.3	2	150.2	-0.36	149.8
3	151.0	-0.36	150.6	3	151.1	-0.36	150.7	3	149.9	-0.36	149.5
Mean			150.54	Mean			150.61	Mean			149.74
SD			0.100	SD			0.231	SD			0.173
%RSD			0.066	%RSD			0.153	%RSD			0.116

Hole 10				Hole 11				Hole 12			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	150.6	-0.36	150.2	1	150.5	-0.36	150.1	1	150.9	-0.36	150.5
2	150.5	-0.36	150.1	2	150.9	-0.36	150.5	2	150.0	-0.36	149.6
3	149.9	-0.36	149.5	3	151.1	-0.36	150.7	3	150.5	-0.36	150.1
Mean			149.97	Mean			150.47	Mean			150.11
SD			0.379	SD			0.306	SD			0.451
%RSD			0.252	%RSD			0.203	%RSD			0.300

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## สรุปผลการ Verify

ปรับอุณหภูมิ 154.0 °C แต่ค่าควบคุมยังมีอุณหภูมิ 150 ± 2 °C ทุกครั้ง

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Agilent Technologies (Thailand) Limited  
U CHU LIANG BLDG. 22/F UNIT A,D  
968 RAMA 4 ROAD, SILOM, BANGRAK  
Bangkok 10500 Thailand

Tel. +662 637 6363  
Fax: +662 632 4334  
Email: [ccc-smt@agilent.com](mailto:ccc-smt@agilent.com)  
Website: [www.agilent.com/chem](http://www.agilent.com/chem)

Service Confirmation Number: 6904997683

Service Confirmation Date: 28.06.2023

#### Customer Contact:

SGS (Thailand) Limited  
Branch 00003  
1/209 1/211 Moo 1 T Bangchang  
A Banchang  
RAYONG 21130

TAX ID : 0105532106079

Saijai.Ruangsaawat@sgs.com  
038-685 260-4

#### Invoice To:

SGS (Thailand) Limited  
Branch 00003  
1/209 1/211 Moo 1 T Bangchang A  
Banchang RAYONG 21130

#### Delivery Site:

SGS (Thailand) Limited  
Branch 00003  
1/209 1/211 Moo 1 T Bangchang  
A Banchang  
RAYONG 21130

#### Location:

Room  
Bldg  
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Dept

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Agilent Technologies (Thailand) Limited. Head Office  
U Chu Liang Bldg. 22/F Unit A,D  
968 Rama 4 Road, Silom, Bangrak,  
Bangkok 10500 Thailand  
Tax ID : 0105542068218

### SERVICE REPORT

<b>Customer Purchase Order Number:</b>	<b>Customer Number:</b> 70205138
<b>Service Request:</b>	<b>Service Request Date:</b>
<b>Service Order:</b> 6006193098	<b>Service Confirmation:</b> 6904997683

#### Direct Inquiries to:

Contact Name: Customer Contact Center  
Contact E-mail: [ccc-smt@agilent.com](mailto:ccc-smt@agilent.com)  
Contact Telephone: +662 637 6363  
Contact Fax: +662 632 4334

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Citibank N.A. Bangkok Branch  
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Sub-district, Wattana District, Bangkok 10110 Thailand  
Acc. No: 012-4452-007  
THB:Krung Thai Bank PCL  
Siam Square Br.,416/1-2 Rama I Rd.,Pathumwan, BKK 10330  
Thailand

ORIGINAL

#### Service Instrument:

Model Number	Model Description	Serial Number	System Handle	Parent Asset
SYS-GM-5977T-X	GCMS 5977 Turbo System Adv Funct			
G7077B	5977B Inert Plus MSD Turbo EI Mainframe	US1746M008	000000006002373266	SYS-GM-5977T-X
G4514A	7693A Tray, 150 Vial	CN17480003	000000006002373266	SYS-GM-5977T-X
TMR-ATOMX	Teledyne Tekmar Atomx	US10088004		SYS-GM-5977T-X
G4513A	7693A Autoinjector	CN17490204	000000006002373266	SYS-GM-5977T-X
G3440B	Agilent 7890B Series GC Custom	CN17493064	000000006002373266	SYS-GM-5977T-X

#### Service Items:



Item	Service/Part #	Description	Qty	Entitlement	Service Start	Service End
1000	PM	Preventive Maintenance	1.00	Agreement Entitlement - 100 % covered	26.06.2023	26.06.2023
1010	5188-6496	QuickPick Split Vent + Inlet PM Kit	1.00	Agreement Entitlement - 100 % covered		
1020	5188-6497	QuickPick Splitless Inlet/Vent PM Kit	1.00	Agreement Entitlement - 100 % covered		
1030	5191-5851	Agilent Vacuum Fluid 45 Platinum, 1Qt	1.00	Agreement Entitlement - 100 % covered		
1040	G7005-60061	Filament,high temperature EI for GCMS	2.00	Agreement Entitlement - 100 % covered		
1050	G8160-60120	Tubing, Drain, Self Retracting (per foot	1.00	Agreement Entitlement - 100 % covered		
1060	G1099-80039	Oil Mist Filter, 3/8 BSP Male Threads	1.00	Agreement Entitlement - 100 % covered		

#### Additional Information:

**Service Confirmation Number:** 6904997683

**Service Confirmation Date:** 28.06.2023

**Service Information:**

<b>Problem Description:</b> NR-C-PM-GMAtomX-5001151743		
<b>Service Provided:</b> PM 7890B/5977B/ATOMX. Clean source , change all consumable.		
<b>Service Overview Code:</b> Reason Code: Scheduled Service Diagnosis Code: Scheduled Service Resolution Code: Scheduled Service		
<b>Reported Hours:</b> 6.0	<b>Travel Hours:</b> 2.0	
<b>Customer Field Service Representative Name:</b> Eaknarin Puangsopa	<b>Customer Field Service Representative Signature:</b> 	<b>Date:</b> 28 Jun 2023
<b>Customer Name:</b> Hatairat Linjee	<b>Customer Signature:</b> 	<b>Date:</b> 28 Jun 2023
<b>Additional Comments:</b>		






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



Cert.No.: 23CH1117

Page.: 1 of 3

## Certificate of Calibration

**Equipment :** pH Meter  
**Manufacturer :** Mettler Toledo  
**Model :** Seven Easy S20  
**Serial No. :** 1231235141  
**ID No. :** P2010024  
**Condition As-Received:** Used Item  
**Received Date :** 07 September 2023  
**Calibration Date :** 08 September 2023  
**Reference :** 2309-0247WSC-4  
**Submitted by :** SGS (Thailand) Limited  
1/209, 1/211 Moo 1, Ban Chang,  
Ban Chang, Rayong 21130  
**Ambient Temperature :** (25 ± 2.5) °C  
**Relative Humidity :** (50 ± 15) %  
**Calibration Procedure :** In - house method :  
- CP-CH5 by direct measurement with standard  
voltage calibrator and direct measurement with  
certified reference material (CRM)  
- CP-CH8 by comparison with standard thermometer  
**Calibrated by :** Warakorn Lerngagtrakul  
**Approved by :**   
Approved Signatory  
(✓) Saithip Meangmai  
( ) Warakorn Lerngagtrakul  
( ) Ponpan Paipim  
**Issue Date :** 12 September 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

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Cert.No.: 23CH1117

Page.: 2 of 3

### Condition of this calibration result

1. Reference Standard Instrument : -

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	23E2802	27 Aug 2024
2) Ref. Standard Thermometer	4982054	110RC044	23I908	26 Jul 2024

This certification is traceable to the International System of Unit maintained through:-  
- Technology Promotion Association (Thailand-Japan)

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,  
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 1.679	CPA chem	794119	25 Feb 2024
pH 4.008	CPA chem	863832	28 Dec 2024
pH 6.986	CPA chem	863833	28 Dec 2023
pH 9.997	CPA chem	913600	14 July 2024

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

### Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement ( ±mV )	Coverage factor k
			mV	pH		
pH Meter S/N.: 1231235141	1.680	314.73	314.9	1.680	0.058	2.00
	4.000	177.48	177.7	4.000	0.058	2.00
	7.000	0.00	0.2	7.000	0.058	2.00
	10.000	-177.48	-177.2	10.000	0.058	2.00

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Cert.No.: 23CH1117

Page.: 3 of 3

#### Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading ( mV )	Uncertainty of pH measurement ( $\pm$ )	Coverage factor $k$
pH Electrode S/N.: 9448396	1.679	1.709	300.9	0.0052	2.05
	4.008	4.011	167.3	0.0045	2.00
	6.986	6.991	-5.5	0.0084	2.00
	9.997	10.000	-183.8	0.0068	2.00

#### Function : Temperature Measurement

( \* ) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLab®Expert Pro  
- Serial No. : 9448396

Dimension of probe;

- Length : 120 mm  
- Diameter : 12 mm  
- Immersion Depth : 100 mm

Calibration Point ( °C )	Standard Temperature ( °C )	UUC* Reading ( °C )	Error ( °C )	Uncertainty of measurement ( $\pm$ °C )	Coverage factor $k$
25.0	25.002	24.9	-0.102	0.13	2.00

Remark : - UUC\* = Unit Under Calibration

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

-o0o-

ระดับเสียง

### Certificate of Calibration

#### Customer

Name : SGS (Thailand) Limited.  
Address : 100 Nanglinchec Road, Chongnonsi, Yannawa Bangkok 10120

Certificate No : 22-ACT-474  
Request No : Req-2022-1211

#### Unit Under Calibration Details

Measurement item : Sound Level Meier  
Manufacturer : Cirrus  
Model : CR:161B  
Serial Number : G080146  
ID : -  
Resolution : 0.1 dB  
Microphone Class : I  
Microphone Model : MK224  
Microphone S/N : 209923D  
Preamplifier Model : KM:170  
Preamplifier S/N : 0908  
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 : 22 July 2022  
Calibrated Date : 8 August 2022  
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	GRAS	40AN	188273	15 September 2022	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2022	TSI
Audio Generator	Svanitek	Svan401	131	18 October 2022	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 : [Redacted]

Calibration Officer

Approved By : [Redacted]

Calibration Engineer Supervisor

Issue Date : 8 August 2022



Certificate No : 22-ACT-474  
Request No : Req-2022-1211

#### 1. Indication at the calibration check frequency

UUC Setting	Nominal Level	Before Adjust		Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
100) Hz 94.00 dB	93.81	91.0	-2.81	93.8	-0.01	0.20	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN. 58079

#### 2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 20-140		
UUC Weighting		
A	19.3	0.10

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

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 20-140		
UUC Weighting		
A	16.0	0.10
C	28.7	0.10
Z	38.4	0.10

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	A (dB)	C (dB)	Z (dB)		
FAST / 20-140					
STD Setting					
125 Hz	0.6	0.4	0.3	0.50	1.0
1000 Hz	0.0	0.0	0.0	0.60	0.7
4000 Hz	0.2	0.4	0.5	0.60	1.0
8000 Hz	1.0	1.2	1.4	0.70	+1.5 -2.5

Certificate No : 22-ACT-474

Request No : Req-2022-1211

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

UUC Setting		Deviation from various Frequency			UNCERTAINTY	Acceptance
FAST / 20-140		Weighting Responce curve				
STD Setting		A (dB)	C (dB)	Z (dB)	( ± dB)	Limit ( ± dB)
63 Hz		0.5	0.2	0.2	0.2	1.0
125 Hz		0.3	0.1	0.1		1.0
250 Hz		0.2	0.0	0.0		1.0
500 Hz		0.1	0.0	0.0		1.0
1000 Hz		0.0	0.0	0.0		0.7
2000 Hz		-0.2	0.0	0.0		1.0
4000 Hz		-0.4	-0.2	0.0		1.0
8000 Hz		-0.6	-0.4	-0.1		+1.5, -2.5
16000 Hz		0.0	0.1	-0.4		+2.5, -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / 20-140	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	0.2	0.2
A	114.00	114.0	0.0		
C	114.00	114.0	0.0		
Z	114.00	114.0	0.0		

UUC Setting	STD	Measured		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
20-140 / A	REF	UUC	ERR		
UUC Time Responce	(dB)	(dB)	(dB)	0.2	0.1
Fast	114.00	114.0	0.0		
Slow	114.00	114.0	0.0		
Leq	114.00	114.0	0.0		

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FH-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 22-ACT-474

Request No : Req-2022-1211

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 20-140	UUC		
STD Setting	(dB)	0.1	0.1
Initial	114.0		
Final	114.0		
Deviated	0.0		

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 20-140	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	0.3	0.8
139.00	139	139.0	0.0		
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	79.1	0.1		
74.00	74	74.1	0.1		
69.00	69	69.1	0.1		
64.00	64	64.1	0.1		
59.00	59	59.1	0.1		
54.00	54	54.1	0.1		
49.00	49	49.0	0.0		
44.00	44	44.1	0.1		
39.00	39	39.1	0.1		
34.00	34	34.1	0.1		
29.00	29	29.2	0.2		
24.00	24	24.5	0.5		

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

FH-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 22-ACT-474  
 Request No : Req-2022-1211

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance
FAST / A	REF	UUC	ERR	( ± dB)	Limit
UUC Range	(dB)	(dB)	(dB)		( ± dB)
20-140	24.0	23.7	-0.3	0.3	0.8
	114	114.0	0.0		0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance
A / 20-140	Toneburst	Ref	UUC	ERR	( ± dB)	Limit
UUC Time Response	(ms)	(dB)	(dB)	(dB)		( ± dB)
Fast	200	136.0	136.0	0.0	0.3	0.5
	2	119.0	118.9	-0.1		+1.0, -1.5
	0.25	110.0	109.9	-0.1		+1.0, -3.0
Slow	200	129.6	129.6	0.0		0.5
	2	110.0	110.0	0.0		+1.0, -3.0
SEL	200	130.0	130.0	0.0		0.5
	2	110.0	110.0	0.0		+1.0, -1.5
	0.25	101.0	100.9	-0.1		+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance
FAST / C / 20-140	REF	UUC	ERR	( ± dB)	Limit
STD Setting	(dB)	(dB)	(dB)		( ± dB)
Complete cycle	135.4	135.4	0.00	0.2	2.0
Positive half cycle	134.4	134.2	-0.20		1.0
Negative half cycle	134.4	134.2	-0.20		1.0

Certificate No : 22-ACT-474  
 Request No : Req-2022-1211

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 20-140	UUC	( ± dB)	Limit
STD Setting	(dB)		( ± dB)
Positive one-half cycle	147.7		
Negative one-half cycle	147.7		
Deviated	0.0	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 20-140	UUC	( ± dB)	Limit
STD Setting	(dB)		( ± dB)
Initial	139.0		
Final	139.0		
Deviated	0.0	0.1	0.1

End of Certificate



# Certificate of Calibration

## Customer

Name : SGS (Thailand) Limited. Certificate No : 23-SLM-138  
 Address : 100 Nanglinchee Road, Chongnonsi, Yannawa Bangkok 10120 Request No : Req-2023-0805

## Unit Under Calibration Details

Measurement item : Sound Level Meter Microphone Class : 1  
 Manufacturer : RION Microphone Model : UC-59  
 Model : NA-28 Microphone S/N : 18897  
 Serial Number : 00570424 Preamplifier Model : NH-23  
 ID : ENSL 030 Preamplifier S/N : 70434  
 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 : 20 April 2023  
 Calibrated Date : 21 April 2023  
 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	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svantek	Svan401	131	12 October 2023	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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 21 April 2023



Certificate No : 23-SLM-138

Request No : Req-2023-0805

## 1. Indication at the calibration check frequency

UUC Setting	Nominal Level	Before Adjust		After Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
FAST / A / 30-130							
Calibrator Setting							
1090 Hz 114 dB	113.79	114.0	+0.21	113.8	+0.01	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand 3M, Model SV335, SN. 58079

## 2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 20-80		
UUC Weighting		
A	15.1	0.1

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

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 20-80		
UUC Weighting		
A	8.1	0.1
C	11.8	0.1
Z	18.5	0.1

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	A (dB)	C (dB)	Z (dB)		
FAST / 30-130					
STD Setting					
125 Hz	0.1	0.2	0.2	0.6	1.0
1000 Hz	0.0	0.0	0.0	0.6	0.7
4000 Hz	-0.1	-0.1	-0.1	0.6	1.0
8000 Hz	-0.5	-0.4	-0.4	0.7	+1.5 -2.5

Certificate No : 23-SLM-138

Request No : Rec-2023-0805

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

UUC Setting	Deviation from various Frequency			UNCERTAINTY	Acceptance
FAST / 30-130	Weighing Response curve				Limit
STD Setting	A (dB)	C (dB)	Z (dB)	( ± dB)	( ± dB)
63 Hz	-0.2	-0.1	0.0	0.2	1.0
125 Hz	-0.1	0.1	0.0		1.0
250 Hz	-0.1	0.0	0.0		1.0
500 Hz	0.0	0.1	0.0		1.0
1000 Hz	0.0	0.0	0.0		0.7
2000 Hz	0.0	0.1	0.0		1.0
4000 Hz	0.0	0.1	0.0		1.0
8000 Hz	0.1	0.1	0.0		+1.5, -2.5
16000 Hz	-0.5	-0.6	0.0		+2.5, -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / 30-130	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	0.2	0.2
A	114.00	114.0	0.0		
C	114.00	114.0	0.0		
Z	114.00	114.0	0.0		

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
30-130 / A	REF	UUC	ERR		
UUC Time Response	(dB)	(dB)	(dB)	0.2	0.1
Fast	114.00	114.0	0.0		
Slow	114.00	114.0	0.0		
Leq	114.00	114.0	0.0		

Certificate No : 23-SLM-138

Request No : Rec-2023-0805

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 50-140	UUC		
STD Setting	(dB)	0.1	0.1
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.1

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 50-140	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	0.3	0.8
130.00	130	130.0	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		



Certificate No : 23-SLM-138

Request No : Req-2023-0805

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit
FAST / A	REF	UUC	ERR		( $\pm$ dB)
UUC Range	(dB)	(dB)	(dB)		
20-120	30.1	30.1	0.0	0.3	0.8
	114	114.0	0.0		0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit
A / 30-130	Toneburst	Ref	UUC	ERR		( $\pm$ dB)
UUC Time Response	(ms)	(dB)	(dB)	(dB)		
Fast	200	126.0	126.0	0.0	0.2	0.5
	2	109.0	109.0	0.0		+1.0, -1.5
	0.25	100.0	99.9	-0.1		+1.0, -3.0
Slow	200	119.6	119.6	0.0		0.5
	2	100.0	100.0	0.0		+1.0, -3.0
SEL	200	120.0	120.0	0.0		0.5
	2	100.0	100.0	0.0		+1.0, -1.5
	0.25	91.0	90.9	-0.1		+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit
FAST / C / 55-141	REF	UUC	ERR		( $\pm$ dB)
STD Setting	(dB)	(dB)	(dB)		
Complete cycle	136.4	136.0	-0.40	0.2	2.0
Positive half cycle	135.4	135.2	-0.20		1.0
Negative half cycle	135.4	135.2	-0.20		1.0

Certificate No : 23-SLM-138

Request No : Req-2023-0805

12. Overload indication

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit
FAST / A / 30-130	UUC		( $\pm$ dB)
STD Setting	(dB)		
Positive one-half cycle	141.7		
Negative one-half cycle	141.6		
Deviated	0.1	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit
FAST / A / 30-130	UUC		( $\pm$ dB)
STD Setting	(dB)		
Initial	129.0		
Final	129.0		
Deviated	0.0	0.1	0.1

End of Certificate

### Certificate of Calibration

#### Customer

Name : SGS (Thailand) Limited. Certificate No : 23-SLM-229  
Address : 100 Nanglinchee Road, Chongnonsi, Yannawa Bangkok 10120 Request No : Req-2023-1390

#### Unit Under Calibration Details

Measurement item : : Sound Level Meter Microphone Class : 1  
Manufacturer : RION Microphone Model : UC-59  
Model : NA-28 Microphone S/N : 01939  
Serial Number : 00570431 Preamplifier Model : NH-23  
ID : - Preamplifier S/N : 01469  
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 : : 23 June 2023  
Calibrated Date : : 29 June 2023  
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	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	SvanteK	Scan401	131	12 October 2023	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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 29 June 2023



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-SLM-01 Rev.0 Issue date 1/7/19

Certificate No : 23-SLM-229

Request No : Req-2023-1390

#### 1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
FAST / A / 30-130							
Calibrator Setting							
1000 Hz 114 dB	114.54	114.9	+0.36	114.5	-0.04	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand 3M, Model AC-300, SN. AC-300001087

#### 2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 20-80		
UUC Weighting	(dB)	(± dB)
A	13.6	0.1

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

UUC Setting	Measured	UNCERTAINTY
FAST / 20-80		
UUC Weighting	(dB)	(± dB)
A	8.6	0.1
C	11.8	0.1
Z	19.1	0.1

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	A	C	Z		
FAST / 30-130					
STD Setting	(dB)	(dB)	(dB)		
125 Hz	0.2	0.3	0.2	0.6	1.0
1000 Hz	0.0	0.0	0.0	0.6	0.7
4000 Hz	-0.7	-0.7	-0.7	0.6	1.0
8000 Hz	-1.6	-1.5	-1.6	0.7	+1.5 -2.5

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-SLM-01 Rev.0 Issue date 1/7/19

Certificate No : 13-SLM-229  
Request No : Req-2023-1390

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

UUC Setting	Deviation from various Frequency			UNCERTAINTY	Acceptance
FAST / 30-130	Weighting Response curve				Limit
STD Setting	A (dB)	C (dB)	Z (dB)	( ± dB)	( ± dB)
63 Hz	-0.2	-0.1	-0.1	0.2	1.0
125 Hz	-0.2	0.0	0.0		1.0
250 Hz	-0.1	-0.1	0.0		1.0
500 Hz	-0.1	0.0	0.0		1.0
1000 Hz	0.0	0.0	0.0		0.7
2000 Hz	0.0	0.0	0.0		1.0
4000 Hz	0.0	0.0	0.0		1.0
8000 Hz	0.0	0.0	0.0		+1.5, -2.5
16000 Hz	-0.6	-0.6	-0.1		+2.5, -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD REF	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
		UUC (dB)	ERR (dB)		
FAST / 30-130	(dB)	(dB)	(dB)	0.2	0.2
UUC Weighting	(dB)	(dB)	(dB)		
A	114.00	114.0	0.0		
C	114.00	114.0	0.0		
Z	114.00	114.0	0.0		0.2

UUC Setting	STD REF	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
		UUC (dB)	ERR (dB)		
30-130 / A	(dB)	(dB)	(dB)	0.2	0.1
UUC Time Response	(dB)	(dB)	(dB)		
Fast	114.00	114.0	0.0		
Slow	114.00	114.0	0.0		
Leq	114.00	114.0	0.0		0.1

Certificate No : 23-SLM-229  
Request No : Req-2023-1390

7. Long Term Stability

UUC Setting	Measured UUC	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 30-130	(dB)		
STD Setting			
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.1

8. Level linearity on the reference level range

UUC Setting	Anticipated REF	Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
		UUC (dB)	ERR (dB)		
FAST / A / 30-130	(dB)	(dB)	(dB)	0.30	0.8
STD dB	(dB)	(dB)	(dB)		
130.00	130	130.0	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	79.1	0.1		
74.00	74	74.0	0.0		
69.00	69	69.1	0.1		
64.00	64	64.1	0.1		
59.00	59	59.1	0.1		
54.00	54	54.1	0.1		
49.00	49	49.0	0.0		
44.00	44	44.2	0.2		
39.00	39	39.0	0.0		
34.00	34	34.1	0.1		
33.00	33	33.0	0.0		
32.00	32	32.0	0.0		
31.00	31	31.0	0.0		
30.00	30	30.0	0.0		

