

ภาคผนวก ค

สำเนาใบรับรองการสอบเทียบเครื่องมือ



Certificate of Calibration



Certificate No.: C24240053

Page: 2 of 2

Equipment: CONDUCTIVITY METER
Model: HQ14d
Serial No. (or ID.): 141200015083
Manufacturer: HACH
Electrode Serial No.: 150122587009
Condition: In Condition
Certificate No.: C24240053
Issued Date: 7 March 2024
Job No.: WO-00018779
Page: 1 of 2
Brand: HACH
Model: CDC401

Customer: SGS (THAILAND) CO., LTD.
1/209, 1/211 Moo 1, Tambol Banchang,
Amphur Banchang, Rayong 21130 Thailand

Environment Condition: Temperature 23 °C ± 2 °C
Humidity 50 %RH ± 15 %RH

Calibration Place: Environment Laboratory, DKSH Technology Limited,
2533 Sukhumvit Road, Bangchak,
Phrakhanong, Bangkok 10260 Thailand

Calibration By: Mr. Pongpisut Suebchantha
Calibration Date: 7 March 2024
The Method used: In house method, CAL-WI-49, base on ASTM D 1125-14 and D 5391-14
Traceability: This certificate is traceable to the SI Units maintained by CRM of NIST(SRM) through CPA chem Co., Ltd. (ISO/IEC 17034) Certificate No. 960753, 890591, 890593

Person in charge
This certificate is issued to the units of measurement according to the International System of Units (SI). It provides traceability of measurement to International or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

Authorized signatory
When Resealing unit/box 4 file
DKSH Technology Limited
2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/thailand/en/indonesia

Delivering Growth - in Asia and Beyond.

Delivering Growth - in Asia and Beyond.

CAL-FM-C24-08: 12 Sep 2022

Calibration Results:

Before Adjustment

Standard	Unit Under Calibration	Correction	Coverage Factor (k)	Uncertainty (±)
Conductivity Solution	Reading			
25.000 µS/cm	32.6 µS/cm	-7.600 µS/cm	2.00	0.21 µS/cm
1413.0 µS/cm	1568 µS/cm	-156.0 µS/cm	2.00	9.0 µS/cm
111.3 mS/cm	123.2 mS/cm	-11.9 mS/cm	2.00	0.67 mS/cm

After Adjustment ; at 1413 µS/cm

Standard	Unit Under Calibration	Correction	Coverage Factor (k)	Uncertainty (±)
Conductivity Solution	Reading			
25.000 µS/cm	24.8 µS/cm	0.200 µS/cm	2.00	0.21 µS/cm
1413.0 µS/cm	1413 µS/cm	0.0 µS/cm	2.00	9.0 µS/cm
111.3 mS/