Certificate No : 23-SLM-229  
Request No : Req-2023-1390

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance
FAST / A	REF	UUC	ERR		Limit
UUC Range	(dB)	(dB)	(dB)	( ± dB)	( ± dB)
30-130	35.00	34.9	-0.1	0.3	0.8
	114	114.0	0.0		0.8
20-120	30.00	30.0	0.0		0.8
	114	114.0	0.0		0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance
A / 30-130	Toneburst	Ref	UUC	ERR		Limit
UUC Time Response	(ms)	(dB)	(dB)	(dB)	( ± dB)	( ± dB)
Fast	200	126.0	126.0	0.0	0.2	0.5
	2	109.0	109.0	0.0		+1.0, -1.5
	0.25	100.0	99.9	-0.1		+1.0, -3.0
Slow	200	119.6	119.6	0.0		0.5
	2	100.0	100.0	0.0		+1.0, -3.0
SEL	200	120.0	120.1	+0.1		0.5
	2	100.0	100.5	+0.5		+1.0, -1.5
	0.25	91.0	90.9	-0.1		+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance
FAST / C / 30-130	REF	UUC	ERR		Limit
STD Setting	(dB)	(dB)	(dB)	( ± dB)	( ± dB)
Complete cycle	125.4	125.4	0.00	0.2	2.0
Positive half cycle	124.4	124.1	-0.30		1.0
Negative half cycle	124.4	124.2	-0.20		1.0

Certificate No : 23-SLM-229  
Request No : Req-2023-1390

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 30-130	UUC		Limit
STD Setting	(dB)	( ± dB)	( ± dB)
Positive one-half cycle	141.4		
Negative one-half cycle	141.4		
Deviated	0.0	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 30-130	UUC		Limit
STD Setting	(dB)	( ± dB)	( ± dB)
Initial	129.0		
Final	129.0		
Deviated	0.0	0.1	0.1

End of Certificate

### Certificate of Calibration

#### Customer

Name : SGS (Thailand) Limited. Certificate No : 23-SLM-137  
Address : 100 Nanglinchee Road, Chongkronsi, Yannawa Bangkok 10120 Request No : Req-2023-0806

#### Unit Under Calibration Details

Measurement item : Sound Level Meter Microphone Class : 1  
Manufacturer : RION Microphone Model : UC-59  
Model : NA-28 Microphone S/N : 18902  
Serial Number : 00570433 Preamplifier Model : NH-23  
ID : ENSL 045 Preamplifier S/N : 70448  
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 : 20 April 2023  
Calibrated Date : 21 April 2023  
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	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svantek	Svan401	131	12 October 2023	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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 21 April 2023



Certificate No : 23-SLM-137

Request No : Req-2023-0806

#### 1. Indication at the calibration check frequency

UUC Setting	Nominal Level	Before Adjust		After Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)	(± dB)	(± dB)
1000 Hz 114 dB	113.79	113.9	+0.11	113.8	+0.01	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Svanek, Model SV35, SN. 58079

#### 2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 20-80		
UUC Weighting	(dB)	(± dB)
A	14.9	0.1

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

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 20-80		
UUC Weighting	(dB)	(± dB)
A	7.9	0.1
C	11.4	0.1
Z	18.2	0.1

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	A (dB)	C (dB)	Z (dB)		
FAST / 30-130					
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
125 Hz	0.1	0.2	0.1	0.6	1.0
1000 Hz	0.0	0.0	0.0	0.6	0.7
4000 Hz	-0.2	-0.1	0.0	0.6	1.0
8000 Hz	-0.6	-0.6	-0.5	0.7	+1.5 -2.5

Certificate No : 23-SLM-137

Request No : Req-2023-0806

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

UUC Setting		Deviation from various Frequency			UNCERTAINTY	Acceptance Limit
FAST / 30-130		Weighting Response curve				
STD Setting		A (dB)	C (dB)	Z (dB)	( ± dB)	( ± dB)
63 Hz		-0.1	0.0	0.0	0.2	1.0
125 Hz		-0.1	0.1	0.0		1.0
250 Hz		-0.1	0.0	0.0		1.0
500 Hz		0.0	0.1	0.0		1.0
1000 Hz		0.0	0.0	0.0		0.7
2000 Hz		0.0	0.1	0.0		1.0
4000 Hz		0.0	0.1	0.0		1.0
8000 Hz		0.1	0.1	0.0		+1.5, -2.5
16000 Hz		-0.5	-0.5	0.0		+2.5, -16.0

#### 6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / 30-130	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	0.2	0.2 0.2 0.2
A	114.00	114.0	0.0		
C	114.00	114.0	0.0		
Z	114.00	114.0	0.0		

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
30-130 / A	REF	UUC	ERR		
UUC Time Response	(dB)	(dB)	(dB)	0.2	0.1 0.1 0.1
Fast	114.00	114.0	0.0		
Slow	114.00	114.0	0.0		
Leq	114.00	114.0	0.0		

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-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-137

Request No : Req-2023-0806

#### 7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 50-140	UUC		
STD Setting	(dB)	0.1	0.1
Initial	114.0		
Final	114.0		
Deviated	0.0		

#### 8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 50-140	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	0.3	0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8
130.00	130	130.0	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		

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-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-137

Request No : Req-2023-0806

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit
FAST / A	REF	UUC	ERR		( $\pm$ dB)
UUC Range	(dB)	(dB)	(dB)		
20-120	30.1	30.1	0.0	0.3	0.8
	114	114.0	0.0		0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit
A / 30-130	Toneburst	Ref	UUC	ERR		( $\pm$ dB)
UUC Time Response	(ms)	(dB)	(dB)	(dB)		
Fast	200	126.0	126.0	0.0	0.2	0.5
	2	109.0	109.0	0.0		+1.0, -1.5
	0.25	100.0	99.9	-0.1		+1.0, -3.0
Slow	200	119.6	119.6	0.0		0.5
	2	100.0	100.0	0.0		+1.0, -3.0
SEL	200	120.0	120.0	0.0		0.5
	2	100.0	100.0	0.0		+1.0, -1.5
	0.25	91.0	90.9	-0.1		+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit
FAST / C / 55-141	REF	UUC	ERR		( $\pm$ dB)
STD Setting	(dB)	(dB)	(dB)		
Complete cycle	136.4	136.1	-0.30	0.2	2.0
Positive half cycle	135.4	135.2	-0.20		1.0
Negative half cycle	135.4	135.2	-0.20		1.0

Certificate No : 23-SLM-137

Request No : Req-2023-0806

12. Overload indication

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit
FAST / A / 30-130	UUC		( $\pm$ dB)
STD Setting	(dB)		
Positive one-half cycle	141.7		
Negative one-half cycle	141.7		
Deviated	0.0	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit
FAST / A / 30-130	UUC		( $\pm$ dB)
STD Setting	(dB)		
Initial	129.0		
Final	129.0		
Deviated	0.0	0.1	0.1

End of Certificate

## Certificate of Calibration

### Customer

Name : SGS (Thailand) Limited.  
 Address : 100 Nanlinghe Road, Chongnonsi, Yannawa Bangkok 10120

Certificate No : 23-SLM-041  
 Request No : Req-2023-0295

### Unit Under Calibration Details

Measurement item : Sound Level Meter  
 Manufacturer : Cirrus  
 Model : CR161B  
 Serial Number : G078054  
 ID : ENSL 16122  
 Resolution : 0.1 dB  
 Microphone Class : I  
 Microphone Model : MK224  
 Microphone S/N : 206565A  
 Preamplifier Model : KM170  
 Preamplifier S/N : 0824  
 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 : 2 February 2023  
 Calibrated Date : 9 February 2023  
 Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part3: Periodic test  
 Location of Calibration : Lab Acoustic

### Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svantek	Svan401	131	12 October 2023	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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 9 February 2023



Certificate No : 23-SLM-041

Request No : Req-2023-0295

### 1. Indication at the calibration check frequency

UUC Setting	Nominal Level (dB)	Before Adjust		Adjust		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
1000 Hz 94.00 dB	93.81	93.7	-0.11	93.8	-0.01	0.20	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN. 58079

### 2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY ( ± dB)
FAST / 20-140		
UUC Weighting	(dB)	( ± dB)
A	19.7	0.10

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

UUC Setting	Measured (dB)	UNCERTAINTY ( ± dB)
FAST / 20-140		
UUC Weighting	(dB)	( ± dB)
A	-	0.10
C	18.2	0.10
Z	31.1	0.10

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
	A	C	Z		
FAST / 20-140	(dB)	(dB)	(dB)	( ± dB)	( ± dB)
STD Setting	(dB)	(dB)	(dB)	( ± dB)	( ± dB)
125 Hz	0.5	0.3	0.2	0.50	1.0
1000 Hz	0.0	0.0	0.0	0.60	0.7
4000 Hz	-0.8	-0.7	-0.3	0.60	1.0
8000 Hz	0.2	0.5	0.9	0.70	+1.5 -2.5



Certificate No : 23-SLM-041  
 Request No : Req-2023-0295

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

UUC Setting		Deviation from various Frequency			UNCERTAINTY	Acceptance
FAST / 20-140		Weighting Response curve				
STD Setting		A (dB)	C (dB)	Z (dB)	( ± dB)	Limit ( ± dB)
63 Hz		0.2	0.0	0.0	0.2	1.0
125 Hz		0.2	0.0	0.0		1.0
250 Hz		0.2	0.0	0.0		1.0
500 Hz		0.1	0.0	0.0		1.0
1000 Hz		0.0	0.0	0.0		0.7
2000 Hz		-0.2	0.0	0.0		1.0
4000 Hz		-0.4	-0.2	0.0		1.0
8000 Hz		-0.5	-0.4	-0.1		+1.5, -2.5
16000 Hz		0.1	0.2	-0.3		+2.5, -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / 20-140	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	0.2	0.2
A	114.00	114.0	0.0		
C	114.00	114.0	0.0		
Z	114.00	114.0	0.0		

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
20-140 / A	REF	UUC	ERR		
UUC Time Response	(dB)	(dB)	(dB)	0.2	0.1
Fast	114.00	114.0	0.0		
Slow	114.00	114.0	0.0		
Leq	114.00	114.0	0.0		

Certificate No : 23-SLM-041  
 Request No : Req-2023-0295

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 20-140	UUC		
STD Setting	(dB)	0.1	0.1
Initial	114.0		
Final	114.0		
Deviated	0.0		

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 20-140	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	0.3	0.8
139.00	139	139.0	0.0		
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	29.1	0.1		
24.00	24	23.9	-0.1		

Certificate No : 23-SLM-041  
 Request No : Req-2023-0295

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A	REF	UUC	ERR		
UUC Range	(dB)	(dB)	(dB)		
20-140	25.3	25.4	0.1	0.3	0.8
	114	114.0	0.0		0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
A / 20-140	Toneburst	Ref	UUC	ERR		
UUC Time Response	(ms)	(dB)	(dB)	(dB)		
Fast	200	136.0	136.0	0.0	0.3	0.5
	2	119.0	118.9	-0.1		+1.0, -1.5
	0.25	110.0	109.9	-0.1		+1.0, -3.0
Slow	200	129.6	129.6	0.0		0.5
	2	110.0	110.0	0.0		+1.0, -3.0
SEL	200	130.0	130.0	0.0		0.5
	2	110.0	110.0	0.0		+1.0, -1.5
	0.25	101.0	101.0	0.0		+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / C / 20-140	REF	UUC	ERR		
STD Setting	(dB)	(dB)	(dB)		
Complete cycle	135.4	135.6	+0.20	0.2	2.0
Positive half cycle	134.4	134.2	-0.20		1.0
Negative half cycle	134.4	134.2	-0.20		1.0

Certificate No : 23-SLM-041  
 Request No : Req-2023-0295

12. Overload indication

UUC Setting	Measured	UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 20-140	UUC		
STD Setting	(dB)		
Positive one-half cycle	143.7		
Negative one-half cycle	143.6		
Deviated	0.1	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 20-140	UUC		
STD Setting	(dB)		
Initial	139.0		
Final	139.0		
Deviated	0.0	0.1	3.1

End of Certificate

## Certificate of Calibration

### Customer

Name : SGS (Thailand) Limited.  
Address : 100 Nanlingchee Road, Chongnonsi, Yannawa Bangkok 10120

Certificate No : 23-SLM-086  
Request No : Req-2023-0575

### Unit Under Calibration Details

Measurement item : Sound Level Meter  
Manufacturer : Cirrus  
Model : CR-171B  
Serial Number : G078141  
ID : ENSL 16125  
Resolution : 0.1 dB  
Microphone Class : 1  
Microphone Model : MK224  
Microphone S/N : 205147A  
Preamplifier Model : -  
Preamplifier S/N : 7759F  
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 March 2023  
Calibrated Date : 13 March 2023  
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	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	SvanteK	Svan401	131	12 October 2023	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 :

Calibration Officer

Approved By :

Calibration Engineer/Supervisor

Issue Date : 13 March 2023



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FM-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-086

Request No : Req-2023-0575

### 1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		Adjust		UNCERTAINTY	Acceptance
FAST / A / 20-140	Level	UUC	ERR	UUC	ERR	( ± dB)	Limit
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)		( ± dB)
1000 Hz 94.00 dB	94.03	90.3	-3.73	93.8	-0.23	0.20	0.3

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
FAST / 20-140	(dB)	( ± dB)
UUC Weighting		
A	16.5	0.10

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

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140	(dB)	( ± dB)
UUC Weighting		
A	-	0.10
C	16.4	0.10
Z	34.2	0.10

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY	Acceptance
FAST / 20-140	A	C	Z	( ± dB)	Limit
STD Setting	(dB)	(dB)	(dB)		( ± dB)
125 Hz	0.6	0.4	0.3	0.50	1.0
1000 Hz	0.0	0.0	0.0	0.60	0.7
4000 Hz	-0.7	-0.7	-0.7	0.60	1.0
8000 Hz	-0.5	-0.4	-0.1	0.70	+1.5 -2.5

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-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-086  
 Request No : Req-2023-0575

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

UUC Setting	Deviation from various Frequency			UNCERTAINTY	Acceptance Limit
FAST / 20-140	Weighting Response curve				
STD Setting	A (dB)	C (dB)	Z (dB)	( ± dB)	( ± dB)
63 Hz	0.2	0.0	0.1	0.2	1.0
125 Hz	0.1	0.0	0.1		1.0
250 Hz	0.1	0.0	0.1		1.0
500 Hz	0.1	0.0	0.0		1.0
1000 Hz	0.0	0.0	0.0		0.7
2000 Hz	-0.1	0.0	0.0		1.0
4000 Hz	-0.2	-0.2	0.0		1.0
8000 Hz	-0.2	-0.2	-0.1		+1.5, -2.5
16000 Hz	0.2	0.2	-0.1		+2.5, -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / 20-140	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	0.2	0.2
A	114.00	114.0	0.0		
C	114.00	114.0	0.0		
Z	114.00	114.0	0.0		

UUC Setting	STD	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
20-140 / A	REF	UUC	ERR		
UUC Time Response	(dB)	(dB)	(dB)	0.2	0.1
Fast	114.00	114.0	0.0		
Slow	114.00	114.0	0.0		
Leq	114.00	114.0	0.0		

Certificate No : 23-SLM-086  
 Request No : Req-2023-0575

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / A / 20-140	UUC		
STD Setting	(dB)		
Initial	114.0		
Final	114.0		
Deviated	0.0		

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / A / 20-140	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	0.3	0.8
139.00	139	139.0	0.0		
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	44.1	0.1		
39.00	39	39.1	0.1		
34.00	34	34.1	0.1		
29.00	29	29.1	0.1		
24.00	24	24.2	0.2		

Certificate No : 23-SLM-086  
 Request No : Req-2023-0575

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance
FAST / A	REF	UUC	ERR	( ± dB)	Limit
UUC Range	(dB)	(dB)	(dB)		( ± dB)
20-140	29.3	29.5	0.2	0.3	0.8
	114	114.0	0.0		0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance
A / 20-140	Toneburst	Ref	UUC	ERR	( ± dB)	Limit
UUC Time Response	(ms)	(dB)	(dB)	(dB)		( ± dB)
Fast	200	136.0	136.0	0.0	0.3	0.5
	2	119.0	119.0	0.0		+1.0, -1.5
	0.25	110.0	109.9	-0.1		+1.0, -3.0
Slow	200	129.6	129.5	-0.1		0.5
	2	110.0	109.9	-0.1		+1.0, -3.0
SEL	200	130.0	130.0	0.0		0.5
	2	110.0	109.9	-0.1		+1.0, -1.5
	0.25	101.0	100.9	-0.1		+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance
FAST / C / 20-140	REF	UUC	ERR	( ± dB)	Limit
STD Setting	(dB)	(dB)	(dB)		( ± dB)
Complete cycle	135.4	135.1	-0.30	0.2	2.0
Positive half cycle	134.4	134.1	-0.30		1.0
Negative half cycle	134.4	134.1	-0.30		1.0

Certificate No : 23-SLM-086  
 Request No : Req-2023-0575

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 20-140	UUC	( ± dB)	Limit
STD Setting	(dB)		( ± dB)
Positive one-half cycle	143.5		
Negative one-half cycle	143.2		
Deviated	0.3	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 20-140	UUC	( ± dB)	Limit
STD Setting	(dB)		( ± dB)
Initial	139.0		
Final	139.0		
Deviated	0.0	0.1	0.1

End of Certificate

### Certificate of Calibration

#### Customer

Name : SGS (Thailand) Limited.  
Address : 100 Nanglinchee Road, Chongronsi, Yannawa Bangkok 10120

Certificate No : 23-SLM-088  
Request No : Req-2023-0582

#### Unit Under Calibration Details

Measurement item : Sound Level Meter  
Manufacturer : Cirrus  
Model : CR-171B  
Serial Number : G078138  
ID : ENSL 16127  
Resolution : 0.1 dB  
Microphone Class : 1  
Microphone Model : MK224  
Microphone S/N : 202157A  
Preamplifier Model : MK-170  
Preamplifier S/N : 0805  
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 March 2023  
Calibrated Date : 13 March 2023  
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	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svante	Svan401	131	12 October 2023	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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 13 March 2023



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

FH-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-088

Request No : Req-2023-0582

#### 1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		Adjust		UNCERTAINTY	Acceptance
FAST / A / 20-140	Level	UUC	ERR	UUC	ERR	( ± dB)	Limit
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)		( ± dB)
1000 Hz 94.00 dB	94.03	93.8	-0.23	93.8	-0.23	0.20	0.3

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

#### 2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140	(dB)	( ± dB)
UUC Weighting		
A	18.1	0.10

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

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140	(dB)	( ± dB)
UUC Weighting		
A	-	0.10
C	19.4	0.10
Z	30.9	0.10

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY	Acceptance
FAST / 20-140	A	C	Z	( ± dB)	Limit
STD Setting	(dB)	(dB)	(dB)		( ± dB)
125 Hz	0.4	0.5	0.6	0.50	1.0
1000 Hz	0.0	0.0	0.0	0.60	0.7
4000 Hz	-0.6	-0.5	-0.4	0.60	1.0
8000 Hz	-1.7	-1.6	-1.7	0.70	+1.5 -2.5

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

FH-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-088  
 Request No : Req-2023-0582

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

UUC Setting		Deviation from various Frequency			UNCERTAINTY	Acceptance
FAST / 20-140		Weighting Response curve				
STD Setting		A (dB)	C (dB)	Z (dB)	( ± dB)	Limit ( ± dB)
63 Hz		0.2	0.1	0.0	0.2	1.0
125 Hz		0.2	0.0	0.0		1.0
250 Hz		0.1	0.0	0.0		1.0
500 Hz		0.1	0.0	0.0		1.0
1000 Hz		0.0	0.0	0.0		0.7
2000 Hz		-0.2	0.0	0.0		1.0
4000 Hz		-0.3	-0.2	0.0		1.0
8000 Hz		-0.4	-0.3	-0.1		+1.5, -2.5
16000 Hz		0.2	0.2	-0.2		+2.5, -16.0

# 6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / 20-140	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	0.2	0.2
A	114.00	114.0	0.0		
C	114.00	114.0	0.0		
Z	114.00	114.0	0.0		

UUC Setting	STD	Measured		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
20-140 / A	REF	UUC	ERR		
UUC Time Response	(dB)	(dB)	(dB)	0.2	0.1
Fast	114.00	114.0	0.0		
Slow	114.00	114.0	0.0		
Leq	114.00	114.0	0.0		

Certificate No : 23-SLM-088  
 Request No : Req-2023-0582

# 7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 20-140	UUC		
STD Setting	(dB)	0.1	0.1
Initial	114.0		
Final	114.0		
Deviated	0.0		

# 8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 20-140	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	0.3	0.8
139.00	139	139.0	0.0		
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	54.1	0.1		
49.00	49	49.1	0.1		
44.00	44	44.1	0.1		
39.00	39	39.1	0.1		
34.00	34	34.1	0.1		
29.00	29	29.2	0.2		
24.00	24	24.2	0.2		

Certificate No : 23-SLM-088  
 Request No : Req-2023-0582

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A	REF	UUC	ERR		
UUC Range	(dB)	(dB)	(dB)		
20-140	24.9	25.3	0.4	0.3	0.8
	114	114.0	0.0		0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
A / 20-140	Toneburst	Ref	UUC	ERR		
UUC Time Response	(ms)	(dB)	(dB)	(dB)		
Fast	200	136.0	136.0	0.0	0.3	0.5
	2	119.0	118.9	-0.1		+1.0, -1.5
	0.25	110.0	109.9	-0.1		+1.0, -3.0
Slow	200	129.6	129.6	0.0		0.5
	2	110.0	110.0	0.0		+1.0, -3.0
SEL	200	130.0	130.0	0.0		0.5
	2	110.0	110.0	0.0		+1.0, -1.5
	0.25	101.0	100.9	-0.1		+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / C / 20-140	REF	UUC	ERR		
STD Setting	(dB)	(dB)	(dB)		
Complete cycle	135.4	135.5	+0.10	0.2	2.0
Positive half cycle	134.4	134.3	-0.10		1.0
Negative half cycle	134.4	134.3	-0.10		1.0

Certificate No : 23-SLM-088  
 Request No : Req-2023-0582

12. Overload indication

UUC Setting	Measured	UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 20-140	UUC		
STD Setting	(dB)		
Positive one-half cycle	141.1		
Negative one-half cycle	140.9		
Deviated	0.2	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 20-140	UUC		
STD Setting	(dB)		
Initial	139.0		
Final	139.0		
Deviated	0.0	0.1	0.1

End of Certificate



### Certificate of Calibration

#### Customer

Name : SGS (Thailand) Limited.  
Address : 100 Nanglinchee Road, Chongnonsi, Yannaawa Bangkok 10120

Certificate No : 23-NDM-063  
Request No : Req-2023-0577

#### Unit Under Calibration Details

Measurement item : Noise dosimeter  
Manufacturer : CASELLA  
Model : dBadge2  
Serial Number : 1167163  
ID : ENSL 17141  
Resolution : 0.1 dB  
Microphone Class : 2  
Microphone Model : -  
Microphone S/N : 54251  
Preamplifier Model : -  
Preamplifier S/N : -  
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 March 2023  
Calibrated Date : 24 March 2023  
Calibration Procedure : In-house method CP-NDM-01 based on IEC 61252 : 2017  
Location of Calibration : Lab Acoustic

#### Reference Standard


Instrument	Brand	Model	SN.	Due calibration	Traceability
Multifrequency Calibrator	Quest	Quest-cal	188272	29 June 2023	TSI
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Sine Generator	Svantek	Svan401	131	12 October 2023	WK Electric
Timer	EXTECH	-	05-ACT	24 March 2023	TPA

#### Note

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

This Certificate was issued to replace to Calibration Certificate No. 22-ACT-202

Calibrated By :   
Calibration Officer

Approved By :   
Calibration Engineer Supervisor

Issue Date : 24 March 2023



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-NDM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-NDM-063  
Request No : Req-2023-0577

#### 1. Absolute acoustical sensitivity

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	(%)	Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)		(%)
1000 Hz 94 dB	120.00	120	0.03	0.03	0.00	3.0	-21, +26

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

#### 2. Frequency weightings

UUC Setting	Deviation from various Frequency Weighting		UNCERTAINTY	Tolerances
FAST / 54-140	A	C	(± dB)	Limit
STD Setting	(dB)	(dB)		(± dB)
*63 Hz	-0.5	-0.6	0.40	2.0
125 Hz	-0.7	-0.7	0.40	1.5
250 Hz	-0.7	-0.7	0.40	1.5
500 Hz	-0.2	-0.1	0.40	1.5
1000 Hz	0.0	0.0	0.40	-
2000 Hz	-0.3	-0.2	0.40	2.0
4000 Hz	0.8	0.8	0.40	3.0
8000 Hz	-1.0	-1.0	0.40	5.0

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-NDM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-NDM-063

Request No : Req-2023-0577

### 3. Linearity of response to steady signals

#### a. Sound exposure meter, linearity of response for changes of input sinusoidal signal level

UUC Setting			FAST / A / High								
1000 Hz	Ref	(dB)	54.0	80.0	90.0	100.0	110.0	114.0	120.0	130.0	140.0
	Level A	(dB)	54.2	80.1	90.0	100.0	110.0	114.0	120.0	129.9	139.9
	Error	(dB)	0.2	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
8000 Hz	Ref	(dB)			88.9	98.9	108.9	112.9	118.9	128.9	138.9
	Level A	(dB)			89.0	99.0	108.9	112.9	118.9	128.9	138.9
	Error	(dB)			0.1	0.1	0.0	0.0	0.0	0.0	0.0
63 Hz	Ref	(dB)						87.8	93.8	103.8	113.8
	Level A	(dB)						87.8	93.8	103.8	113.8
	Error	(dB)						0.0	0.0	0.0	0.0
Tolerances Limit		(±dB)	1.0								
UNCERTAINTY		(±dB)	0.27								

#### b. Sound exposure meter linearity of error

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140		Ref	UUC	Ref	UUC	Error		Limit
Calibrator Setting		(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
1000 Hz 110 dB		27	27	0.30	0.30	0.00	4.3	-21, +26
1000 Hz 110 dB		45	45	0.50	0.50	0.00		
1000 Hz 110 dB		90	90	1.00	0.99	-1.00		
1000 Hz 110 dB		180	180	2.00	1.98	-1.00		
1000 Hz 120 dB		36	36	4.00	3.98	-0.50		
1000 Hz 120 dB		72	72	8.00	7.93	-0.88	3.8	
1000 Hz 120 dB		90	90	10.00	9.90	-1.00		
1000 Hz 120 dB		180	180	20.00	19.83	-0.85		
1000 Hz 120 dB		360	360	40.00	39.63	-0.92		
1000 Hz 120 dB		720	720	80.00	79.24	-0.95		

Certificate No : 23-NDM-063

Request No : Req-2023-0577

### 4. Response to short duration

#### a. Response for sinusoidal signals - reference level

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
FAST / A / 54-140		Ref	UUC	Ref	UUC	Error		
Calibrator Setting		(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)
4000 Hz 95 dB		2846	2846	1.00	0.99	-0.01	0.01	-0.29 - 0.41

#### b. Sound exposure meter response for series of toneburst impulses

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
FAST / A / 54-140		Ref	UUC	Ref	UUC	Error		
Calibrator Setting		(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Burst 1 ms, 95 dB		2846	2846	1.00	0.99	-1.00	3.0	-21 - +26
Burst 1 ms, 100 dB		900	900	1.00	0.99	-1.00		-21 - +41
Burst 1 ms, 108 dB		143	143	1.00	1.00	0.00		-21 - +41

### 5. Response to unipolar pulse

UUC Setting		Time	Exposure Measurement		UNCERTAINTY	Tolerances
FAST / A / 54-140		UUC	UUC	Different		Limit
Calibrator Setting		(s)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Continuous Rectangle +		29	10.13	+0.39	2.4	-21 - +26
Continuous Rectangle -			10.17			

\* Indicates non accredited

End of Certificate

### Certificate of Calibration

#### Customer

Name : Clarion Asia (Thailand) Co., Ltd.  
Address : 500/39 Moo 3 WHA Eastern Seaboard Industrial Estate 1, Tasith,  
Phuakdaeng, Rayong 21140, Thailand.

Certificate No : 23-APC-034

Request No : Req-2023-0611

#### Unit Under Calibration Details

Measurement Item : Particle counter  
Manufacturer : CEM  
Model : DT-9880  
Serial Number : 191202797  
ID : -

#### Environment Condition

Temperature : 23 °C ± 3 °C  
Humidity : 55 %RH ± 15 %RH  
Received Date : 13 March 2023  
Calibration result : As Left

Calibration Procedure : In-house method CP-APC-01 based on ISO 21501-4

Location of Calibration : Particle Counter Laboratory


Aerotrak Calibration Kit				
Reference Standard	Model	Serial Number	Traceable	Due Calibration
Particle counter	9310-02	93101540006	WK Electric	19 May 2023
Air flow meter	Gilibrator 3 High Flow	18501012012	Sensidyne	15 June 2023

Particle Standard				
Particle Size (µm)	Standard Uncertainty (µm)	Lot No.	Traceable	Due Calibration
0.303	0.003	231958	NIST	1 October 2023
0.508	0.0035	221485	NIST	1 May 2024
1.036	0.006	231965	NIST	1 October 2023
5.400	0.15	230231	NIST	1 August 2023
9.700	0.25	223900	NIST	1 September 2025

Traceability : This Certificate is traceable to SI Unit through WK Electric Co., Ltd. and Miracle international Technology Co., Ltd. and Sensidyne

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

Calibration By :   
Service Calibration Engineer

Approved By :   
Calibration Engineer Supervisor  
Issue Date : 24 March 2023

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-APC-01 Rev.00 Issue date 01/07/19

Certificate No : 23-APC-034

Request No : Req-2023-0611

Counting Efficiency			
Particle Size (µm)	Deviation %	**Allowable Range %	Uncertainty %
0.3	-93.6	± 20	13
0.5	-49.9	± 10	15
1.0	-10.9	± 10	5.9
5.0	-64.3	± 10	5.8
10.0	-71.3	± 10	6.2

* False Count Rate					
Sample Time	Sampled	Measured Counts	Concentration	95% UCL	**Allowable Range
(min)	(L)	(#)	(#/M <sup>3</sup> )	(#/M <sup>3</sup> )	(#/M <sup>3</sup> )
15	740	0	0.00	70.0	≤ 70.0

Sampling Flow Rate						
Temperature (°C)	Pressure (kPa)	UUC (Fixed Flow) (l/min)	STD (l/min)	Error %	**Allowable Range %	Uncertainty (L/min)
25.52	100.17	2.83	2.775	-1.9	± 5	0.064

Note : - UUC Reference Condition : At atmospheric and room temperature condition

- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{\text{meas}} = Q_{\text{ref}} \times \frac{P_{\text{ref}}}{P_{\text{meas}}} \times \frac{T_{\text{meas}}}{T_{\text{ref}}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature  
Meas = Measurement Condition ref = Standard Condition

*Calibration Interval	
Calibration Date	**Expiration Date
24 March 2023	<= 1 Year

\* Indicates non accredited

\*\* Specified in ISO 21501-4

End of Certificate

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-APC-01 Rev.00 Issue date 01/07/19

### Certificate of Calibration

#### Customer

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

Certificate No : 23-NDM-064  
Request No : Req-2023-0579

#### Unit Under Calibration Details

Measurement item : Noise dosimeter  
Manufacturer : CASELLA  
Model : dBadge2  
Serial Number : 1167272  
ID : ENSL 17144  
Resolution : 0.1 dB  
Microphone Class : 2  
Microphone Model : -  
Microphone S/N : 62289  
Preamplifier Model : -  
Preamplifier S/N : -  
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 March 2023  
Calibrated Date : 24 March 2023  
Calibration Procedure : In-house method CP-NDM-01 based on IEC 61252 : 2017  
Location of Calibration : Lab Acoustic

#### Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Multifrequency Calibrator	Quest	Quest-cal	188272	29 June 2023	TSI
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Sine Generator	Svantek	Svan401	131	12 October 2023	WK Electric
Timer	EXTECH	-	05-ACT	24 March 2023	TPA

#### Note

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

This Certificate was issued to replace to Calibration Certificate No. 22-ACT-202

Calibrated By :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 24 March 2023



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-NDM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-NDM-064  
Request No : Req-2023-0579

#### 1. Absolute acoustical sensitivity

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	(%)	Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)		(%)
1000 Hz 94 dB	120.00	120	0.03	0.03	0.00	3.0	-21, +26

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR:315, SN. 80400

#### 2. Frequency weightings

UUC Setting	Deviation from various Frequency Weighting		UNCERTAINTY	Tolerances
FAST / 54-140	A	C	( ± dB)	Limit
STD Setting	(dB)	(dB)		( ± dB)
*63 Hz	-0.4	-0.5	0.40	2.0
125 Hz	-0.5	-0.5	0.40	1.5
250 Hz	-0.3	-0.3	0.40	1.5
500 Hz	-0.1	0.0	0.40	1.5
1000 Hz	0.0	0.0	0.40	-
2000 Hz	-0.2	-0.1	0.40	2.0
4000 Hz	1.2	1.2	0.40	3.0
8000 Hz	-1.3	-1.3	0.40	5.0

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-NDM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-NDM-064  
Request No : Req-2023-0579

### 3. Linearity of response to steady signals

#### a. Sound exposure meter, linearity of response for changes of input sinusoidal signal level

UUC Setting		FAST / A / High									
1000 Hz	Ref	(dB)	54.0	80.0	90.0	100.0	110.0	114.0	120.0	130.0	140.0
	Level A	(dB)	54.2	80.1	90.0	100.0	110.0	114.0	120.0	130.0	140.0
	Error	(dB)	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8000 Hz	Ref	(dB)					88.9	98.9	108.9	118.9	128.9
	Level A	(dB)					88.9	98.9	108.9	118.9	128.8
	Error	(dB)					0.0	0.0	0.0	-0.1	-0.1
63 Hz	Ref	(dB)					87.8	93.8	103.8	113.8	
	Level A	(dB)					87.8	93.8	103.8	113.8	
	Error	(dB)					0.0	0.0	0.0	0.0	
Tolerances Limit		(±dB)	1.0								
UNCERTAINTY		(±dB)	0.27								

#### b. Sound exposure meter linearity of error

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error			
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	Limit	
1000 Hz 110 dB	27	27	0.30	0.30	0.00	4.3	-21, +26	
1000 Hz 110 dB	45	45	0.50	0.50	0.00			
1000 Hz 110 dB	90	90	1.00	0.99	-1.00			
1000 Hz 110 dB	180	180	2.00	1.99	-0.50			
1000 Hz 120 dB	36	36	4.00	3.96	-1.00			
1000 Hz 120 dB	72	72	8.00	7.92	-1.00			
1000 Hz 120 dB	90	90	10.00	9.90	-1.00			
1000 Hz 120 dB	180	180	20.00	19.83	-0.85	3.8		
1000 Hz 120 dB	360	360	40.00	39.66	-0.85			
1000 Hz 120 dB	720	720	80.00	79.26	-0.92			

Certificate No : 23-NDM-064  
Request No : Req-2023-0579

### 4. Response to short duration

#### a. Response for sinusoidal signals - reference level

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	(Pa <sup>2</sup> h)	Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)		
4000 Hz 95 dB	2846	2846	1.00	0.99	-0.01	0.01	-0.29 - 0.41

#### b. Sound exposure meter response for series of toneburst impulses

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	(%)	Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)		
Burst 1 ms, 95 dB	2846	2846	1.00	0.99	-1.00	3.0	-21 - +26
Burst 1 ms, 100 dB	900	900	1.00	0.99	-1.00		-21 - +41
Burst 1 ms, 108 dB	143	143	1.00	1.00	0.00		-21 - +41

### 5. Response to unipolar pulse

UUC Setting	Time	Exposure Measurement		UNCERTAINTY	Tolerances
FAST / A / 54-140	UUC	UUC	Different	(%)	Limit
Calibrator Setting	(s)	(Pa <sup>2</sup> h)	(%)		
Continuous Rectangle +	29	10.24	+0.78	2.4	-21 - +26
Continuous Rectangle -		10.32			

\* Indicates non accredited

End of Certificate

### Certificate of Calibration

#### Customer

Name SGS (Thailand) Limited.  
Address 100 Nanglinchee Road, Chongnonsi, Yannawa Bangkok 10120

Certificate No : 23-NDM-162  
Request No : Req-2023-1377

#### Unit Under Calibration Details

Measurement item : Noise Dosimeter  
Manufacturer : CASELLA  
Model : dBadge2  
Serial Number : 1167278  
ID : ENSL 17146  
Resolution : 0.1 dB  
Microphone Class : 2  
Microphone Model : -  
Microphone S/N : 59434  
Preamplifier Model : -  
Preamplifier S/N : -  
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 : 20 June 2023  
Calibrated Date : 23 June 2023  
Calibration Procedure : In-house method CP-NDM-01 based on IEC 61252 : 2017  
Location of Calibration : Lab Acoustic

#### Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Multifrequency Calibrator	Quest	Quest-cal	188272	29 June 2023	TSI
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Sine Generator	Svantek	Svan401	131	12 October 2023	WK Electric
Timer	EXTECH	-	05-ACT	20 March 2024	TPA

#### 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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 23 June 2023



Certificate No : 23-NDM-162  
Request No : Req-2023-1377

#### 1. Absolute acoustical sensitivity

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	(%)	Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)		
1000 Hz 94 dB	120	120	0.03	0.03	0.00	3.1	-21, +26

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

#### 2. Frequency weightings

UUC Setting	Deviation from various Frequency Weighting		UNCERTAINTY	Tolerances
FAST / 54-140	A	C	( ± dB)	Limit
STD Setting	(dB)	(dB)		( ± dB)
*63 Hz	-0.1	0.0	0.40	2.0
125 Hz	-0.8	-0.3	0.40	1.5
250 Hz	-0.6	-0.1	0.40	1.5
500 Hz	-0.3	0.1	0.40	1.5
1000 Hz	0.0	0.0	0.40	-
2000 Hz	0.1	0.5	0.40	2.0
4000 Hz	2.3	2.4	0.40	3.0
8000 Hz	-3.3	-3.3	0.40	5.0

Certificate No : 23-NDM-162  
 Request No : Req-2023-1377

### 3. Linearity of response to steady signals

#### a. Sound exposure meter, linearity of response for changes of input sinusoidal signal level

UUC Setting		FAST / A / High										
1000 Hz	Ref	(dB)	55.0	80.0	90.0	100.0	110.0	114.0	120.0	130.0	140.0	
	Level A	(dB)	54.5	80.0	90.0	99.9	109.9	114.0	119.9	129.9	139.9	
	Error	(dB)	-0.5	0.0	0.0	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	
8000 Hz	Ref	(dB)			88.9	98.9	108.9	112.9	118.9	128.9	138.9	
	Level A	(dB)			89.0	98.9	108.9	112.9	118.9	128.9	138.8	
	Error	(dB)			0.1	0.0	0.0	0.0	0.0	0.0	-0.1	
63 Hz	Ref	(dB)						87.8	93.8	103.8	113.8	
	Level A	(dB)						87.8	93.7	103.7	113.7	
	Error	(dB)						0.0	-0.1	-0.1	-0.1	
Tolerances Limit		(±dB)	1.0									
UNCERTAINTY		(±dB)	0.3									

#### b. Sound exposure meter linearity of error

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	Limit		
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)	
1000 Hz 110 dB	27	27	0.30	0.30	0.00	5.6	-21, +26	
1000 Hz 110 dB	45	45	0.50	0.50	0.00			
1000 Hz 110 dB	90	90	1.00	0.99	-1.00			
1000 Hz 110 dB	180	180	2.00	1.98	-1.00			
1000 Hz 120 dB	36	36	4.00	3.98	-0.50			
1000 Hz 120 dB	72	72	8.00	7.98	-0.25	5.6		
1000 Hz 120 dB	90	90	10.00	9.98	-0.20			
1000 Hz 120 dB	180	180	20.00	19.95	-0.25			
1000 Hz 120 dB	360	360	40.00	39.92	-0.20			
1000 Hz 120 dB	720	720	80.00	79.84	-0.20			

Certificate No : 23-NDM-162  
 Request No : Req-2023-1377

### 4. Response to short duration

#### a. Response for sinusoidal signals - reference level

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
	Ref	UUC	Ref	UUC	Error		
FAST / A / 54-140	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)
4000 Hz 95 dB	2846	2846	1.00	0.98	-0.02	0.052	-0.29 - +0.41

#### b. Sound exposure meter response for series of toneburst impulses

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
	Ref	UUC	Ref	UUC	Error		
FAST / A / 54-140	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Burst 1 ms, 95 dB	2846	2846	1.00	0.98	-2.00	5.6	-21 - +26
Burst 1 ms, 100 dB	900	900	1.00	0.98	-2.00		-29 - +41
Burst 1 ms, 108 dB	143	143	1.00	0.99	-1.00		-29 - +41

### 5. Response to unipolar pulse

UUC Setting	Time		Exposure Measurement		UNCERTAINTY	Tolerances Limit
	UUC	UUC	UUC	Different		
FAST / A / 55-140	(s)	(s)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Continuous Rectangle +	28		10.37	+0.39	3.7	-21 - +26
Continuous Rectangle -			10.33			

\* Indicates non accredited

End of Certificate



### Certificate of Calibration

#### Customer

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

Certificate No : 23-NDM-066  
Request No : Req-2023-0598

#### Unit Under Calibration Details

Measurement item : Noise dosimeter  
Manufacturer : CASELLA  
Model : dBadge2  
Serial Number : 1167292  
ID : ENSL 17147  
Resolution : 0.1 dB  
Microphone Class : 2  
Microphone Model : -  
Microphone S/N : 59286  
Preamplifier Model : -  
Preamplifier S/N : -  
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 March 2023  
Calibrated Date : 24 March 2023  
Calibration Procedure : In-house method CP-NDM-01 based on IEC 61252 : 2017  
Location of Calibration : Lab Acoustic

#### Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Multifrequency Calibrator	Quest	Quest-cal	188272	29 June 2023	TSI
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Sine Generator	Svantek	Svan401	131	12 October 2023	WK Electric
Timer	EXTECH	-	05-ACT	24 March 2023	TPA

#### Note

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

This Certificate was issued to replace to Calibration Certificate No. 22-ACT-202

Calibrated By :



Calibration Officer

Approved By :



Calibration Engineer Supervisor

Issue Date : 24 March 2023



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-NDM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-NDM-066

Request No : Req-2023-0598

#### 1. Absolute acoustical sensitivity

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	(%)	Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)		(%)
1000 Hz 94 dB	120.00	120	0.03	0.03	0.00	3.0	-21, +26

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR:315, SN. 80400

#### 2. Frequency weightings

UUC Setting	Deviation from various Frequency Weighting		UNCERTAINTY	Tolerances
FAST / 54-140	A	C	( ± dB)	Limit
STD Setting	(dB)	(dB)		( ± dB)
63 Hz	0.1	0.0	0.40	2.0
125 Hz	-0.7	-0.7	0.40	1.5
250 Hz	-0.8	-0.8	0.40	1.5
500 Hz	-0.4	-0.3	0.40	1.5
1000 Hz	0.0	0.0	0.40	-
2000 Hz	0.2	0.3	0.40	2.0
4000 Hz	2.3	2.3	0.40	3.0
8000 Hz	-2.5	-2.5	0.40	5.0

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-NDM-01 Rev.0 Issue date 01/07/19



Certificate No : 23-NDM-066  
Request No : Req-2023-0598

### 3. Linearity of response to steady signals

#### a. Sound exposure meter, linearity of response for changes of input sinusoidal signal level

UUC Setting		FAST / A / High									
1000 Hz	Ref	(dB)	54.0	80.0	90.0	100.0	110.0	114.0	120.0	130.0	140.0
	Level A	(dB)	54.5	80.2	90.2	100.1	110.0	114.0	120.0	130.0	140.0
	Error	(dB)	0.5	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0
8000 Hz	Ref	(dB)			88.9	98.9	108.9	112.9	118.9	128.9	138.9
	Level A	(dB)			89.0	99.0	109.0	112.9	118.9	128.9	138.9
	Error	(dB)			0.1	0.1	0.1	0.0	0.0	0.0	0.0
63 Hz	Ref	(dB)						87.8	93.8	103.8	113.8
	Level A	(dB)						87.8	93.8	103.8	113.8
	Error	(dB)						0.0	0.0	0.0	0.0
Tolerances Limit		(±dB)	1.0								
UNCERTAINTY		(±dB)	0.27								

#### b. Sound exposure meter linearity of error

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	Limit		
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)	
1000 Hz 110 dB	27	27	0.30	0.30	0.00	4.3	-21, +26	
1000 Hz 110 dB	45	45	0.50	0.50	0.00			
1000 Hz 110 dB	90	90	1.00	0.99	-1.00			
1000 Hz 110 dB	180	180	2.00	1.98	-1.00			
1000 Hz 120 dB	36	36	4.00	3.94	-1.50			
1000 Hz 120 dB	72	72	8.00	7.87	-1.63	3.8		
1000 Hz 120 dB	90	90	10.00	9.90	-1.00			
1000 Hz 120 dB	180	180	20.00	19.76	-1.20			
1000 Hz 120 dB	360	360	40.00	39.48	-1.30			
1000 Hz 120 dB	720	720	80.00	78.66	-1.68			

Certificate No : 23-NDM-066  
Request No : Req-2023-0598

### 4. Response to short duration

#### a. Response for sinusoidal signals - reference level

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error		
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)
4000 Hz 95 dB	2846	2846	1.00	0.99	-0.01	0.01	-0.29 - 0.41

#### b. Sound exposure meter response for series of toneburst impulses

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error		
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Burst 1 ms, 95 dB	2846	2846	1.00	0.99	-1.00	3.0	-21 - +26
Burst 1 ms, 100 dB	900	900	1.00	0.99	-1.00		-21 - +41
Burst 1 ms, 108 dB	143	143	1.00	1.00	0.00		-21 - +41

### 5. Response to unipolar pulse

UUC Setting	Time	Exposure Measurement		UNCERTAINTY	Tolerances Limit
FAST / A / 54-140	UUC	UUC	Different		
Calibrator Setting	(s)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Continuous Rectangle +	29	10.28	+0.58	2.4	-21 - +26
Continuous Rectangle -		10.35			

\* Indicates non accredited

End of Certificate



### Certificate of Calibration

#### Customer

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

Certificate No : 23-ACT-016  
Request No : Req-2023-0110

#### Unit Under Calibration Details

Measurement item : Acoustic Calibrator  
Manufacturer : Cirrus  
Model : CR:515  
Serial Number : 80411  
ID : ENSL 17149

Class : 1  
Range : 94 dB / 1000 Hz  
Instrument Status : Used

#### Calibration Environment and Details

Temperature : ( 23 ±2 °C )  
Humidity : ( 50 ± 20 %RH )  
Barometric Pressure : ( 1013 ±10.0 hPa )  
Received Date : 12 January 2023  
Calibration Date : 26 January 2023  
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	31 May 2023
THD Multimeter	2015	1047765	NIMT	2 February 2023

**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 :   
Service Calibration Engineer

Approved By :   
Calibration Engineer Supervisor  
Issue Date : 26 January 2023



Certificate No : 23-ACT-016  
Request No : Req-2023-0110

#### Sound pressure level

#### Calibration Results : Without Adjustment

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty ( ± dB )	Acceptance limit Class 1 ( ± dB )
	Measured	Error	Measured	Error		
94 dB / 1000 Hz	94.01	0.01	-	-	0.13	0.25

#### Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty ( ± % )	Acceptance limit Class 1 ( ± % )
	Measured (Hz)	Error (%)	Measured (Hz)	Error (%)		
94 dB / 1000 Hz	1000.00	0.00	-	-	0.10	0.70

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

Calibration Range (Hz)	Without Adjustment	Adjustment	Uncertainty ( ± % )	Acceptance limit Class 1 ( ± % )
	Measured (%)	Measured (%)		
94 dB / 1000 Hz	0.09	-	0.40	2.5

#### Note :

- Acceptance limit was IEC60542:2017 Class 1
- 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.  
 Address : 100 Nanglinchee Road, Chongnonsi, Yannawa Bangkok  
 10120

Certificate No : 23-ACT-015  
 Request No : Req-2023-0109

## Unit Under Calibration Details

Measurement item : Acoustic Calibrator  
 Manufacturer : CASELLA  
 Model : CEL-120/2  
 Serial Number : 3864875  
 ID : ENSL 17150

Class : 2  
 Range : 114 dB / 1000 Hz  
 Instrument Status : Used

## Calibration Environment and Details

Temperature : ( 23 ±2 °C )  
 Humidity : ( 50 ± 20 %RH )  
 Barometric Pressure : ( 1013 ±10.0 hPa )  
 Received Date : 12 January 2023  
 Calibration Date : 26 January 2023  
 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	31 May 2023
THD Multimeter	2015	1047765	NIMT	2 February 2023

**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 :

Service Calibration Engineer

Approved By :

Calibration Engineer Supervisor

Issue Date : 26 January 2023

Certificate No : 23-ACT-015  
 Request No : Req-2023-0109

## Sound pressure level

## Calibration Results : Without Adjustment

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty ( ± dB)	Acceptance limit Class 2 ( ± dB)
	Measured	Error	Measured	Error		
114 dB / 1000 Hz	114.07	0.07	-	-	0.11	0.40

## Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty ( ± %)	Acceptance limit Class 2 ( ± %)
	Measured (Hz)	Error (%)	Measured (Hz)	Error (%)		
114 dB / 1000 Hz	1000.00	0.00	-	-	0.10	1.7

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

Calibration Range (Hz)	Without Adjustment	Adjustment	Uncertainty ( ± %)	Acceptance limit Class 2 ( ± %)
	Measured (%)	Measured (%)		
114 dB / 1000 Hz	0.17	-	0.40	3.0

## Note :

- Acceptance limit was IEC60942:2017 Class 1
- 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.  
Address 100 Nanglinchee Road, Chongnonsi, Yannawa Bangkok 10120

Certificate No: 23-NDM-212  
Request No: Req-2023-1728

#### Unit Under Calibration Details

Measurement item: Noise Dosimeter  
Manufacturer: CASELLA  
Model: dBadge2  
Serial Number: 2311488  
ID: ENSL 21174  
Resolution: 0.1 dB  
Microphone Class: 2  
Microphone Model: -  
Microphone S/N: 94560  
Preamplifier Model: -  
Preamplifier S/N: -  
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: 15 August 2023  
Calibrated Date: 23 August 2023  
Calibration Procedure: In-house method CP-NDM-01 based on IEC 61252: 2017  
Location of Calibration: Lab Acoustic

#### Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Multifrequency Calibrator	Quest	Quest-cal	188272	25 July 2024	TSI
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Sine Generator	Svantek	Svan401	131	12 October 2023	WK Electric
Timer	EXTECH	-	05-ACT	20 March 2024	TPA

#### 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: [Signature]  
Calibration Officer

Approved By: [Signature]  
Calibration Engineer Supervisor

Issue Date: 23 August 2023



Certificate No: 23-NDM-212  
Request No: Req-2023-1728

#### 1. Absolute acoustical sensitivity

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	(%)	Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)		
1000 Hz 94 dB	120	120	0.03	0.03	0.00	3.1	-21, +26

Note: Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN. 58079

#### 2. Frequency weightings

UUC Setting	Deviation from various Frequency Weighting		UNCERTAINTY	Tolerances
FAST / 54-140	A	C	(± dB)	Limit
STD Setting	(dB)	(dB)		
*63 Hz	0.1	0.2	0.40	2.0
125 Hz	-1.0	-1.0	0.40	1.5
250 Hz	-0.5	-0.4	0.40	1.5
500 Hz	-0.1	0.3	0.40	1.5
1000 Hz	0.0	0.0	0.40	-
2000 Hz	-0.3	-0.3	0.40	2.0
4000 Hz	0.4	0.4	0.40	3.0
8000 Hz	-1.1	-1.1	0.40	5.0

Certificate No : 23-NDM-212  
Request No : Req-2023-1728

### 3. Linearity of response to steady signals

#### a. Sound exposure meter, linearity of response for changes of input sinusoidal signal level

UUC Setting		FAST / A / High									
1000 Hz	Ref	(dB)	54.0	80.0	90.0	100.0	110.0	114.0	120.0	130.0	140.0
	Level A	(dB)	53.8	80.2	90.1	100.0	110.0	114.0	119.9	129.9	139.9
	Error	(dB)	-0.2	0.2	0.1	0.0	0.0	0.0	-0.1	-0.1	-0.1
8000 Hz	Ref	(dB)			88.9	98.9	108.9	112.9	118.9	128.9	138.9
	Level A	(dB)			89.0	99.0	108.9	112.9	118.9	128.8	138.7
	Error	(dB)			0.1	0.1	0.0	0.0	0.0	-0.1	-0.2
63 Hz	Ref	(dB)						87.8	93.8	103.8	113.8
	Level A	(dB)						87.8	93.8	103.8	113.8
	Error	(dB)						0.0	0.0	0.0	0.0
Tolerances Limit		(±dB)	1.0								
UNCERTAINTY		(±dB)	0.3								

#### b. Sound exposure meter linearity of error

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	Limit		
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)	
1000 Hz 110 dB	27	27	0.30	0.30	0.00	5.6	-21, +26	
1000 Hz 110 dB	45	45	0.50	0.50	0.00			
1000 Hz 110 dB	90	90	1.00	0.99	-1.00			
1000 Hz 110 dB	180	180	2.00	1.98	-1.00			
1000 Hz 120 dB	36	36	4.00	3.98	-0.50			
1000 Hz 120 dB	72	72	8.00	7.95	-0.62	5.6		
1000 Hz 120 dB	90	90	10.00	9.92	-0.80			
1000 Hz 120 dB	180	180	20.00	19.80	-1.00			
1000 Hz 120 dB	360	360	40.00	39.62	-0.95			
1000 Hz 120 dB	720	720	80.00	79.25	-0.94			

Certificate No : 23-NDM-212  
Request No : Req-2023-1728

### 4. Response to short duration

#### a. Response for sinusoidal signals - reference level

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error		
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)
4000 Hz 95 dB	2846	2846	1.00	0.99	-0.01	0.052	-0.29 - +0.41

#### b. Sound exposure meter response for series of toneburst impulses

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error		
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Burst 1 ms, 95 dB	2846	2846	1.00	0.99	-1.00	5.6	-21 - +26
Burst 1 ms, 100 dB	900	900	1.00	0.99	-1.00		-29 - +41
Burst 1 ms, 108 dB	143	143	1.00	1.00	0.00		-29 - +41

### 5. Response to unipolar pulse

UUC Setting	Time	Exposure Measurement		UNCERTAINTY	Tolerances Limit
FAST / A / 55-140	UUC	UUC	Different		
Calibrator Setting	(s)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Continuous Rectangle +	29	10.12	+0.30	3.7	-21 - +26
Continuous Rectangle -		10.15			

\* Indicates non accredited

End of Certificate

## Certificate of Calibration

### Customer

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

Certificate No : 22-ACT-558  
 Request No : Req-2022-1544

### Unit Under Calibration Details

Measurement item : Noise dosimeter  
 Manufacturer : CASELLA  
 Model : dBadge2  
 Serial Number : 2311488  
 ID : -  
 Resolution : 0.1 dB  
 Microphone Class : 2  
 Microphone Model : -  
 Microphone S/N : 94560  
 Preamplifier Model : -  
 Preamplifier S/N : -  
 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 : 9 August 2022  
 Calibrated Date : 31 August 2022  
 Calibration Procedure : In-house method CP-NDM-01 based on IEC 61252 : 2017  
 Location of Calibration : Lab Acoustic

### Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Multifrequency Calibrator	Quest	Quest-cal	188272	29 June 2023	TSI
Standard Microphone	GRAS	40AN	188273	15 September 2022	GRAS
Sine Generator	Svantek	Svan401	131	18 October 2022	WK Electric
Timer	EXTECH	-	05-ACT	24 March 2023	IPA

### Note

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

This Certificate was issued to replace to Calibration Certificate No. 22-ACT-202

Calibrated By :   
 Calibration Officer

Approved By :   
 Calibration Engineer Supervisor

Issue Date : 31 August 2022



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-NDM-01 Rev.0 Issue date 01/07/19

Certificate No : 22-ACT-558

Request No : Req-2022-1544

### 1. Absolute acoustical sensitivity

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	(%)	Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)		
1000 Hz 114 dB	120.00	120	3.73	3.79	+1.61	3.0	-21, +26

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand 3M, Model AC-300, SN. AC-300001087

### 2. Frequency weightings

UUC Setting	Deviation from various Frequency Weighting		UNCERTAINTY	Tolerances
FAST / 54-140	A	C	( ± dB)	Limit ( ± dB)
STD Setting	(dB)	(dB)		
63 Hz	-0.2	-0.3	0.40	2.0
125 Hz	-0.6	-0.3	0.40	1.5
250 Hz	-0.2	-0.2	0.40	1.5
500 Hz	0.0	0.1	0.40	1.5
1000 Hz	0.0	0.0	0.40	-
2000 Hz	-0.5	-0.5	0.40	2.0
4000 Hz	-0.5	-0.6	0.40	3.0
8000 Hz	-1.0	-1.1	0.40	5.0

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-NDM-01 Rev.0 Issue date 01/07/19

Certificate No : 22-ACT-558  
 Request No : Req-2022-1544

### 3. Linearity of response to steady signals

#### a. Sound exposure meter, linearity of response for changes of input sinusoidal signal level

UUC Setting		SLOW / A / High									
1000 Hz	Ref	(dB)	54.0	80.0	90.0	100.0	110.0	114.0	120.0	130.0	140.0
	Level A	(dB)	54.0	80.1	90.1	100.0	110.0	114.0	120.0	129.9	139.9
	Error	(dB)	0.0	0.1	0.1	0.0	0.0	0.0	0.0	-0.1	-0.1
8000 Hz	Ref	(dB)			88.9	98.9	108.9	112.9	118.9	128.9	138.9
	Level A	(dB)			89.0	98.9	108.9	112.9	118.9	128.8	138.8
	Error	(dB)			0.1	0.0	0.0	0.0	0.0	-0.1	-0.1
63 Hz	Ref	(dB)						87.8	93.8	103.8	113.8
	Level A	(dB)						87.8	93.8	103.8	113.7
	Error	(dB)						0.0	0.0	0.0	-0.1
Tolerances Limit		(±dB)	1.0								
UNCERTAINTY		(±dB)	0.27								

#### b. Sound exposure meter linearity of error

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	Limit		
Calibrator Setting	(s)	(s)	$\text{Pa}^2 \text{ h}$	$\text{Pa}^2 \text{ h}$	(%)	(%)	(%)	
1000 Hz 110 dB	27	27	0.30	0.30	0.00	4.3	-21, +26	
1000 Hz 110 dB	45	45	0.50	0.50	0.00			
1000 Hz 110 dB	90	90	1.00	0.99	-1.00			
1000 Hz 110 dB	180	180	2.00	1.99	-0.50			
1000 Hz 120 dB	36	36	4.00	3.96	-1.00			
1000 Hz 120 dB	72	72	8.00	7.92	-1.00	3.8		
1000 Hz 120 dB	90	90	10.00	9.90	-1.00			
1000 Hz 120 dB	180	180	20.00	19.80	-1.00			
1000 Hz 120 dB	360	360	40.00	39.60	-1.00			
1000 Hz 120 dB	720	720	80.00	79.21	-0.99			

Certificate No : 22-ACT-558  
 Request No : Req-2022-1544

### 4. Response to short duration

#### a. Response for sinusoidal signals - reference level

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error		Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)
4000 Hz 95 dB	2846	2846	1.00	1.00	0.00	0.01	-0.29 - 0.41

#### b. Sound exposure meter response for series of toneburst impulses

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error		Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Burst 1 ms, 95 dB	2846	2846	1.00	1.00	0.00	3.0	-21 - +26
Burst 1 ms, 100 dB	900	900	1.00	1.00	0.00		-21 - +41
Burst 1 ms, 108 dB	143	143	1.00	1.01	+1.00		-21 - +41

### 5. Response to unipolar pulse

UUC Setting	Time		Exposure Measurement		UNCERTAINTY	Tolerances
FAST / A / 54-140	UUC		UUC	Different		Limit
Calibrator Setting	(s)		(Pa <sup>2</sup> h)	(%)	(%)	(%)
Continuous Rectangle +	6		10.22	0.00	2.4	-21 - +26
Continuous Rectangle -			10.22			

\* Indicates non accredited

End of Certificate



### Certificate of Calibration

#### Customer

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

Certificate No : 23-NDM-213  
Request No : Req-2023-1729

#### Unit Under Calibration Details

Measurement item : Noise Dosimeter  
Manufacturer : CASELLA  
Model : dBadge2  
Serial Number : 2311490  
ID : ENSL 21175  
Resolution : 0.1 dB

Microphone Class : 2  
Microphone Model : -  
Microphone S/N : 90981  
Preamplifier Model : -  
Preamplifier S/N : -  
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 : 15 August 2023  
Calibrated Date : 23 August 2023  
Calibration Procedure : In-house method CP-NDM-01 based on IEC 61252 : 2017  
Location of Calibration : Lab Acoustic

#### Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Multifrequency Calibrator	Quest	Quest-cal	188272	25 July 2024	TSI
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Sine Generator	Svantek	Svan401	131	12 October 2023	WK Electric
Timer	EXTECH	-	05-ACT	20 March 2024	TPA

#### 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 :   
Calibration Officer

Approved By :   
Calibration Engineer Supervisor

Issue Date : 23 August 2023



Certificate No : 23-NDM-213  
Request No : Req-2023-1729

#### 1. Absolute acoustical sensitivity

UUC Setting	Time		Exposure Measurement			UNCERTAINTY (%)	Tolerances Limit (%)
	Ref (s)	UUC (s)	Ref (Pa <sup>2</sup> h)	UUC (Pa <sup>2</sup> h)	Error (%)		
FAST / A / 54-140							
Calibrator Setting							
1000 Hz 94 dB	120	120	0.03	0.03	0.00	3.1	-21, +26

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN. 58079

#### 2. Frequency weightings

UUC Setting	Deviation from various Frequency Weighting		UNCERTAINTY (± dB)	Tolerances Limit (± dB)
	A (dB)	C (dB)		
FAST / 54-140				
STD Setting				
*63 Hz	0.3	0.4	0.40	2.0
125 Hz	-1.1	-0.8	0.40	1.5
250 Hz	-0.5	-0.4	0.40	1.5
500 Hz	-0.1	0.3	0.40	1.5
1000 Hz	0.0	0.0	0.40	-
2000 Hz	0.7	0.7	0.40	2.0
4000 Hz	2.3	2.3	0.40	3.0
8000 Hz	-2.9	-2.9	0.40	5.0



Certificate No : 23-NDM-213  
Request No : Req-2023-1729

### 3. Linearity of response to steady signals

#### a. Sound exposure meter, linearity of response for changes of input sinusoidal signal level

UUC Setting		FAST / A / High										
1000 Hz	Ref	(dB)	54.0	80.0	90.0	100.0	110.0	114.0	120.0	130.0	140.0	
	Level A	(dB)	54.5	80.1	90.1	100.0	110.0	114.0	120.0	130.0	140.0	
	Error	(dB)	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
8000 Hz	Ref	(dB)			88.9	98.9	108.9	112.9	118.9	128.9	138.9	
	Level A	(dB)			89.0	98.9	108.9	112.9	118.9	128.8	138.7	
	Error	(dB)			0.1	0.0	0.0	0.0	0.0	-0.1	-0.2	
63 Hz	Ref	(dB)						87.8	93.8	103.8	113.8	
	Level A	(dB)						87.8	93.8	103.8	113.8	
	Error	(dB)						0.0	0.0	0.0	0.0	
Tolerances Limit		(±dB)	1.0									
UNCERTAINTY		(±dB)	0.3									

#### b. Sound exposure meter linearity of error

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	Limit		
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)	
1000 Hz 110 dB	27	27	0.30	0.30	0.00	5.6	-21, +26	
1000 Hz 110 dB	45	45	0.50	0.50	0.00			
1000 Hz 110 dB	90	90	1.00	0.99	-1.00			
1000 Hz 110 dB	180	180	2.00	1.98	-1.00			
1000 Hz 120 dB	36	36	4.00	3.98	-0.50			
1000 Hz 120 dB	72	72	8.00	7.98	-0.25	81.7		
1000 Hz 120 dB	90	90	10.00	9.95	-0.50			
1000 Hz 120 dB	180	180	20.00	19.92	-0.40			
1000 Hz 120 dB	360	360	40.00	39.84	-0.40			
1000 Hz 120 dB	720	720	80.00	79.78	-0.27			

Certificate No : 23-NDM-213  
Request No : Req-2023-1729

### 4. Response to short duration

#### a. Response for sinusoidal signals - reference level

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error		
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)
4000 Hz 95 dB	2846	2846	1.00	0.99	-0.01	0.052	-0.29 - +0.41

#### b. Sound exposure meter response for series of toneburst impulses

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error		
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Burst 1 ms, 95 dB	2846	2846	1.00	0.99	-1.00	5.6	-21 - +26
Burst 1 ms, 100 dB	900	900	1.00	0.99	-1.00		-29 - +41
Burst 1 ms, 108 dB	143	143	1.00	1.00	0.00		-29 - +41

### 5. Response to unipolar pulse

UUC Setting	Time		Exposure Measurement		UNCERTAINTY	Tolerances Limit
FAST / A / 55-140	UUC		UUC	Different		
Calibrator Setting	(s)		(Pa <sup>2</sup> h)	(%)	(%)	(%)
Continuous Rectangle +	29		10.18	+0.49	3.7	-21 - +26
Continuous Rectangle -			10.23			

\* Indicates non accredited

End of Certificate



### Certificate of Calibration

#### Customer

Name : SGS (Thailand) Limited.  
 Address : 100 Nanglinchee Road, Chongnensi, Yannawa Bangkok 10120

Certificate No : 22-ACT-560  
 Request No : Req-2022-1544

#### Unit Under Calibration Details

Measurement item : Noise dosimeter  
 Manufacturer : CASELLA  
 Model : dBadge2  
 Serial Number : 2311550  
 ID : -  
 Resolution : 0.1 dB  
 Microphone Class : 2  
 Microphone Model : -  
 Microphone S/N : 91204  
 Preamplifier Model : -  
 Preamplifier S/N : -  
 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 : 9 August 2022  
 Calibrated Date : 31 August 2022  
 Calibration Procedure : In-house method CP-NDM-01 based on IEC 61252 : 2017  
 Location of Calibration : Lab Acoustic

#### Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Multifrequency Calibrator	Quest	Quest-cal	188272	29 June 2023	TSI
Standard Microphone	GRAS	40AN	188273	15 September 2022	GRAS
Sine Generator	Svantek	Svan401	131	18 October 2022	WK Electric
Timer	EXTECH	-	05-ACT	24 March 2023	TPA

#### Note

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

This Certificate was issued to replace to Calibration Certificate No. 22-ACT-202

Calibrated By :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 31 August 2022



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



Certificate No : 22-ACT-560  
 Request No : Req-2022-1544

#### 1. Absolute acoustical sensitivity

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	(%)	Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)		
1000 Hz 114 dB	120.00	120	3.73	3.71	-0.54	3.0	-21, +26

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand 3M, Model AC-306, SN. AC-300001087

#### 2. Frequency weightings

UUC Setting	Deviation from various Frequency Weighting		UNCERTAINTY	Tolerances
FAST / 54-140	A	C	( ± dB)	Limit
STD Setting	(dB)	(dB)		( ± dB)
63 Hz	-0.1	-0.2	0.40	2.0
125 Hz	-0.6	-0.3	0.40	1.5
250 Hz	-0.2	-0.2	0.40	1.5
500 Hz	-0.1	0.0	0.40	1.5
1000 Hz	0.0	0.0	0.40	-
2000 Hz	-0.2	-0.2	0.40	2.0
4000 Hz	0.7	0.6	0.40	3.0
8000 Hz	-0.6	-0.7	0.40	5.0

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

Certificate No : 22-ACT-560  
 Request No : Req-2022-1544

### 3. Linearity of response to steady signals

#### a. Sound exposure meter, linearity of response for changes of input sinusoidal signal level

UUC Setting		SLOW / A / High									
1000 Hz	Ref	(dB)	54.0	80.0	90.0	100.0	110.0	114.0	120.0	130.0	140.0
	Level A	(dB)	54.6	80.1	90.0	100.0	110.0	114.0	120.0	130.0	140.0
	Error	(dB)	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8000 Hz	Ref	(dB)			88.9	98.9	108.9	112.9	118.9	128.9	138.9
	Level A	(dB)			89.0	98.9	108.9	112.9	118.9	128.8	138.8
	Error	(dB)			0.1	0.0	0.0	0.0	0.0	-0.1	-0.1
63 Hz	Ref	(dB)						87.8	93.8	103.8	113.8
	Level A	(dB)						87.8	93.8	103.8	113.8
	Error	(dB)						0.0	0.0	0.0	0.0
Tolerances Limit		(±dB)	1.0								
UNCERTAINTY		(±dB)	0.27								

#### b. Sound exposure meter linearity of error

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error			
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)		
1000 Hz 110 dB	27	27	0.30	0.30	0.00	4.3	-21, +26	
1000 Hz 110 dB	45	45	0.50	0.50	0.00			
1000 Hz 110 dB	90	90	1.00	1.00	0.00			
1000 Hz 110 dB	180	180	2.00	1.99	-0.50			
1000 Hz 120 dB	36	36	4.00	4.03	+0.75			
1000 Hz 120 dB	72	72	8.00	8.05	+0.53	3.8		
1000 Hz 120 dB	90	90	10.00	10.03	+0.30			
1000 Hz 120 dB	180	180	20.00	19.92	-0.40			
1000 Hz 120 dB	360	360	40.00	39.94	-0.15			
1000 Hz 120 dB	720	720	80.00	79.79	-0.26			

Certificate No : 22-ACT-560  
 Request No : Req-2022-1544

### 4. Response to short duration

#### a. Response for sinusoidal signals - reference level

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	(Pa <sup>2</sup> h)	Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)		(Pa <sup>2</sup> h)
4000 Hz 95 dB	2846	2846	1.00	0.99	-0.01	0.01	-0.29 - 0.41

#### b. Sound exposure meter response for series of toneburst impulses

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	(%)	Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)		(%)
Burst 1 ms, 95 dB	2846	2846	1.00	0.99	-1.00	3.0	-21 - +26
Burst 1 ms, 100 dB	900	900	1.00	0.99	-1.00		-21 - +41
Burst 1 ms, 108 dB	143	143	1.00	1.00	0.00		-21 - +41

### 5. Response to unipolar pulse

UUC Setting	Time		Exposure Measurement		UNCERTAINTY	Tolerances
FAST / A / 54-140	UUC		UUC	Different	(%)	Limit
Calibrator Setting	(s)		(Pa <sup>2</sup> h)	(%)		(%)
Continuous Rectangle +	6		10.35	+0.10	2.4	-21 - +26
Continuous Rectangle -			10.34			

\* Indicates non accredited

End of Certificate

### Certificate of Calibration

#### Customer

Name : SGS (Thailand) Limited.  
Address : 100 Nanglinchee Road, Chongnossi, Yannawa Bangkok 10120

Certificate No: 23-NDM-211  
Request No: Req-2023-1727

#### Unit Under Calibration Details

Measurement item : Noise Dosimeter  
Manufacturer : CASELLA  
Model : dBadge2  
Serial Number : 2311712  
ID : ENSL 21177  
Resolution : 0.1 dB

Microphone Class : 2  
Microphone Model : -  
Microphone S/N : 90939  
Preamplifier Model : -  
Preamplifier S/N : -  
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 : 15 August 2023  
Calibrated Date : 23 August 2023  
Calibration Procedure : In-house method CP-NDM-01 based on IEC 61252 : 2017  
Location of Calibration : Lab Acoustic

#### Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Multifrequency Calibrator	Quest	Quest-cal	188272	25 July 2024	TSI
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Sine Generator	Svantek	Svan401	131	12 October 2023	WK Electric
Timer	EXTECH	-	05-ACT	20 March 2024	TPA

#### 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 : [Redacted]

Calibration Officer



Approved By : [Redacted]

Calibration Engineer Supervisor

Issue Date: 23 August 2023

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-NDM-01 Rev.0 Issue date 01/08/21

Certificate No : 23-NDM-211  
Request No : Req-2023-1727

#### 1. Absolute acoustical sensitivity

UUC Setting	Time		Exposure Measurement			UNCERTAINTY (%)	Tolerances Limit (%)
	Ref (s)	UUC (s)	Ref (Pa <sup>2</sup> h)	UUC (Pa <sup>2</sup> h)	Error (%)		
FAST / A / 54-140							
Calibrator Setting							
1000 Hz 94 dB	120	120	0.03	0.03	0.00	3.1	-21, +26

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN. 58079

#### 2. Frequency weightings

UUC Setting	Deviation from various Frequency Weighting		UNCERTAINTY ( ± dB)	Tolerances Limit ( ± dB)
	A (dB)	C (dB)		
FAST / 54-140				
STD Setting				
*63 Hz	0.2	0.3	0.40	2.0
125 Hz	-0.9	-0.6	0.40	1.5
250 Hz	-0.8	-0.5	0.40	1.5
500 Hz	-0.3	0.1	0.40	1.5
1000 Hz	0.0	0.0	0.40	-
2000 Hz	0.4	0.4	0.40	2.0
4000 Hz	2.3	2.2	0.40	3.0
8000 Hz	-3.0	-3.0	0.40	5.0

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-NDM-01 Rev.0 Issue date 01/08/21

Certificate No : 23-NDM-211  
 Request No : Req-2023-1727

### 3. Linearity of response to steady signals

#### a. Sound exposure meter, linearity of response for changes of input sinusoidal signal level

UUC Setting		FAST / A / High									
1000 Hz	Ref	(dB)	54.0	80.0	90.0	100.0	110.0	114.0	120.0	130.0	140.0
	Level A	(dB)	53.5	80.2	90.1	100.0	110.0	114.0	120.0	130.0	140.0
	Error	(dB)	-0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8000 Hz	Ref	(dB)			88.9	98.9	108.9	112.9	118.9	128.9	138.9
	Level A	(dB)			89.0	98.9	108.9	112.9	118.9	128.9	138.9
	Error	(dB)			0.1	0.0	0.0	0.0	0.0	0.0	0.0
63 Hz	Ref	(dB)						87.8	93.8	103.8	113.8
	Level A	(dB)						87.8	93.8	103.8	113.8
	Error	(dB)						0.0	0.0	0.0	0.0
Tolerances Limit		(±dB)	1.0								
UNCERTAINTY		(±dB)	0.3								

#### b. Sound exposure meter linearity of error

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140		Ref	UUC	Ref	UUC	Error		Limit
Calibrator Setting		(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
1000 Hz 110 dB		27	27	0.30	0.30	0.00	5.6	-21, +26
1000 Hz 110 dB		45	45	0.50	0.50	0.00		
1000 Hz 110 dB		90	90	1.00	0.99	-1.00		
1000 Hz 110 dB		180	180	2.00	1.98	-1.00		
1000 Hz 120 dB		36	36	4.00	3.98	-0.50		
1000 Hz 120 dB		72	72	8.00	7.98	-0.25	5.6	
1000 Hz 120 dB		90	90	10.00	9.98	-0.20		
1000 Hz 120 dB		180	180	20.00	19.95	-0.25		
1000 Hz 120 dB		360	360	40.00	39.92	-0.20		
1000 Hz 120 dB		720	720	80.00	79.84	-0.20		

Certificate No : 23-NDM-211  
 Request No : Req-2023-1727

### 4. Response to short duration

#### a. Response for sinusoidal signals - reference level

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
FAST / A / 54-140		Ref	UUC	Ref	UUC	Error		
Calibrator Setting		(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)
4000 Hz 95 dB		2846	2846	1.00	0.99	-0.01	0.052	-0.29 - +0.41

#### b. Sound exposure meter response for series of toneburst impulses

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
FAST / A / 54-140		Ref	UUC	Ref	UUC	Error		
Calibrator Setting		(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Burst 1 ms, 95 dB		2846	2846	1.00	0.99	-1.00	5.6	-21 - +26
Burst 1 ms, 100 dB		900	900	1.00	0.99	-1.00		-29 - +41
Burst 1 ms, 108 dB		143	143	1.00	1.00	0.00		-29 - +41

### 5. Response to unipolar pulse

UUC Setting		Time	Exposure Measurement		UNCERTAINTY	Tolerance Limit
FAST / A / 55-140		UUC	UUC	Different		
Calibrator Setting		(s)	(Pa <sup>3</sup> h)	(%)	(%)	(%)
Continuous Rectangle +		30	10.33	0.00	3.7	-21 - +26
Continuous Rectangle -			10.33			

\* Indicates non accredited

End of Certificate

### Certificate of Calibration

#### Customer

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

Certificate No : 23-NDM-215  
Request No : Req-2023-1731

#### Unit Under Calibration Details

Measurement item : Noise Dosimeter  
Manufacturer : CASELLA  
Model : dBadge2  
Serial Number : 2311744  
ID : ENSL 21178  
Resolution : 0.1 dB  
Microphone Class : 2  
Microphone Model : -  
Microphone S/N : 89959  
Preamplifier Model : -  
Preamplifier S/N : -  
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 : 15 August 2023  
Calibrated Date : 23 August 2023  
Calibration Procedure : In-house method CF-NDM-01 based on IEC 61252 : 2017  
Location of Calibration : Lab Acoustic

#### Reference Standard

Instrument	Brand	Model	SN.	Duc calibration	Traceability
Multifrequency Calibrator	Quest	Quest-cal	188272	25 July 2024	TSI
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Sine Generator	Svantek	Svan401	131	12 October 2023	WK Electric
Timer	EXTECH	-	05-ACT	20 March 2024	TPA

#### 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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 23 August 2023



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-NDM-01 Rev.0 Issue date 01/08/21

Certificate No : 23-NDM-215  
Request No : Req-2023-1731

#### 1. Absolute acoustical sensitivity

UUC Setting	Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140	Ref	UUC	Ref	UUC	Error	(%)	Limit
Calibrator Setting	(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)		
1000 Hz 94 dB	120	120	0.03	0.03	0.00	3.1	-21, +26

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Mode: SV 35A, SN. 58079

#### 2. Frequency weightings

UUC Setting	Deviation from various Frequency Weighting		UNCERTAINTY	Tolerances
FAST / 54-140	A	C	(± dB)	(± dB)
STD Setting	(dB)	(dB)		
*63 Hz	0.2	0.3	0.40	2.0
125 Hz	-0.8	-0.8	0.40	1.5
250 Hz	-0.7	-0.6	0.40	1.5
500 Hz	-0.1	0.1	0.40	1.5
1000 Hz	0.0	0.0	0.40	-
2000 Hz	0.4	0.4	0.40	2.0
4000 Hz	1.9	1.9	0.40	3.0
8000 Hz	-2.6	-2.6	0.40	5.0

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-NDM-01 Rev.0 Issue date 01/08/21

Certificate No : 23-NDM-215  
Request No : Req-2023-1731

### 3. Linearity of response to steady signals

#### a. Sound exposure meter, linearity of response for changes of input sinusoidal signal level

UUC Setting		FAST / A / High										
1000 Hz	Ref	(dB)	54.0	83.0	90.0	100.0	110.0	114.0	120.0	130.0	140.0	
	Level A	(dB)	54.4	80.1	90.1	100.0	110.0	114.0	120.0	129.9	139.8	
	Error	(dB)	0.4	0.1	0.1	0.0	0.0	0.0	0.0	-0.1	-0.2	
8000 Hz	Ref	(dB)			88.9	98.9	108.9	112.9	118.9	128.9	138.9	
	Level A	(dB)			88.9	98.9	108.9	112.9	118.9	128.8	138.7	
	Error	(dB)			0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	
63 Hz	Ref	(dB)						87.8	93.8	103.8	113.8	
	Level A	(dB)						87.8	93.8	103.8	113.8	
	Error	(dB)						0.0	0.0	0.0	0.0	
Tolerances Limit		(±dB)	1.0									
UNCERTAINTY		(±dB)	0.3									

#### b. Sound exposure meter linearity of error

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances
FAST / A / 54-140		Ref	UUC	Ref	UUC	Error		Limit
Calibrator Setting		(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
1000 Hz 110 dB		27	27	0.30	0.30	0.00	5.6	-21, +26
1000 Hz 110 dB		45	45	0.50	0.50	0.00		
1000 Hz 110 dB		90	90	1.00	0.99	-1.00		
1000 Hz 110 dB		180	180	2.00	1.99	-0.50		
1000 Hz 120 dB		36	36	4.00	3.95	-1.25		
1000 Hz 120 dB		72	72	8.00	7.92	-1.00	5.6	
1000 Hz 120 dB		90	90	10.00	9.90	-1.00		
1000 Hz 120 dB		180	180	20.00	19.78	-1.10		
1000 Hz 120 dB		360	360	40.00	39.54	-1.15		
1000 Hz 120 dB		720	720	80.00	79.32	-0.85		

Certificate No : 23-NDM-215  
Request No : Req-2023-1731

### 4. Response to short duration

#### a. Response for sinusoidal signals - reference level

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
FAST / A / 54-140		Ref	UUC	Ref	UUC	Error		
Calibrator Setting		(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)
4000 Hz 95 dB		2846	2846	1.00	0.99	-0.01	0.052	-0.29 - +0.41

#### b. Sound exposure meter response for series of toneburst impulses

UUC Setting		Time		Exposure Measurement			UNCERTAINTY	Tolerances Limit
FAST / A / 54-140		Ref	UUC	Ref	UUC	Error		
Calibrator Setting		(s)	(s)	(Pa <sup>2</sup> h)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Burst 1 ms, 95 dB		2846	2846	1.00	0.99	-1.00	5.6	-21 - +26
Burst 1 ms, 100 dB		900	900	1.00	0.99	-1.00		-29 - +41
Burst 1 ms, 108 dB		143	143	1.00	1.00	0.00		-29 - +41

### 5. Response to unipolar pulse

UUCSetting	Time	Exposure Measurement		UNCERTAINTY	Tolerances
FAST / A / 55-140	UUC	UUC	Different		
Calibrator Setting	(s)	(Pa <sup>2</sup> h)	(%)	(%)	(%)
Continuous Rectangle +	29	10.29	+0.39	3.7	-21 - +26
Continuous Rectangle -		10.33			

\* Indicates non accredited

End of Certificate



### Certificate of Calibration

#### Customer

Name SGS (Thailand) Limited.  
Address 100 Nanglinchee Road, Chongnonsi, Yannawa Bangkok 10120

Certificate No : 23-SLM-169  
Request No : Req-2023-1077

#### Unit Under Calibration Details

Measurement item : Sound Level Meier  
Manufacturer : SCARLET  
Model : ST-21D  
Serial Number : 820702  
ID : ENSL 22174  
Resolution : 0.1 dB  
Microphone Class : 2  
Microphone Model : AWA14421  
Microphone S/N : A-000202  
Preamplifier Model : -  
Preamplifier S/N : -  
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 : 19 May 2023  
Calibrated Date : 23 May 2023  
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	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svante	Svan401	131	12 October 2023	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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 23 May 2023



Certificate No : 23-SLM-169

Request No : Req-2023-1077

#### 1. Indication at the calibration check frequency

UUC Setting	Nominal Level (dB)	Before Adjust		After Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
1000 Hz 94 dB	93.81	93.6	-0.21	93.8	-0.01	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SOUNDTEK, Model ST-120, SN. 211203780

#### 2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	24.5	0.2

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

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	23.1	0.1
C	24.4	0.1
Z	28.3	0.1

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	A	C	Z		
FAST / 28-133	(dB)	(dB)	(dB)	(± dB)	(± dB)
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
125 Hz	0.0	0.1	0.1	0.6	2.0
1000 Hz	0.0	0.0	0.0	0.6	1.0
4000 Hz	0.3	0.2	0.1	0.6	3.0
8000 Hz	0.0	0.0	0.2	0.7	5.0



Certificate No : 23-SLM-169  
 Request No : Req-2023-1077

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

UUC Setting		Deviation from various Frequency			UNCERTAINTY	Acceptance
FAST / 28-133		Weighting Response curve				
STD Setting		A (dB)	C (dB)	Z (dB)	( ± dB)	( ± dB)
63 Hz		-0.1	-0.1	0.0	0.2	2.0
125 Hz		-0.1	0.0	0.0		1.5
250 Hz		-0.1	0.0	0.0		1.5
500 Hz		0.0	0.0	0.0		1.5
1000 Hz		0.0	0.0	0.0		1.0
2000 Hz		0.1	0.1	0.0		2.0
4000 Hz		0.2	0.2	0.0		3.0
8000 Hz		-0.1	-0.2	0.0		5

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / 28-133	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	0.2	0.2
A	114.00	114.0	0.0		
C	114.00	113.9	-0.1		
Z	114.00	113.9	-0.1		

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
28-133 / A	REF	UUC	ERR		
UUC Time Response	(dB)	(dB)	(dB)	0.2	0.1
Fast	114.00	114.0	0.0		
Slow	114.00	114.0	0.0		
Leq	114.00	114.0	0.0		

Certificate No : 23-SLM-169  
 Request No : Req-2023-1077

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)	0.1	0.3
Initial	114.0		
Final	114.0		
Deviated	0.0		

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	0.3	1.1
137.00	137	137.0	0.0		
136.00	136	136.0	0.0		
135.00	135	135.0	0.0		
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	104.1	0.1		
99.00	99	99.1	0.1		
94.00	94	94.1	0.1		
89.00	89	89.1	0.1		
84.00	84	84.1	0.1		
79.00	79	79.1	0.1		
74.00	74	74.1	0.1		
69.00	69	69.1	0.1		
64.00	64	64.1	0.1		
59.00	59	59.1	0.1		
54.00	54	54.1	0.1		
49.00	49	49.1	0.1		
44.00	44	44.1	0.1		
39.00	39	39.0	0.0		
38.00	38	38.0	0.0		
37.00	37	36.9	-0.1		
36.00	36	35.7	-0.3		

Certificate No : 23-SLM-169  
 Request No : Req-2023-1077

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A	REF	UUC	ERR		
UUC Range	(dB)	(dB)	(dB)		
28-133	41.7	41.9	0.2	0.3	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
A / 28-133	Toneburst	Ref	UUC	ERR		
UUC Time Response	(ms)	(dB)	(dB)	(dB)		
Fast	200	129.0	129.1	+0.1	0.2	1
	2	112.0	112.0	0.0		-1.0, -2.5
	0.25	103.0	102.7	-0.3		-1.5, -5.0
Slow	200	122.6	122.7	+0.1		1
	2	103.0	103.1	+0.1		-1.0, -5.0
SEL	200	123.0	123.1	+0.1		1
	2	103.0	103.1	+0.1		-1.0, -2.5
	0.25	94.0	93.9	-0.1		-1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / C / 28-133	REF	UUC	ERR		
STD Setting	(dB)	(dB)	(dB)		
Complete cycle	128.4	127.1	-1.30	0.2	3.0
Positive half cycle	127.4	127.3	-0.10		2.0
Negative half cycle	127.4	127.3	-0.10		2.0

Certificate No : 23-SLM-169  
 Request No : Req-2023-1077

12. Overload indication

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Positive one-half cycle	139.7		
Negative one-half cycle	139.9		
Deviated	-0.2	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Initial	132.0		
Final	132.0		
Deviated	0.0	0.1	0.3

End of Certificate

### Certificate of Calibration

#### Customer

Name : SGS (Thailand) Limited.  
Address : 100 Nanglinchee Road, Chongronsi, Yannawa Bangkok 10120

Certificate No : 23-SLM-177  
Request No : Req-2023-1078

#### Unit Under Calibration Details

Measurement item : : Sound Level Meter  
Manufacturer : : SCARLET  
Model : : ST-21D  
Serial Number : : 820703  
ID : : ENSL 22175  
Resolution : : 0.1 dB  
Microphone Class : 2  
Microphone Model : AWA14421  
Microphone S/N : A-000219  
Preamplifier Model : -  
Preamplifier S/N : -  
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 : : 19 May 2023  
Calibrated Date : : 23 May 2023  
Calibration Procedure : : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic test  
Location of Calibration : : Lab Acoustic

#### Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svante	Svan401	131	12 October 2023	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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 23 May 2023



Certificate No : 23-SLM-177  
Request No : Req-2023-1078

#### 1. Indication at the calibration check frequency

UUC Setting	Nominal Level	Before Adjust		After Adjust		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
FAST / A / 28-133							
Calibrator Setting	(dB)						
1000 Hz 94 dB	93.81	93.3	-0.51	93.8	-0.01	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SOUNDTEK, Model ST-120, SN. 211203780

#### 2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY ( ± dB)
FAST / 28-133		
UUC Weighting		
A	24.1	0.1

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

UUC Setting	Measured (dB)	UNCERTAINTY ( ± dB)
FAST / 28-133		
UUC Weighting		
A	23.3	0.1
C	24.7	0.1
Z	28.6	0.1

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
	A	C	Z		
FAST / 28-133					
STD Setting	(dB)	(dB)	(dB)		
125 Hz	0.1	0.2	0.2	0.6	2.0
1000 Hz	0.0	0.0	0.0	0.6	1.0
4000 Hz	-0.9	-0.8	-1.0	0.6	3.0
8000 Hz	-1.3	-1.3	-1.1	0.7	5.0

Certificate No : 23-SLM-177  
Request No : Req-2023-1078

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

UUC Setting	Deviation from various Frequency			UNCERTAINTY	Acceptance
FAST / 28-133	Weighting Response curve				
STD Setting	A (dB)	C (dB)	Z (dB)	( ± dB)	Limit ( ± dB)
63 Hz	-0.1	-0.1	0.0	0.2	2.0
125 Hz	-0.2	-0.1	0.0		1.5
250 Hz	-0.2	0.0	0.0		1.5
500 Hz	-0.1	0.0	0.0		1.5
1000 Hz	0.0	0.0	0.0		1.0
2000 Hz	0.1	0.0	0.0		2.0
4000 Hz	0.1	0.2	0.0		3.0
8000 Hz	-0.1	-0.2	0.0		5

6. Frequency and time weightings at 1kHz

UUC Setting	STD REF	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
		UUC (dB)	ERR (dB)		
FAST / 28-133	114.00	114.0	0.0	0.2	0.2
UUC Weighting	114.00	113.9	-0.1		0.2
A	114.00	113.9	-0.1		0.2

UUC Setting	STD REF	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
		UUC (dB)	ERR (dB)		
28-133 / A	114.00	114.0	0.0	0.2	0.1
UUC Time Response	114.00	114.0	0.0		0.1
Fast	114.00	114.0	0.0		0.1

Certificate No : 23-SLM-177  
Request No : Req-2023-1078

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 28-133	UUC (dB)		
STD Setting			
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.3

8. Level linearity on the reference level range

UUC Setting	Anticipated REF	Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
		UUC (dB)	ERR (dB)		
FAST / A / 28-133	137.00	137	137.0	0.0	0.8
STD dB	136.00	136	136.0	0.0	0.8
135.00	135	135.0	0.0	0.3	1.1
134.00	134	134.0	0.0		1.1
129.00	129	129.1	0.1		1.1
124.00	124	124.1	0.1		1.1
119.00	119	119.1	0.1		1.1
114.00	114	114.0	0.0		1.1
109.00	109	109.1	0.1		1.1
104.00	104	104.1	0.1		1.1
99.00	99	99.1	0.1		1.1
94.00	94	94.1	0.1		1.1
89.00	89	89.0	0.0		1.1
84.00	84	84.0	0.0		1.1
79.00	79	79.0	0.0		1.1
74.00	74	74.0	0.0		1.1
69.00	69	69.0	0.0		1.1
64.00	64	64.0	0.0		1.1
59.00	59	59.1	0.1		1.1
54.00	54	54.1	0.1		1.1
49.00	49	49.1	0.1		1.1
44.00	44	44.1	0.1		1.1
39.00	39	38.8	-0.2		1.1
38.00	38	37.8	-0.2		1.1
37.00	37	36.6	-0.4		0.8
36.00	36	35.6	-0.4		1.1

Certificate No : 23-SLM-177  
 Request No : Req-2023-1078

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A	REF	UUC	ERR		
UUC Range	(dB)	(dB)	(dB)		
28-133	42.3	42.4	0.1	0.3	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
A / 28-133	Toneburst	Ref	UUC	ERR		
UUC Time Response	(ms)	(dB)	(dB)	(dB)		
Fast	200	129.0	129.1	+0.1	0.2	1
	2	112.0	111.8	-0.2		+1.0, -2.5
	0.25	103.0	102.7	-0.3		+1.5, -5.0
Slow	200	122.6	122.5	-0.1		1
	2	103.0	102.9	-0.1		+1.0, -5.0
SEL	200	123.0	123.1	+0.1		1
	2	103.0	102.9	-0.1		+1.0, -2.5
	0.25	94.0	93.8	-0.2		+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / C / 28-133	REF	UUC	ERR		
STD Setting	(dB)	(dB)	(dB)		
Complete cycle	128.4	128.1	-0.30	0.2	3.0
Positive half cycle	127.4	127.3	-0.10		2.0
Negative half cycle	127.4	127.3	-0.10		2.0

Certificate No : 23-SLM-177  
 Request No : Req-2023-1078

12. Overload indication

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Positive one-half cycle	139.7	0.2	1.5
Negative one-half cycle	140.4		
Deviated	-0.7		

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Initial	132.0	0.1	0.3
Final	132.0		
Deviated	0.0		

End of Certificate

### Certificate of Calibration

#### Customer

Name SGS (Thailand) Limited.  
Address 100 Nanglinchev Road, Chongnonsi, Yannawa Bangkok 10120

Certificate No : 23-SLM-171  
Request No : Req-2023-1081

#### Unit Under Calibration Details

Measurement item : Sound Level Meter  
Manufacturer : SCARLET  
Model : ST-21D  
Serial Number : 820706  
ID : ENSL 22178  
Resolution : 0.1 dB  
Microphone Class : 2  
Microphone Model : AWA14421  
Microphone S/N : A-090283  
Preamplifier Model : -  
Preamplifier S/N : -  
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 : 19 May 2023  
Calibrated Date : 23 May 2023  
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	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svante	Svan401	131	12 October 2023	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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 23 May 2023



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-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-171

Request No : Req-2023-1081

#### 1. Indication at the calibration check frequency

UUC Setting	Nominal Level	Before Adjust		After Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
1000 Hz 94 dB	93.81	93.1	-0.71	93.8	-0.01	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SOUNDTEK, Model ST-120, SN. 211203780

#### 2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	24.8	0.1

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

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	24.1	0.1
C	24.9	0.1
Z	29.6	0.1

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	A	C	Z		
FAST / 28-133					
STD Setting	(dB)	(dB)	(dB)		
125 Hz	0.0	0.2	0.1	0.6	2.0
1000 Hz	0.0	0.0	0.0	0.6	1.0
4000 Hz	0.1	0.1	-0.2	0.6	3.0
8000 Hz	0.1	0.2	0.3	0.7	5.0

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-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-171  
 Request No : Req-2023-1081

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

UUC Setting		Deviation from various Frequency			UNCERTAINTY	Acceptance
FAST / 28-133		Weighting Response curve				
STD Setting		A (dB)	C (dB)	Z (dB)	( ± dB)	Limit ( ± dB)
63 Hz		-0.2	-0.1	0.0	0.2	2.0
125 Hz		-0.1	0.0	0.0		1.5
250 Hz		-0.1	-0.1	0.0		1.5
500 Hz		0.0	0.0	0.0		1.5
1000 Hz		0.0	0.0	0.0		1.0
2000 Hz		0.1	0.1	0.0		2.0
4000 Hz		0.2	0.2	0.0		3.0
8000 Hz		-0.1	-0.2	0.0		5

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / 28-133	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	0.2	0.2
A	114.00	114.0	0.0		
C	114.00	113.9	-0.1		
Z	114.00	113.9	-0.1		

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
28-133 / A	REF	UUC	ERR		
UUC Time Response	(dB)	(dB)	(dB)	0.2	0.1
Fast	114.00	114.0	0.0		
Slow	114.00	114.0	0.0		
Leq	114.00	114.0	0.0		

Certificate No : 23-SLM-171  
 Request No : Req-2023-1081

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)	0.1	6.3
Initial	114.0		
Final	114.0		
Deviated	0.0		

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	0.3	1.1
137.00	137	137.0	0.0		
136.00	136	136.0	0.0		
135.00	135	135.0	0.0		
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	94.1	0.1		
89.00	89	89.1	0.1		
84.00	84	84.1	0.1		
79.00	79	79.1	0.1		
74.00	74	74.1	0.1		
69.00	69	69.1	0.1		
64.00	64	64.1	0.1		
59.00	59	59.1	0.1		
54.00	54	54.1	0.1		
49.00	49	49.1	0.1		
44.00	44	44.0	0.0		
39.00	39	38.8	-0.2		
38.00	38	37.8	-0.2		
37.00	37	36.8	-0.2		
36.00	36	35.8	-0.2		

Certificate No : 23-SLM-171  
 Request No : Req-2023-1081

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A	REF	UUC	ERR		
UUC Range	(dB)	(dB)	(dB)		
28-133	42.3	42.4	0.1	0.3	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
A / 28-133	Toneburst	Ref	UUC	ERR		
UUC Time Response	(ms)	(dB)	(dB)	(dB)		
Fast	200	129.0	129.0	0.0	0.2	1
	2	112.0	111.8	-0.2		+1.0, -2.5
	0.25	103.0	102.8	-0.2		+1.5, -5.0
Slow	200	122.6	122.6	0.0		1
	2	103.0	103.0	0.0		+1.0, -5.0
SEL	200	123.0	123.1	+0.1		1
	2	103.0	103.1	+0.1		+1.0, -2.5
	0.25	94.0	93.9	-0.1		+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / C / 28-133	REF	UUC	ERR		
STD Setting	(dB)	(dB)	(dB)		
Complete cycle	128.4	127.7	-0.70	0.2	3.0
Positive half cycle	127.4	127.3	-0.10		2.0
Negative half cycle	127.4	127.3	-0.10		2.0

Certificate No : 23-SLM-171  
 Request No : Req-2023-1081

12. Overload indication

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Positive one-half cycle	139.7	0.2	1.5
Negative one-half cycle	140.5		
Deviated	-0.8		

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Initial	132.0	0.1	0.3
Final	132.0		
Deviated	0.0		

End of Certificate



### Certificate of Calibration

#### Customer

Name : SGS (Thailand) Limited.  
Address : 100 Nanglinchee Road, Chongnensi, Yannawa Bangkok 10120

Certificate No : 23-SLM-173  
Request No : Req-2023-1083

#### Unit Under Calibration Details

Measurement item : : Sound Level Meier  
Manufacturer : : SCARLET  
Model : : ST-21D  
Serial Number : : 820710  
ID : : ENSL 22181  
Resolution : : 0.1 dB  
Microphone Class : 2  
Microphone Model : AWA14421  
Microphone S/N : A-000223  
Preamplifier Model : -  
Preamplifier S/N : -  
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 : : 19 May 2023  
Calibrated Date : : 23 May 2023  
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	GRAS	40AN	188273	6 October 2023	GRAS
Multi-frequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svantek	Svan401	131	12 October 2023	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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 23 May 2023



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FM-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-173

Request No : Req-2023-1083

#### 1. Indication at the calibration check frequency

UUC Setting	Nominal Level	Before Adjust		After Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
1000 Hz 94 dB	93.81	95.3	+1.49	93.8	-0.01	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SOUNDTEK, Model ST-120, SN. 211203780

#### 2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	24.0	0.1

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

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	23.6	0.1
C	25.1	0.1
Z	29.4	0.1

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	A	C	Z		
FAST / 28-133	(dB)	(dB)	(dB)	(± dB)	(± dB)
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
125 Hz	0.0	0.1	0.1	0.6	2.0
1000 Hz	0.0	0.0	0.0	0.6	1.0
4000 Hz	-0.2	-0.1	-0.3	0.6	3.0
8000 Hz	-0.4	-0.3	-0.1	0.7	5.0

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FM-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-173

Request No : Req-2023-1083

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

UUC Setting	Deviation from various Frequency			UNCERTAINTY	Acceptance
FAST / 28-133	Weighting Response curve				
STD Setting	A (dB)	C (dB)	Z (dB)	( ± dB)	Limit ( ± dB)
63 Hz	-0.2	-0.1	0.0	0.2	2.0
125 Hz	-0.1	0.0	0.0		1.5
250 Hz	-0.1	-0.1	0.0		1.5
500 Hz	-0.1	0.0	0.0		1.5
1000 Hz	0.0	-0.1	0.0		1.0
2000 Hz	0.1	0.0	0.0		2.0
4000 Hz	0.2	0.1	0.0		3.0
8000 Hz	-0.2	-0.2	0.0		5

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / 28-133	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	0.2	0.2
A	114.00	114.0	0.0		
C	114.00	113.9	-0.1		
Z	114.00	113.9	-0.1		0.2

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
28-133 / A	REF	UUC	ERR		
UUC Time Response	(dB)	(dB)	(dB)	0.2	0.1
Fast	114.00	114.0	0.0		
Slow	114.00	114.0	0.0		
Leq	114.00	114.0	0.0		

Certificate No : 23-SLM-173

Request No : Req-2023-1083

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)	0.1	0.3
Initial	114.0		
Final	114.0		
Deviated	0.0		

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	0.3	1.1
137.00	137	137.0	0.0		
136.00	136	136.0	0.0		
135.00	135	135.0	0.0		
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	84.1	0.1		
79.00	79	79.0	0.0		
74.00	74	74.1	0.1		
69.00	69	69.0	0.0		
64.00	64	64.0	0.0		
59.00	59	59.1	0.1		
54.00	54	54.0	0.0		
49.00	49	49.0	0.0		
44.00	44	44.1	0.1		
39.00	39	38.8	-0.2		
38.00	38	37.8	-0.2		
37.00	37	36.6	-0.4		
36.00	36	35.7	-0.3		

Certificate No : 23-SLM-173  
 Request No : Req-2023-1083

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A	REF	UUC	ERR		
UUC Range	(dB)	(dB)	(dB)		
28-133	42.2	42.2	0.0	0.3	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
A / 28-133	Toneburst	Ref	UUC	ERR		
UUC Time Response	(ms)	(dB)	(dB)	(dB)		
Fast	200	129.0	129.1	+0.1	0.2	1
	2	112.0	111.8	-0.2		-1.0, -2.5
	0.25	103.0	102.9	-0.1		-1.5, -5.0
Slow	200	122.6	122.7	+0.1		1
	2	103.0	103.1	+0.1		-1.0, -5.0
SEL	200	123.0	123.1	+0.1		1
	2	103.0	103.1	+0.1		-1.0, -2.5
	0.25	94.0	94.0	0.0		-1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / C / 28-133	REF	UUC	ERR		
STD Setting	(dB)	(dB)	(dB)		
Complete cycle	128.4	128.2	-0.20	0.2	3.0
Positive half cycle	127.4	127.3	-0.10		2.0
Negative half cycle	127.4	127.3	-0.10		2.0

Certificate No : 23-SLM-173  
 Request No : Req-2023-1083

12. Overload indication

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Positive one-half cycle	139.5		
Negative one-half cycle	139.9		
Deviated	-0.4		

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Initial	132.0		
Final	132.0		
Deviated	0.0		

End of Certificate

ENSL 22182

INNOVATIVE INSTRUMENT CALIBRATION LAB  
 INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE  
 7/139 MOO 13, SOI SUTINAKORN 11 TAMBON BANG KAE0,  
 AMPH0E BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND  
 TEL: (6690-2116-5860-1 FAX: (6690-2116-7140



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### Certificate of Calibration

#### Customer

Name : SGS (Thailand) Limited. Certificate No : 23-SLM-181  
 Address : 100 Nanglinches Road, Chongnonsi, Yannawa Bangkok 10120 Request No : Req-2023-1136

#### Unit Under Calibration Details

Measurement item : Sound Level Meier Microphone Class : 2  
 Manufacturer : SCARLET Microphone Model : AWA14421  
 Model : ST-21D Microphone S/N : A-000281  
 Serial Number : 820711 Preamplifier Model : -  
 ID : ENSL 22182 Preamplifier S/N : -  
 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 : 25 May 2023  
 Calibrated Date : 1 June 2023  
 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	Tracebility
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svantek	Svan401	131	12 October 2023	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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

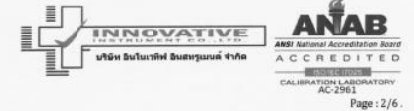
Issue Date : 1 June 2023



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FM-708-SLM-01 Rev.0 Issue date 01/07/19

INNOVATIVE INSTRUMENT CALIBRATION LAB  
 INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE  
 7/139 MOO 13, SOI SUTINAKORN 11 TAMBON BANG KAE0,  
 AMPH0E BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND  
 TEL: (6690-2116-5860-1 FAX: (6690-2116-7140



Page : 2/6.

Certificate No : 23-SLM-181  
 Request No : Req-2023-1136

#### 1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 28-133	Level	UUC	ERR	UUC	ERR		
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)		
1000 Hz 114 dB	114.09	113.9	-0.19	114.1	+0.01	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand CASELLA, Model CEL-120/2, SN. 3865016

#### 2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133	(dB)	( ± dB)
UUC Weighting	(dB)	( ± dB)
A	26.4	0.1

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

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133	(dB)	( ± dB)
UUC Weighting	(dB)	( ± dB)
A	25.7	0.1
C	26.9	0.1
Z	30.6	0.1

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY	Acceptance Limit
FAST / 28-133	A	C	Z	( ± dB)	( ± dB)
STD Setting	(dB)	(dB)	(dB)		
125 Hz	0.0	0.2	0.1	0.6	2.0
1000 Hz	0.0	0.0	0.0	0.6	1.0
4000 Hz	0.0	0.0	-0.2	0.6	3.0
8000 Hz	0.4	0.5	0.6	0.7	5.0

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FM-708-SLM-01 Rev.0 Issue date 01/07/19

UUC Setting	Deviation from various Frequency			UNCERTAINTY ( $\pm$ dB)	Acceptance
FAST / 28-133	Weighting Response curve				Limit
STD Setting	A (dB)	C (dB)	Z (dB)		( $\pm$ dB)
63 Hz	-0.2	-0.1	-0.1	0.2	2.0
125 Hz	-0.2	-0.1	-0.1		1.5
250 Hz	-0.1	-0.1	-0.1		1.5
500 Hz	-0.1	-0.1	-0.1		1.5
1000 Hz	0.0	-0.1	-0.1		1.0
2000 Hz	0.0	0.0	-0.1		2.0
4000 Hz	0.2	0.1	-0.1		3.0
8000 Hz	-0.2	-0.3	0.0		5

UUC Setting	STD REF	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
		UUC	ERR		
		(dB)	(dB)		
FAST / 28-133					
UUC Weighting	(dB)	(dB)	(dB)		
A	114.00	114.0	0.0	0.2	0.2
C	114.00	113.9	-0.1		0.2
Z	114.00	113.9	-0.1		0.2

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance
28-133 / A	REF	UUC	ERR		Limit
UUC Time Respo	(dB)	(dB)	(dB)	( ± dB)	( ± dB)
Fast	114.00	114.0	0.0	0.2	0.1
Slow	114.00	114.0	0.0		0.1
Leq	114.00	114.0	0.0		0.1

UUC Setting		Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	STD Setting	UUC (dB)		
	Initial	114.0		
	Final	114.0		
	Deviated	0.0	0.1	0.3

6. Level Inertia On the Reference Level Range					
UUC Setting	Anticipated	Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance
FAST / A / 28-133	REF	UUC	ERR		Limit
STD dB	(dB)	(dB)	(dB)		( $\pm$ dB)
136.00	136	136.0	0.0	0.3	0.8
135.00	135	135.0	0.0		1.1
134.00	134	134.0	0.0		1.1
129.00	129	129.0	0.0		1.1
124.00	124	124.0	0.0		1.1
119.00	119	119.0	0.0		1.1
114.00	114	114.0	0.0		1.1
109.00	109	109.0	0.0		1.1
104.00	104	104.1	0.1		1.1
99.00	99	99.1	0.1		1.1
94.00	94	94.1	0.1		1.1
89.00	89	89.1	0.1		1.1
84.00	84	84.1	0.1		1.1
79.00	79	79.1	0.1		1.1
74.00	74	74.1	0.1		1.1
69.00	69	69.1	0.1		1.1
64.00	64	64.1	0.1		1.1
59.00	59	59.1	0.1		1.1
54.00	54	54.1	0.1		1.1
49.00	49	49.1	0.1		1.1
44.00	44	44.1	0.1	1.1	
39.00	39	38.8	-0.2	1.1	
38.00	38	37.8	-0.2	1.1	
37.00	37	36.9	-0.1	0.8	
36.00	36	35.7	-0.3	1.1	

Certificate No : 23-SLM-181  
 Request No : Req-2023-1136

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance
FAST / A	REF	UUC	ERR	( ± dB)	Limit
UUC Range	(dB)	(dB)	(dB)	( ± dB)	( ± dB)
28-133	43.4	43.6	0.2	0.3	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance
A / 28-133	Toneburst	Ref	UUC	ERR	( ± dB)	Limit
UUC Time Response	(ms)	(dB)	(dB)	(dB)	( ± dB)	( ± dB)
Fast	200	129.0	129.1	+0.1	0.2	1
	2	112.0	112.1	+0.1		-1.0, -2.5
	0.25	103.0	102.9	-0.1		-1.5, -5.0
Slow	200	122.6	122.7	+0.1		1
	2	103.0	103.1	+0.1		-1.0, -5.0
SEL	200	123.0	123.1	+0.1		1
	2	103.0	103.1	+0.1		-1.0, -2.5
	0.25	94.0	94.0	0.0		-1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance
FAST / C / 28-133	REF	UUC	ERR	( ± dB)	Limit
STD Setting	(dB)	(dB)	(dB)	( ± dB)	( ± dB)
Complete cycle	128.4	127.9	-0.50	0.2	3.0
Positive half cycle	127.4	127.2	-0.20		2.0
Negative half cycle	127.4	127.2	-0.20		2.0

Certificate No : 23-SLM-181  
 Request No : Req-2023-1136

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 28-133	UUC	( ± dB)	Limit
STD Setting	(dB)	( ± dB)	( ± dB)
Positive one-half cycle	138.7		
Negative one-half cycle	139.9		
Deviated	-1.2	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 28-133	UUC	( ± dB)	Limit
STD Setting	(dB)	( ± dB)	( ± dB)
Initial	132.0		
Final	132.0		
Deviated	0.0	0.1	0.3

End of Certificate

# Certificate of Calibration

## Customer

Name : SGS (Thailand) Limited. Certificate No : 23-SLM-178  
 Address : 100 Nanglinchee Road, Chongasensi, Yannawa Bangkok 10120 Request No : Req-2023-1084

## Unit Under Calibration Details

Measurement item : : Sound Level Meier Microphone Class : 2  
 Manufacturer : : SCARLET Microphone Model : AWA14421  
 Model : : ST-21D Microphone S/N : A-000218  
 Serial Number : : 820712 Preamplifier Model : -  
 ID : : ENSL 22183 Preamplifier S/N : -  
 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 : : 19 May 2023  
 Calibrated Date : : 24 May 2023  
 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	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	SvanteK	Svan401	131	12 October 2023	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 :

[Signature]  
 Calibration Officer

Approved By :

[Signature]  
 Calibration Engineer Supervisor

Issue Date : 24 May 2023



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FM-708-SLM-01 Rev.D Issue date 01/07/19

Certificate No : 23-SLM-178

Request No : Req-2023-1084

## 1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
Level	Level	UUC	ERR	UUC	ERR		
(dB)	(dB)	(dB)	(dB)	(dB)	(dB)		
1000 Hz 94 dB	93.81	93.3	-0.51	93.8	-0.01	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SOUNDTEK, Model ST-120, SN. 211203780

## 2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	( ± dB)
A	23.3	0.1

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

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	( ± dB)
A	22.6	0.1
C	22.3	0.1
Z	26.2	0.1

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / 28-133	A	C	Z		
STD Setting	(dB)	(dB)	(dB)		
125 Hz	0.0	0.2	0.2	0.6	2.0
1000 Hz	0.0	0.0	0.0	0.6	1.0
4000 Hz	-0.7	-0.6	-0.9	0.6	3.0
8000 Hz	-0.9	-0.9	-0.7	0.7	5.0

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-SLM-01 Rev.D Issue date 01/07/19

Certificate No : 23-SLM-178  
 Request No : Req-2023-1084

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

UUC Setting		Deviation from various Frequency			UNCERTAINTY	Acceptance
FAST / 28-133		Weighting Response curve				
STD Setting		A (dB)	C (dB)	Z (dB)	( ± dB)	Limit ( ± dB)
63 Hz		-0.2	-0.1	0.0	0.2	2.0
125 Hz		-0.1	0.0	0.0		1.5
250 Hz		-0.1	-0.1	0.0		1.5
500 Hz		0.0	0.0	0.0		1.5
1000 Hz		0.0	0.0	0.0		1.0
2000 Hz		0.1	0.0	0.0		2.0
4000 Hz		0.2	0.2	0.0		3.0
8000 Hz		-0.1	-0.2	0.0		5

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / 28-133	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	0.2	0.2
A	114.00	114.0	0.0		
C	114.00	113.9	-0.1		
Z	114.00	113.9	-0.1		

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
28-133 / A	REF	UUC	ERR		
UUC Time Response	(dB)	(dB)	(dB)	0.2	0.1
Fast	114.00	114.0	0.0		
Slow	114.00	114.0	0.0		
Leq	114.00	114.0	0.0		

Certificate No : 23-SLM-178  
 Request No : Req-2023-1084

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)	0.1	0.3
Initial	114.0		
Final	114.0		
Deviated	0.0		

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	0.3	1.1
136.00	136	135.9	-0.1		
135.00	135	134.9	-0.1		
134.00	134	133.9	-0.1		
129.00	129	128.9	-0.1		
124.00	124	124.0	0.0		
119.00	119	119.0	0.0		
114.00	114	114.0	0.0		
109.00	109	108.9	-0.1		
104.00	104	103.9	-0.1		
99.00	99	98.9	-0.1		
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	43.9	-0.1		
39.00	39	38.8	-0.2		
38.00	38	37.8	-0.2		
37.00	37	36.7	-0.3		
36.00	36	35.6	-0.4		



Certificate No : 23-SLM-178  
 Request No : Req-2023-1084

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance
FAST / A	REF	UUC	ERR	(± dB)	Limit
UUC Range	(dB)	(dB)	(dB)		(± dB)
28-133	41.4	41.5	0.1	0.3	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance
A / 28-133	Toneburst	Ref	UUC	ERR	(± dB)	Limit
UUC Time Response	(ms)	(dB)	(dB)	(dB)		(± dB)
Fast	200	129.0	129.1	+0.1	0.2	1
	2	112.0	112.1	+0.1		+1.0, -2.5
	0.25	103.0	102.7	-0.3		+1.5, -5.0
Slow	200	122.6	122.7	+0.1		1
	2	103.0	103.1	+0.1		+1.0, -5.0
SEL	200	123.0	123.2	+0.2		1
	2	103.0	103.1	+0.1		+1.0, -2.5
	0.25	94.0	94.0	0.0		+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance
FAST / C / 28-133	REF	UUC	ERR	(± dB)	Limit
STD Setting	(dB)	(dB)	(dB)		(± dB)
Complete cycle	128.4	127.7	-0.70	0.2	3.0
Positive half cycle	127.4	127.4	0.00		2.0
Negative half cycle	127.4	127.4	0.00		2.0

Certificate No : 23-SLM-178  
 Request No : Req-2023-1084

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 28-133	UUC	(± dB)	Limit
STD Setting	(dB)		(± dB)
Positive one-half cycle	138.4	0.2	1.5
Negative one-half cycle	139.6		
Deviated	-1.2		

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 28-133	UUC	(± dB)	Limit
STD Setting	(dB)		(± dB)
Initial	132.0	0.1	0.3
Final	132.0		
Deviated	0.0		

End of Certificate

### Certificate of Calibration

#### Customer

Name SGS (Thailand) Limited.  
Address 100 Nanglinchee Road, Chongnonsi, Yannawa Bangkok 10120

Certificate No : 23-SLM-174  
Request No : Req-2023-1085

#### Unit Under Calibration Details

Measurement item : Sound Level Meter  
Manufacturer : SCARLET  
Model : ST-21D  
Serial Number : 820713  
ID : ENSL 22184  
Resolution : 0.1 dB  
Microphone Class : 2  
Microphone Model : AWA14421  
Microphone S/N : A-000261  
Preamplifier Model : -  
Preamplifier S/N : -  
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 : 19 May 2023  
Calibrated Date : 23 May 2023  
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	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	SvanteK	Svan401	131	12 October 2023	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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date : 23 May 2023



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PM-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-174

Request No : Req-2023-1085

#### 1. Indication at the calibration check frequency

UUC Setting	Nominal Level	Before Adjust		After Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
1000 Hz 94 dB	93.81	93.2	-0.61	93.8	-0.01	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SOUNDTEK, Model ST-120, SN. 211203780

#### 2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	24.8	0.1

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

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	24.0	0.1
C	24.6	0.1
Z	28.3	0.1

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	A	C	Z		
FAST / 28-133	(dB)	(dB)	(dB)	(± dB)	(± dB)
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
125 Hz	-0.1	0.1	0.1	0.6	2.0
1000 Hz	0.0	0.0	0.0	0.6	1.0
4000 Hz	-0.1	0.0	-0.2	0.6	3.0
8000 Hz	-0.1	0.0	0.2	0.7	5.0

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

PM-708-SLM-01 Rev.0 Issue date 01/07/19

U/C Setting		Deviation from various Frequency			UNCERTAINTY ( $\pm$ dB)	Acceptance
FAST / 28-133		Weighting Response curve				Limit
STD Setting		A (dB)	C (dB)	Z (dB)	0.2	( $\pm$ dB)
63 Hz		-0.2	-0.1	-0.1		2.0
125 Hz		-0.1	0.0	0.0		1.5
250 Hz		-0.1	-0.1	0.0		1.5
500 Hz		0.0	0.0	0.0		1.5
1000 Hz		0.0	0.0	0.0		1.0
2000 Hz		0.1	0.1	0.0		2.0
4000 Hz		0.2	0.2	0.0		3.0
8000 Hz		-0.1	-0.2	0.0		5

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / 28-133	REF	UUC (dB)	ERR (dB)		
UUC Weighting	(dB)	(dB)	(dB)		
A	114.00	114.0	0.0	0.2	0.2
C	114.00	113.9	-0.1		0.2
Z	114.00	113.9	-0.1		0.2

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
28-133 / A	REF	UUC	ERR		
UUC Time Respo	(dB)	(dB)	(dB)	( ± dB)	( ± dB)
Fast	114.00	114.0	0.0	0.2	0.1
Slow	114.00	114.0	0.0		0.1
Leq	114.00	114.0	0.0		0.1

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.3

UUC Setting	Anticipated	Deviation		UNCERTAINTY	Acceptance
FAST / A / 28-133	REF	UUC	ERR		Limit
STD dB	(dB)	(dB)	(dB)	(± dB)	(± dB)
137.00	137	137.0	0.0	0.3	0.8
136.00	136	136.0	0.0		0.8
135.00	135	135.0	0.0		1.1
134.00	134	134.0	0.0		1.1
129.00	129	129.0	0.0		1.1
124.00	124	124.0	0.0		1.1
119.00	119	119.0	0.0		1.1
114.00	114	114.0	0.0		1.1
109.00	109	109.0	0.0		1.1
104.00	104	104.0	0.0		1.1
99.00	99	99.0	0.0		1.1
94.00	94	94.0	0.0		1.1
89.00	89	89.0	0.0		1.1
84.00	84	84.0	0.0		1.1
79.00	79	79.0	0.0		1.1
74.00	74	74.0	0.0		1.1
69.00	69	69.0	0.0		1.1
64.00	64	64.0	0.0		1.1
59.00	59	59.0	0.0		1.1
54.00	54	54.0	0.0		1.1
49.00	49	49.0	0.0		1.1
44.00	44	44.0	0.0		1.1
39.00	39	38.9	-0.1		1.1
38.00	38	37.8	-0.2		1.1
37.00	37	36.8	-0.2		0.8
36.00	36	35.7	-0.3		1.1

Certificate No : 23-SLM-174  
 Request No : Req-2023-1085

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A	REF	UUC	ERR		
UUC Range	(dB)	(dB)	(dB)		
28-133	41.8	41.9	0.1	0.3	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
A / 28-133	Toneburst	Ref	UUC	ERR		
UUC Time Response	(ms)	(dB)	(dB)	(dB)		
Fast	200	129.0	129.1	+0.1	0.3	1
	2	112.0	111.9	-0.1		+1.0, -2.5
	0.25	103.0	102.9	-0.1		+1.5, -5.0
Slow	200	122.6	122.7	+0.1		1
	2	103.0	102.9	-0.1		+1.0, -5.0
SEL	200	123.0	123.2	+0.2		1
	2	103.0	103.1	+0.1		+1.0, -2.5
	0.25	94.0	94.1	+0.1		+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / C / 28-133	REF	UUC	ERR		
STD Setting	(dB)	(dB)	(dB)		
Complete cycle	128.4	127.9	-0.50	0.2	3.0
Posiive half cycle	127.4	127.2	-0.20		2.0
Negative half cycle	127.4	127.2	-0.20		2.0

Certificate No : 23-SLM-174  
 Request No : Req-2023-1085

12. Overload indication

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Positive one-half cycle	139.3	0.2	1.5
Negative one-half cycle	139.7		
Deviated	-0.4		

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Initial	132.0	0.1	0.3
Final	132.0		
Deviated	0.0		

End of Certificate

### Certificate of Calibration

#### Customer

Name : SGS (Thailand) Limited.  
 Address : 100 Nanglinchee Road, Chongkronsi, Yannawa Bangkok 10120

Certificate No : 23-SLM-182  
 Request No : Req-2023-1137

#### Unit Under Calibration Details

Measurement item : Sound Level Meier  
 Manufacturer : SCARLET  
 Model : ST-21D  
 Serial Number : 820717  
 ID : ENSL 22188  
 Resolution : 0.1 dB  
 Microphone Class : 2  
 Microphone Model : AWA14421  
 Microphone S/N : A-000500  
 Preamplifier Model : -  
 Preamplifier S/N : -  
 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 : 25 May 2023  
 Calibrated Date : 1 June 2023  
 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	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svante	Svan401	131	12 October 2023	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 :

Calibration Officer

Approved By :

Calibration Engineer Supervisor

Issue Date :

1 June 2023



Certificate No : 23-SLM-182

Request No : Req-2023-1137

#### 1. Indication at the calibration check frequency

UUC Setting	Nominal Level	Before Adjust		After Adjust		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
FAST / A / 28-133 Calibrator Setting 1000 Hz 114 dB	114.09 (dB)	114.2 (dB)	+0.11 (dB)	114.1 (dB)	+0.01 (dB)	0.2 ( ± dB)	0.3 ( ± dB)

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand CASELLA, Model CEL-120/2, SN. 3865016

#### 2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY ( ± dB)
FAST / 28-133		
UUC Weighting	(dB)	( ± dB)
A	25.6	0.1

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

UUC Setting	Measured (dB)	UNCERTAINTY ( ± dB)
FAST / 28-133		
UUC Weighting	(dB)	( ± dB)
A	25.0	0.1
C	25.4	0.1
Z	29.7	0.1

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
	A (dB)	C (dB)	Z (dB)		
FAST / 28-133					
STD Setting	(dB)	(dB)	(dB)	( ± dB)	( ± dB)
125 Hz	0.0	0.2	0.1	0.6	2.0
1000 Hz	0.0	0.0	0.0	0.6	1.0
4000 Hz	-0.6	-0.5	-0.7	0.6	3.0
8000 Hz	-0.7	-0.7	-0.5	0.7	5.0

Certificate No : 23-SLM-182  
 Request No : Req-2023-1137

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

UUC Setting		Deviation from various Frequency			UNCERTAINTY	Acceptance
FAST / 28-133		Weighting Responce curve				
STD Setting		A (dB)	C (dB)	Z (dB)	( ± dB)	Limit ( ± dB)
63 Hz		-0.1	-0.1	0.0	0.2	2.0
125 Hz		-0.1	-0.1	0.0		1.5
250 Hz		-0.1	0.0	0.0		1.5
500 Hz		0.0	0.0	0.0		1.5
1000 Hz		0.0	0.0	0.0		1.0
2000 Hz		0.0	0.0	0.0		2.0
4000 Hz		0.1	0.1	0.0		3.0
8000 Hz		-0.1	-0.2	0.0		5

#### 6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / 28-133	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	0.2	
A	114.00	114.0	0.0		
C	114.00	113.9	-0.1		
Z	114.00	113.9	-0.1		

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
28-133 / A	REF	UUC	ERR		
UUC Time Response	(dB)	(dB)	(dB)	0.2	
Fast	114.00	114.0	0.0		
Slow	114.00	114.0	0.0		
Leq	114.00	114.0	0.0		

Certificate No : 23-SLM-182  
 Request No : Req-2023-1137

#### 7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Initial	114.0		
Final	114.0		
Deviated	0.0		

#### 8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	0.3	
136.00	136	136.0	0.0		
135.00	135	135.0	0.0		
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	49.1	0.1		
44.00	44	44.1	0.1		
39.00	39	38.8	-0.2		
38.00	38	37.8	-0.2		
37.00	37	36.9	-0.1		
36.00	36	35.7	-0.3		

Certificate No : 23-SLM-182  
 Request No : Req-2023-1137

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A	REF	UUC	ERR		
UUC Range	(dB)	(dB)	(dB)		
28-133	41.9	42.1	0.2	0.3	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
A / 28-133	Toneburst	Ref	UUC	ERR		
UUC Time Response	(ms)	(dB)	(dB)	(dB)		
Fast	200	129.0	129.2	+0.2	0.2	1
	2	112.0	112.2	+0.2		+1.0, -2.5
	0.25	103.0	102.7	-0.3		+1.5, -5.0
Slow	200	122.6	122.5	-0.1		1
	2	103.0	102.9	-0.1		+1.0, -5.0
SEL	200	123.0	123.2	+0.2		1
	2	103.0	103.2	+0.2		+1.0, -2.5
	0.25	94.0	93.8	-0.2		+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / C / 28-133	REF	UUC	ERR		
STD Setting	(dB)	(dB)	(dB)		
Complete cycle	128.4	128.1	-0.30	0.2	3.0
Positive half cycle	127.4	127.3	-0.10		2.0
Negative half cycle	127.4	127.3	-0.10		2.0

Certificate No : 23-SLM-182  
 Request No : Req-2023-1137

12. Overload indication

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Positive one-half cycle	138.5		
Negative one-half cycle	139.3		
Deviated	-0.8	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 28-133	UUC		
STD Setting	(dB)		
Initial	132.0		
Final	132.0		
Deviated	0.0	0.1	0.3

End of Certificate

คุณภาพอากาศในสถานที่ทำงาน




**MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD**

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


## CALIBRATION CERTIFICATE

Certificate No. : L202302025-001

Date Issued : 07-Feb-23

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

**Equipment** : DryCal

**Manufacturer** : MESA LABS

**Model** : DEFENDER 530-L

**Serial No.** : 137751

**ID No./Tag No.** : ENWP 15145

**Date Received** : 02-Feb-23

**Date Calibrated** : 04-Feb-23

**Calibrated by** : Mr. Jame Khaothong

### Calibration Method or Calibration Procedure Used

In-house method : CP-34 by comparison against mass flow calibrator.



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

### Result of Calibration

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

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Approved by



Page 1 of 3

Certificate No. : L202302025-001

**Note** : The actual flow rate is determined by the equation :

$$Q_{Meas} = Q_{Ref} \times \frac{P_{Ref}}{P_{Meas}} \times \frac{T_{Meas}}{T_{Ref}}$$

; Q = Flow rate

; P = Absolute pressure

; T = Absolute temperature

; Subscript "Meas" = Measurement condition

; Subscript "Ref" = Reference condition

Condition As-Received : Used Item

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

### Traceability of Certificate :

The International System of Units (SI) through

NIMT Calibration Certificate No. MW-0013-22 for Mass Flow Calibrator (20 SCCM) Serial No. G500971G20, Due 22-Feb-24

MIT Calibration Certificate No. L202210258-007 for Mass Flow Calibrator (200 SCCM) Serial No. 96093001W, Due 07-Nov-24

MIT Calibration Certificate No. AD2109-180-0001 for Mass Flow Calibrator (2000 SCCM) Serial No. 96093001W, Due 10-Sep-23

**End of Certificate**

Page 3 of 3

Certificate No. : L202302025-001

Environment : Ambient temperature : ( 23 ± 2 ) °C  
Relative humidity : ( 50 ± 15 ) % RH

Capacity Range : 500 ml/min

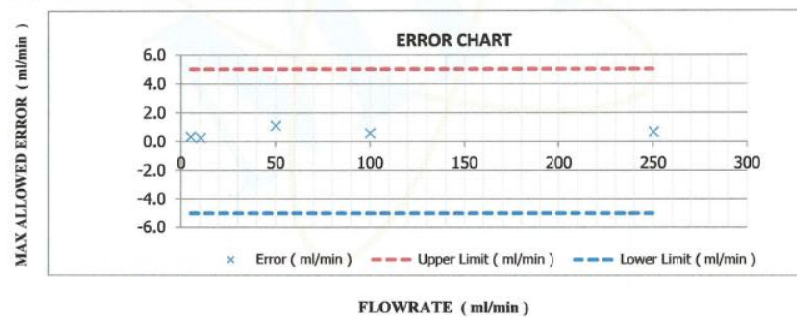
Calibration Media : Air

Type : Volumetric Flowmeter

Unit Under Calibration Reference Condition : At atmospheric pressure and room temperature condition

Temperature ( ° C )	Pressure ( kPa )	UUC Reading ( ml/min )	STD Reading ( ml/min )	Error ( ml/min )	Uncertainty ( ± ml/min )
23.59	101.28	5.0667	4.716	0.3507	0.17
23.56	101.82	10.388	10.126	0.262	0.16
23.52	100.99	50.021	48.92	1.101	1.7
23.50	101.12	100.01	99.42	0.59	1.6
23.57	101.33	250.270	249.6	0.670	7.6

Error = Unit Under Calibration - Standard





Agilent Technologies (Thailand) Limited  
U CHU LIANG BLDG. 22/F UNIT A,D  
968 RAMA 4 ROAD, SILOM, BANGRAK  
Bangkok 10500 Thailand

Tel. +662 637 6363  
Fax: +662 632 4334  
Email: [ccc-smt@agilent.com](mailto:ccc-smt@agilent.com)  
Website: [www.agilent.com/chem](http://www.agilent.com/chem)

Service Confirmation Number: 6904997683

Service Confirmation Date: 28.06.2023

#### Customer Contact:

SGS (Thailand) Limited  
Branch 00003  
1/209 1/211 Moo 1 T Bangchang  
A Banchang  
RAYONG 21130

TAX ID : 0105532106079

Saijai.Ruangsaawat@sgs.com  
038-685 260-4

#### Invoice To:

SGS (Thailand) Limited  
Branch 00003  
1/209 1/211 Moo 1 T Bangchang A  
Banchang RAYONG 21130

#### Delivery Site:

SGS (Thailand) Limited  
Branch 00003  
1/209 1/211 Moo 1 T Bangchang  
A Banchang  
RAYONG 21130

#### Location:

Room  
Bldg  
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Agilent Technologies (Thailand) Limited. Head Office  
U Chu Liang Bldg. 22/F Unit A,D  
968 Rama 4 Road, Silom, Bangrak,  
Bangkok 10500 Thailand  
Tax ID : 0105542068218

### SERVICE REPORT

<b>Customer Purchase Order Number:</b>	<b>Customer Number:</b> 70205138
<b>Service Request:</b>	<b>Service Request Date:</b>
<b>Service Order:</b> 6006193098	<b>Service Confirmation:</b> 6904997683

#### Direct Inquiries to:

Contact Name: Customer Contact Center  
Contact E-mail: [ccc-smt@agilent.com](mailto:ccc-smt@agilent.com)  
Contact Telephone: +662 637 6363  
Contact Fax: +662 632 4334

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Citibank N.A. Bangkok Branch  
399 Interchange 21 Building, Sukhumvit Road, Klongtoey Nau  
Sub-district, Wattana District, Bangkok 10110 Thailand  
Acc. No: 012-4452-007  
THB:Krung Thai Bank PCL  
Siam Square Br.,416/1-2 Rama I Rd.,Pathumwan, BKK 10330  
Thailand

ORIGINAL

#### Service Instrument:

Model Number	Model Description	Serial Number	System Handle	Parent Asset
SYS-GM-5977T-X	GCMS 5977 Turbo System Adv Funct			
G7077B	5977B Inert Plus MSD Turbo EI Mainframe	US1746M008	000000006002373266	SYS-GM-5977T-X
G4514A	7693A Tray, 150 Vial	CN17480003	000000006002373266	SYS-GM-5977T-X
TMR-ATOMX	Teledyne Tekmar Atomx	US10088004		SYS-GM-5977T-X
G4513A	7693A Autoinjector	CN17490204	000000006002373266	SYS-GM-5977T-X
G3440B	Agilent 7890B Series GC Custom	CN17493064	000000006002373266	SYS-GM-5977T-X

#### Service Items:



Item	Service/Part #	Description	Qty	Entitlement	Service Start	Service End
1000	PM	Preventive Maintenance	1.00	Agreement Entitlement - 100 % covered	26.06.2023	26.06.2023
1010	5188-6496	QuickPick Split Vent + Inlet PM Kit	1.00	Agreement Entitlement - 100 % covered		
1020	5188-6497	QuickPick Splitless Inlet/Vent PM Kit	1.00	Agreement Entitlement - 100 % covered		
1030	5191-5851	Agilent Vacuum Fluid 45 Platinum, 1Qt	1.00	Agreement Entitlement - 100 % covered		
1040	G7005-60061	Filament,high temperature EI for GCMS	2.00	Agreement Entitlement - 100 % covered		
1050	G8160-60120	Tubing, Drain, Self Retracting (per foot	1.00	Agreement Entitlement - 100 % covered		
1060	G1099-80039	Oil Mist Filter, 3/8 BSP Male Threads	1.00	Agreement Entitlement - 100 % covered		

#### Additional Information:

**Service Confirmation Number:** 6904997683

**Service Confirmation Date:** 28.06.2023

**Service Information:**

<b>Problem Description:</b> NR-C-PM-GMAtomX-5001151743		
<b>Service Provided:</b> PM 7890B/5977B/ATOMX. Clean source , change all consumable.		
<b>Service Overview Code:</b> Reason Code: Scheduled Service Diagnosis Code: Scheduled Service Resolution Code: Scheduled Service		
<b>Reported Hours:</b> 6.0	<b>Travel Hours:</b> 2.0	
<b>Customer Field Service Representative Name:</b> Eaknarin Puangsopa	<b>Customer Field Service Representative Signature:</b> 	<b>Date:</b> 28 Jun 2023
<b>Customer Name:</b> Hatairat Linjee	<b>Customer Signature:</b> 	<b>Date:</b> 28 Jun 2023
<b>Additional Comments:</b>		

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## ภาคผนวก ค

- สำเนาหนังสือรับรองห้องปฏิบัติการวิเคราะห์เอกชน  
บริษัท เอสจีเอส (ประเทศไทย) จำกัด
  - สำเนาหนังสือรับรองห้องปฏิบัติการวิเคราะห์เอกชนตามมาตรฐาน  
ISO/IEC 17025:2017 บริษัท เอสจีเอส (ประเทศไทย) จำกัด
  - สำเนาใบรับรองมาตรฐาน ISO 9001:2015
-

ที่ อก ๐๓๒๐/๑๖๐๔๑



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑ พฤศจิกายน ๒๕๖๕

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอสจีเอส (ประเทศไทย) จำกัด (สาธารณะยง)

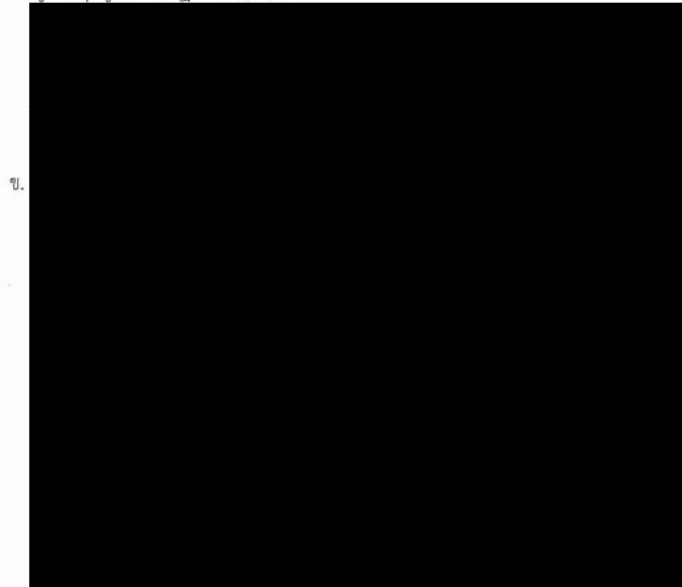
อ้างถึง คำขอต่ออายุของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๑๒ กันยายน ๒๕๖๕

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
บริษัท เอสจีเอส (ประเทศไทย) จำกัด (สาธารณะยง) จำนวน ๒๒ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอสจีเอส (ประเทศไทย) จำกัด (สาธารณะยง) ขอต่ออายุหนังสือ  
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๙๗ สถานที่ตั้งเลขที่ ๑/๒๐๙ และ ๑/๒๑๑ หมู่ที่ ๑  
ตำบลบ้านฉาง อำเภอบ้านฉาง จังหวัดระยอง ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอสจีเอส (ประเทศไทย) จำกัด (สาธารณะยง)  
ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์



ข.

๑๓) นายเฉลิมวุฒิ...

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ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๔๔ รายการ  
น้ำใต้ดิน จำนวน ๑๒๓ รายการ อากาศเสีย (ปล่องระบาย) จำนวน ๒๘ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว  
จำนวน ๓๗ รายการ และดิน จำนวน ๑๒๓ รายการ รวมทั้งสิ้นจำนวน ๓๕๕ รายการ ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๑๒ ตุลาคม ๒๕๖๘ หากประสงค์จะต่ออายุหนังสือ  
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงาน  
อุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ซึ่งคำขอ  
ต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้า  
เว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ท้ายหนังสือนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



ผู้อำนวยการศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก  
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

โทร. ๐ ๓๓๑๓ ๖๐๕๙ ต่อ ๕๐๐๑-๒

ไปรษณีย์อิเล็กทรอนิกส์ einw@div.mail.go.th



ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอสจีเอส (ประเทศไทย) จำกัด (สาขารายอง) เลขทะเบียน ๖-๑๙๗

ที่ อก ๐๓๒๐/๑๖๐๔๑

ลงวันที่ ๑ พฤศจิกายน ๒๕๖๔

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๕๕ รายการ  
น้ำเสีย จำนวน 44 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
2	Arsenic	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
3	Barium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
4	$\alpha$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
5	$\beta$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
6	$\delta$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
7	$\gamma$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
8	Biochemical Oxygen Demand	5-Day BOD Test, Membrane Electrode Method <sup>[4]</sup>
9	Cadmium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
10	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method <sup>[4]</sup>
11	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
12	Color	ADMI Weighted – Ordinate Spectrophotometric Method <sup>[4]</sup>
13	Copper	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
14	Cyanide	Distillation, Colorimetric Method <sup>[4]</sup>
15	p,p'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
16	p,p'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
17	o,p'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
18	p,p'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
19	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
20	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
21	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
22	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
23	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
24	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
25	Formaldehyde	Distillation, Colorimetric Method <sup>[3]</sup>
26	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
27	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
28	Hexavalent Chromium	Filtration, Colorimetric Method <sup>[4]</sup>
29	Lead	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
30	Manganese	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
31	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[4]</sup>
32	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
33	Nickle	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
34	Oil and Grease	Liquid-Liquid, Partition-Gravimetric Method <sup>[4]</sup>
35	pH	Electrometric Method <sup>[4]</sup>
36	Phenols	Distillation, Direct Photometric Method <sup>[4]</sup>
37	Selenium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
38	Temperature	Field Method <sup>[4]</sup>
39	Total Chromium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
40	Total Dissolved Solids	Dried at 180 °C <sup>[4]</sup>
41	Total Kjeldahl Nitrogen	Digestion, Distillation, Titrimetric Method <sup>[4]</sup>
42	Total Suspended Solids	Dried at 103-105 °C <sup>[4]</sup>
43	Trivalent Chromium	Digestion, Inductively Coupled Plasma Method; Filtration, Colorimetric Method, Calculation <sup>[4]</sup>
44	Zinc	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>



## น้ำใต้ดิน จำนวน 123 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
2	Acetone	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
5	Antimony	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
6	Arsenic	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
8	Barium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
9	Benzene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
10	Benzo(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
13	Benzoic acid	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
15	Benzo(g,h,i)perylene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
16	Beryllium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
18	Bis(2-Ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
19	Bromodichloromethane	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
20	Bromoform	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>

21 Butyl...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
21	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
22	Cadmium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
23	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
24	Carbon disulfide	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
25	Carbon tetrachloride	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
26	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
27	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
28	Chlorobenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
29	Chlorodibromomethane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
30	Chloroform	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
31	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
32	Chromium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
33	Chromium Hexavalent	Filtration, Colorimetric Method <sup>[4]</sup>
34	Chromium Trivalent	Digestion, Inductively Coupled Plasma Method ; Filtration, Colorimetric Method; Calculation <sup>[4]</sup>
35	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
36	Cyanide	Distillation, Colorimetric Method
37	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
38	DDD	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
39	DDE	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
40	DTT	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>

41 Dibenz...



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
41	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
42	Di-n-Butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
43	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
44	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
45	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
46	3,3-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
47	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
48	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
49	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
50	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
51	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
52	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
53	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
54	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
55	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
56	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
57	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
58	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>

59 2,4-Dinitrophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
59	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
60	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
61	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
62	Di-n-octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
63	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
64	Endrin	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
65	Ethylbenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
66	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
67	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
68	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
69	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
70	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
71	Hexachloro-1,3-butadiene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
72	$\alpha$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
73	$\beta$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
74	$\gamma$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
75	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
76	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>

77 n-Hexane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
77	n-Hexane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method
78	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
79	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
80	Lead	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
81	Manganese	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
82	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[4]</sup>
83	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
84	Methyl Bromide	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
85	Methylene Chloride	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
86	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
87	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
88	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
89	Naphthalene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
90	Nickel	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
91	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
92	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
93	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
94	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
95	pH	Electrometric Method <sup>[4]</sup>
96	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
97	Phenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
98	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
99	Selenium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
100	Silver	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
101	Styrene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
102	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
103	Tetrachloroethylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
104	Toluene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
105	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
106	TPH (C <sub>5</sub> -C <sub>8</sub> )	Purge and Trap, Gas Chromatographic Mass Spectrometric Method
107	TPH (C <sub>8</sub> -C <sub>16</sub> )	Purge and Trap, Gas Chromatographic Mass Spectrometric Method
108	TPH (C <sub>16</sub> -C <sub>35</sub> )	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
109	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
110	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
111	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
112	Trichloroethylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
113	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
114	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
115	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
116	Vanadium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
117	Vinyl acetate	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
118	Vinyl chloride	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
119	m-Xylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
120	o-Xylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
121	p-Xylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
122	Xylene (Total)	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
123	Zinc	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>

อากาศเสีย (ปล่อยระบาย) จำนวน 28 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
2	Arsenic	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
3	Beryllium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
4	Cadmium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
5	Carbon Monoxide	Instrumental Analyzer Method <sup>[5]</sup>
6	Chlorine	Isokinetic Sampling, Ion Chromatographic Method <sup>[7]</sup>
7	Chromium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
8	Cobalt	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
9	Copper	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
10	Cresol	Absorption Sampling, Gas Chromatographic Method <sup>[6]</sup>
11	Dioxin/Furans	Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory <sup>[5]</sup>

12 Hydrogen...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
12	Hydrogen Chloride	Isokinetic Sampling, Ion Chromatographic Method <sup>[7]</sup>
13	Hydrogen Fluoride	Isokinetic Sampling, Ion Chromatographic Method <sup>[7]</sup>
14	Hydrogen Sulfide	Absorption Sampling, Iodometric Method <sup>[5]</sup>
15	Lead	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
16	Manganese	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
17	Mercury	Isokinetic Sampling, Digestion, Cold-Vapour Atomic Absorption Spectrometric Method <sup>[5]</sup>
18	Nickel	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
19	Opacity	Ringelmann's Method <sup>[1]</sup>
20	Oxides of Nitrogen	1) Absorption Sampling, Colorimetric Method <sup>[6]</sup> 2) Instrumental Analyzer Method <sup>[7]</sup>
21	Tellurium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
22	Tin	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
23	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method <sup>[7]</sup>
24	Selenium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
25	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method <sup>[5]</sup> 2) Instrumental Analyzer Method <sup>[5]</sup>
26	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method <sup>[6]</sup>
27	Vanadium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
28	Xylene	Adsorption Sampling, Gas Chromatographic Method <sup>[6]</sup>

สิ่งปฏิกูลหรือวัสดุ...



## สิ่งปลูกหรือวัสดุที่ไม่ใช่แล้ว จำนวน 37 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>
7	Chlordane	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
8	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction Colorimetric Method; Calculation <sup>[10,17]</sup> 2) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>[2,10,17]</sup>
9	Chromium (VI)	1) Waste Extraction, Digestion, Colorimetric Method <sup>[10,17]</sup> 2) Alkaline Digestion, Colorimetric Method <sup>[10,17]</sup>
10	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>
11	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
12	Dieldrin	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
13	DDD	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
14	DDE	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
15	DDT	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
16	2,4-D (2,4-Dichlorophenoxyacetic acid)	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
17	Endrin	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
18	Heptachlor	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
19	Kepone	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
20	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,11]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>
21	Lindane	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[2,18]</sup> 2) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[18]</sup>
23	Methoxychlor	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
24	Mirex	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>
26	Polychlorinated Biphenyls (PCBs)	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
27	Pentachlorophenol	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
28	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>
29	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
30	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup>
31	Silvex; 2,4,5-Trichlorophenoxypropionic acid	2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup> Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>
33	Total Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction Colorimetric Method; Calculation <sup>[10,17]</sup> 2) Digestion, Inductively Coupled Plasma – Atomic Emission Spectrometry Method <sup>[8,15]</sup>
34	Toxaphene	Ultrasonic Extraction, Gas Chromatographic Method <sup>[12,20,21]</sup>
35	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,22]</sup>
36	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>
37	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[8,15]</sup>

ดิน จำนวน 123 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
2	Acetone	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
3	Aldrin	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
4	Anthracene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
5	Antimony	Digestion, Inductively Coupled Plasma Method <sup>[9,15]</sup>

6 Arsenic...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
6	Arsenic	Digestion, Inductively Coupled Plasma Method <sup>[9,15]</sup>
7	Atrazine	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
8	Barium	Digestion, Inductively Coupled Plasma Method <sup>[9,15]</sup>
9	Benzo(a)anthracene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
10	Benzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
11	Benzo(b)fluoranthene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
12	Benzo(k)fluoranthene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
13	Benzoic acid	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
14	Benzo(a)pyrene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
15	Benzo(g,h,i)perylene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
16	Beryllium	Digestion, Inductively Coupled Plasma Method <sup>[9,15]</sup>
17	Bis(2-Chloroethyl)ether	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
18	Bis(2-Ethylhexyl)phthalate	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
20	Bromoform	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
21	Butyl benzyl phthalate	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
22	Cadmium	Digestion, Inductively Coupled Plasma Method <sup>[9,15]</sup>
23	Carbazole	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
24	Carbon disulfide	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
25	Carbon tetrachloride	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>

26 Chlordane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
26	Chlordane	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
27	p-Chloroaniline	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
28	Chlorobenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
29	Chlorodibromomethane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
30	Chloroform	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
31	2-Chlorophenol	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
32	Chromium	Digestion, Inductively Coupled Plasma Method <sup>[9,15]</sup>
33	Chromium (III)	Digestion, Inductively Coupled Plasma Method ; Filtration, Colorimetric Method; Calculation <sup>[9,10,15]</sup>
34	Chromium (VI)	Alkaline Digestion, Colorimetric Method <sup>[10]</sup>
35	Chrysene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
36	Cyanide	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
37	2,4-D	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
38	DDD	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
39	DDE	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
40	DDT	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
41	Dibenz(a,h)anthracene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
42	Di-n-Butyl phthalate	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
43	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
44	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
45	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
46	3,3-Dichlorobenzidine	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
47	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
48	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
49	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
50	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
51	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
52	2,4-Dichlorophenol	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
53	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
54	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
55	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
56	Dieldrin	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
57	Diethyl phthalate	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
58	2,4-Dimethylphenol	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
59	2,4-Dinitrophenol	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
60	2,4-Dinitrotoluene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
61	2,6-Dinitrotoluene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
62	Di-n-octyl phthalate	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
63	Endosulfan	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
64	Endrin	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
65	Ethylbenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
66	Fluoranthene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
67	Fluorene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
68	Heptachlor	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
69	Heptachlor epoxide	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
70	Hexachlorobenzene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
71	Hexachloro-1,3-butadiene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
72	$\alpha$ -HCH	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
73	$\beta$ -HCH	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
74	$\gamma$ -HCH	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
75	Hexachlorocyclopentadiene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
76	Hexachloroethane	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
77	n-Hexane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
78	Indeno(1,2,3-cd)pyrene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
79	Isophorone	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
80	Lead	Digestion, Inductively Coupled Plasma Method <sup>[9,15]</sup>

81 Manganese...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
81	Manganese	Digestion, Inductively Coupled Plasma Method <sup>[9,15]</sup>
82	Mercury	Digestion, Cold vapor Atomic Absorption Spectrometric Method
83	Methoxychlor	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
84	Methyl Bromide	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
85	Methylene Chloride	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
86	2-Methylnaphthalene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
87	2-Methylphenol	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
88	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
89	Naphthalene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
90	Nickel	Digestion, Inductively Coupled Plasma Method <sup>[9,15]</sup>
91	Nitrobenzene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
92	N-Nitrosodiphenylamine	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
93	N-Nitrosodi-n-propylamine	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
94	Pentachlorophenol	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
95	Phenanthrene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
96	Phenol	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
97	Polychlorinated Biphenyls (PCBs)	Ultrasonic Extraction, Gas Chromatographic Method <sup>[9,16,17]</sup>
98	Pyrene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[23,24]</sup>
99	Selenium	Digestion, Inductively Coupled Plasma Method <sup>[9,15]</sup>
100	Silver	Digestion, Inductively Coupled Plasma Method <sup>[9,15]</sup>

101 Styrene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
101	Styrene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
102	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
103	Tetrachloroethylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
104	Toluene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
105	Toxaphene	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[9,10]</sup>
106	TPH (C <sub>5</sub> -C <sub>8</sub> )	Purge and Trap, Gas Chromatographic Mass Spectrometric Method <sup>[14,22]</sup>
107	TPH (C <sub>8</sub> -C <sub>16</sub> )	Ultrasonic Extraction, Gas Chromatographic Mass Spectrometric Method <sup>[9,10,18]</sup>
108	TPH (C <sub>16</sub> -C <sub>35</sub> )	Ultrasonic Extraction, Gas Chromatographic Mass Spectrometric Method <sup>[10,18]</sup>
109	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
110	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
111	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
112	Trichloroethylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
113	2,4,5-Trichlorophenol	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[9,10]</sup>
114	2,4,6-Trichlorophenol	Microwave Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[9,10]</sup>
115	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
116	Vanadium	Digestion, Inductively Coupled Plasma Method <sup>[9,15]</sup>
117	Vinyl Acetate	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>
118	Vinyl Chloride	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[14,22]</sup>

119 m-Xylene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
119	m-Xylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[6,8]</sup>
120	o-Xylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[6,8]</sup>
121	p-Xylene	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[6,8]</sup>
122	Xylene (Total)	Purge and Trap, Gas Chromatographic / Mass Spectrometric Method <sup>[6,8]</sup>
123	Zinc	Digestion, Inductively Coupled Plasma Method <sup>[9,15]</sup>

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ที่ อก ๐๓๒๐/๑๗/๕๑๓



๒๗ บ.ค. ๒๕๖๖

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอสจีเอส (ประเทศไทย) จำกัด (สาขาระยอง)

อ้างถึง คำขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๑๔ ธันวาคม ๒๕๖๖

ตามหนังสือที่อ้างถึง บริษัท เอสจีเอส (ประเทศไทย) จำกัด (สาขาระยอง) ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๙๗ สถานที่ตั้งเลขที่ ๑/๒๐๙ และ ๑/๒๑๑ หมู่ที่ ๑ ตำบลบ้านฉาง อำเภอบ้านฉาง จังหวัดระยอง ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓ ราย ได้แก่

- |                         |                            |
|-------------------------|----------------------------|
| ๑. นายฟ้าลั่น ศรีธาบุญ  | ทะเบียนเลขที่ ๖-๑๙๗-จ-๐๐๑๖ |
| ๒. นายปฏินันท์ ทิพย์ชิต | ทะเบียนเลขที่ ๖-๑๙๗-จ-๐๐๒๑ |
| ๓. นายณริศ พงษ์วิรัชไชย | ทะเบียนเลขที่ ๖-๑๙๗-จ-๐๐๒๓ |

ทั้งนี้ หากท่านมีความประสงค์จะยื่นคำขอใด ๆ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



ผู้อำนวยการศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

โทร. ๐ ๓๓๑๓ ๖๐๕๙ ต่อ ๕๐๐๑-๒

ไปรษณีย์อิเล็กทรอนิกส์ eirw@diw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่ อก ๐๓๒๐/ ๑๗/๕๑๓



๒๗ บ.ค. ๒๕๖๖

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอสจีเอส (ประเทศไทย) จำกัด (สาขาระยอง)

อ้างถึง คำขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๑๔ ธันวาคม ๒๕๖๖

ตามหนังสือที่อ้างถึง บริษัท เอสจีเอส (ประเทศไทย) จำกัด (สาขาระยอง) ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๙๗ สถานที่ตั้งเลขที่ ๑/๒๐๙ และ ๑/๒๑๑ หมู่ที่ ๑ ตำบลบ้านฉาง อำเภอบ้านฉาง จังหวัดระยอง ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑ ราย ได้แก่ นายจิตรเทพ มีเงิน ทะเบียนเลขที่ ๖-๑๙๗-จ-๐๐๓๓ ทั้งนี้ หากท่านมีความประสงค์จะยื่นคำขอใด ๆ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



ผู้อำนวยการศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

โทร. ๐ ๓๓๑๓ ๖๐๕๙ ต่อ ๕๐๐๑-๒

ไปรษณีย์อิเล็กทรอนิกส์ eirw@diw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่ อก ๐๓๑๐(๑)/ ๑๒ ๗ ๖ ๐



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๙ กันยายน ๒๕๖๕

เรื่อง เปลี่ยนแปลงเลขที่ตั้งห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอสจีเอส (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๒ กันยายน ๒๕๖๕

ตามหนังสือที่อ้างถึง บริษัท เอสจีเอส (ประเทศไทย) จำกัด ขอเปลี่ยนแปลงเลขที่ตั้งห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๑๐ เนื่องจากสำนักงานเขตยานนาวาได้ดำเนินการเปลี่ยนแปลงหมายเลขประจำบ้าน จากเดิมเลขที่ ๔๑/๑๖-๒๐ และ ๔๑/๒๓ ตรอกนอกเขต ถนนพระราม ๓ แขวงช่องนนทรี เขตยานนาวา กรุงเทพมหานคร เป็นเลขที่ ๑๐, ๑๐/๑-๔ และ ๑๒ ซอยพระรามที่ ๓ ซ. ๕๙ แขวงช่องนนทรี เขตยานนาวา กรุงเทพมหานคร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรม ได้รับทราบและดำเนินการเปลี่ยนแปลงเลขที่ตั้งตามที่แจ้งแล้ว ทั้งนี้ หากท่านมีความประสงค์จะยื่นคำขอใดๆ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์ กรมโรงงานอุตสาหกรรม ตาม QR Code หายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน  
ปฏิบัติการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์



ที่ อก ๐๓๑๐(๑)/ ๔๗๘ ๖



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒๑ เมษายน ๒๕๖๕

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอสจีเอส (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๔ มกราคม ๒๕๖๕

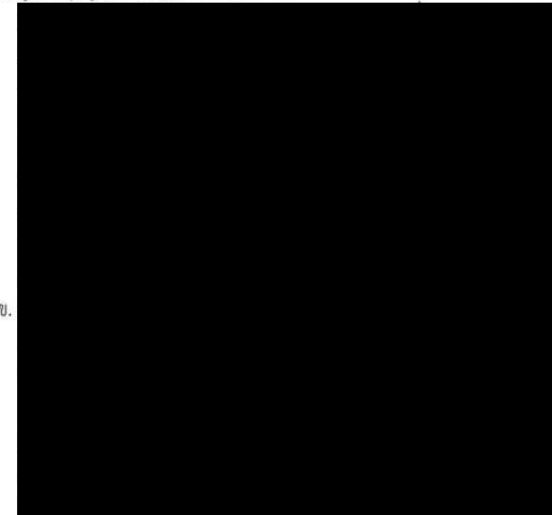
สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
บริษัท เอสจีเอส (ประเทศไทย) จำกัด จำนวน ๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอสจีเอส (ประเทศไทย) จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๑๐ สถานที่ตั้งเลขที่ ๔๑/๑๖-๒๐ และ ๔๑/๒๓ ตรอกนอกเขต ถนนพระราม ๓ แขวงช่องนนทรี เขตยานนาวา กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอสจีเอส (ประเทศไทย) จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

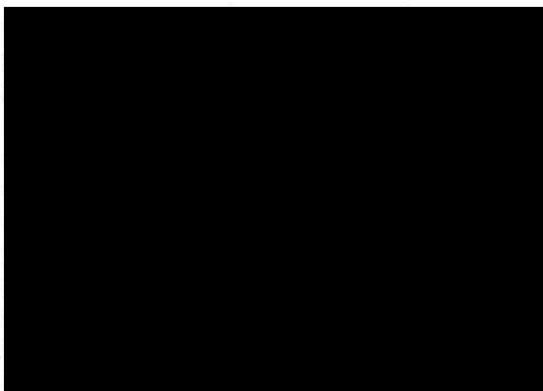
ข.



๗) นายพันจิว...







ค. ขอบข่ายสารมลพิษที่ได้รับการขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๓๐ มกราคม ๒๕๖๘ หากประสงค์จะต่ออายุหนังสือ  
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อ  
กรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้  
ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code หายหนังสือฉบับนี้

จึงเรียนมาเพื่อโปรดทราบ

ขอแสดงความนับถือ



ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน  
ปฏิบัติการตามแผนป้องกันมลพิษโรงงานอุตสาหกรรม



ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอสจีเอส (ประเทศไทย) จำกัด

เลขทะเบียน ว-๐๑๐

ที่ อก ๐๓๑๐(๑)/ ๔๗๘ ๖

ลงวันที่ ๒๑ เมษายน ๒๕๖๕

ขอบข่ายสารมลพิษที่ได้รับการขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๐ รายการ

น้ำเสีย จำนวน 20 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method
2	$\alpha$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method
3	$\beta$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method
4	$\delta$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method
5	$\gamma$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method
6	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method
7	p,p'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method
8	p,p'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method
9	o,p'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method
10	p,p'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method
11	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method
12	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method
13	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method
14	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method
15	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method
16	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method
17	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method
18	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method
19	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method
20	Temperature	Laboratory and Field Methods

เอกสารอ้างอิง

APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater.

23<sup>rd</sup> ed. Washington, DC: APHA, 2017

ที่ อก ๐๓๑๐(๑)/ ๑๖๕๑๖



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๓ ธันวาคม ๒๕๖๖

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอสจีเอส (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๒๗ พฤศจิกายน ๒๕๖๖

ตามหนังสือที่อ้างถึง บริษัท เอสจีเอส (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน  
เลขทะเบียน ๖-๐๑๐ สถานที่ตั้งเลขที่ ๑๐,๑๐/๑-๔ และ ๑๒ ซอยพระรามที่ ๓ ซ.๕๕ แขวงช่องนนทรี  
เขตยานนาวา กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้



ทั้งนี้ หากท่านมีความประสงค์จะยื่นคำขอใดๆ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์  
ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



ผู้อำนวยการกองวิจัยและเฝ้าระวังมลพิษโรงงาน  
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเฝ้าระวังมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๕

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”





แบบ กมช./สมอ.๒  
Form NSC/TISI 2

ใบรับรองเลขที่ 23-LB0119  
(Certificate No.)

## ใบรับรองระบบงาน (Certificate of Accreditation)

อาศัยอำนาจตามความในพระราชบัญญัติการมาตรฐานแห่งชาติ พ.ศ. ๒๕๕๑  
(By Virtue of National Standardization Act B.E. 2551 (2008))

เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม  
(Secretary-General, Thai Industrial Standards Institute)

ออกใบรับรองฉบับนี้ให้  
(Issues this certificate to)

บริษัท เอสจีเอส (ประเทศไทย) จำกัด ห้องปฏิบัติการทดสอบสิ่งแวดล้อม (สาขาระยอง)  
(SGS (Thailand) Limited, Environmental Laboratory (Rayong Branch))

ตั้งอยู่เลขที่  
(Address)

๑/๒๐๙ และ ๑/๒๑๑ หมู่ที่ ๑ ตำบลบ้านฉาง อำเภอบ้านฉาง จังหวัดระยอง  
1/209 and 1/211 Moo 1, Ban Chang, Ban Chang, Rayong

ได้รับการรับรองความสามารถ  
(Certificate of competence)

ตามมาตรฐานเลขที่ มอก. ๑๗๐๒๕ - ๒๕๖๑  
(Standard No. TIS 17025-2561 (2018) (ISO/IEC 17025: 2017))

ข้อกำหนดทั่วไปว่าด้วยความสามารถของ ห้องปฏิบัติการทดสอบและห้องปฏิบัติการสอบเทียบ  
General requirements for the competence of testing and calibration laboratories

หมายเลขการรับรองที่ ทดสอบ ๐๔๗๐  
(Accreditation No. Testing 0470)

โดยมีรายละเอียดสาขาและขอบข่ายที่ได้ใบรับรอง แสดงไว้ใน QR CODE และ [www.tisi.go.th](http://www.tisi.go.th)  
(Details of the scheme and scope of the certificate are shown in QR CODE and [www.tisi.go.th](http://www.tisi.go.th))

ออกให้ ณ วันที่ ๒๐ กุมภาพันธ์ พ.ศ. ๒๕๖๖  
(Issue date : 20 February B.E. 2566 (2023))



รองเลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม  
ปฏิบัติราชการแทน  
เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม



กระทรวงอุตสาหกรรม สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม  
(Ministry of Industry Thailand, Thai Industrial Standards Institute)



Ref No. : 0303/17005

## CERTIFICATE OF TESTING LABORATORY ACCREDITATION

This is to certify that

SGS (Thailand) Limited, Laboratory Services  
10, 10/1-4 and 12 Soi Rama III S.59,  
Chong Nonsi, Yan Nawa, Bangkok 10120

has successfully undergone assessment according to ISO/IEC 17025 : 2017  
and under the Bureau of Laboratory Accreditation, Department of Science Service  
for the requirements, regulations and criteria for the competence of testing laboratories

LABORATORY ACCREDITATION  
Accreditation Number TESTING - 0017  
BLA-DSS

The scope of accreditation is as annexed hereto

Issue date : 7<sup>th</sup> November 2022

Expired date : 6<sup>th</sup> November 2026

Signature : 

Director of Bureau of Laboratory Accreditation

Bureau of Laboratory Accreditation, Department of Science Service,  
Ministry of Higher Education, Science, Research and Innovation

# ABS Quality Evaluations

## Certificate Of Conformance

This is to certify that the Quality Management System of:

**SGS (Thailand) Ltd.**  
**100 Nanglinchee Road**  
**Chongnonsee, Yannawa**  
**Bangkok 10120**  
**Thailand**

(WITH ADDITIONAL FACILITIES LISTED ON ATTACHED ANNEX)

has been assessed by ABS Quality Evaluations, Inc. and found to be in conformance with the requirements set forth by:

**ISO 9001:2015**

The Quality Management System is applicable to:

**PROVISION OF PHYSICAL INSPECTION, FUMIGATION, PEST CONTROL AND LABORATORY TESTING AND CALIBRATION**

This certificate may be found on the ABS QE Website ([www.abs-qe.com](http://www.abs-qe.com)). For certificates issued in the People's Republic of China information may also be verified on the CNCA website ([www.cnca.gov.cn](http://www.cnca.gov.cn)).

Certificate No: 52229  
Certification Date: 30 July 2015  
Effective Date: 14 July 2023  
Expiration Date: 24 July 2026  
Revision Date: 20 July 2025

Dominic Townsend, President



Validity of this certificate is based on the successful completion of the periodic surveillance audits of the management system defined by the above scope and is contingent upon prompt, written notification to ABS Quality Evaluations, Inc. of significant changes to the management system or components thereof.

ABS Quality Evaluations, Inc. 1701 City Plaza Drive, Spring, TX 77389, U.S.A.  
Validity of this certificate may be confirmed at [www.abs-qe.com/cert\\_validation](http://www.abs-qe.com/cert_validation).

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# ABS Quality Evaluations

ISO 9001:2015

## Certificate Of Conformance

**ANNEX**

Certificate No: 52229

**SGS (Thailand) Ltd.**

At Below Facilities:

Facility: 100 Nanglinchee Road, Chongnonsee, Yannawa,  
Bangkok 10120  
Thailand

Activity: Management of QMS, Inspection Service

Facility: Sriracha Office  
144, 146 Sriracha Nakorn 1 Road,  
T. Sriracha, A. Sriracha,  
Chonburi 20110  
Thailand

Activity: Inspection, Fumigation & Pest Control.

Facility: Hat Yai Branch  
57, 59 and 61 Soi 10 Phetkasem Road,  
T. Hat Yai, A. Hat Yai,  
Songkhla 90110  
Thailand

Activity: Inspection, Fumigation, Pest Control & Testing.

Facility: Rayong Branch  
1/209 and 1/211 Moo 1 T. Ban Chang,  
A. Ban Chang,  
Rayong 21130  
Thailand

Activity: Inspection & Testing.

Facility: Nakornratchasima Office  
1340/46 Suranarai Road., T. Nai-Muang,  
A. Muang Nakornratchasima,  
30000  
Thailand

Activity: Inspection & Fumigation.

Facility: Rama III Branch, Laboratory Services  
10,10/1-4, 12 Rama III Road, Soi 59,  
Chongnonsee, Yannawa,  
Bangkok 10120  
Thailand

Activity: Testing



Validity of this certificate may be confirmed at [www.abs-qe.com/cert\\_validation](http://www.abs-qe.com/cert_validation).

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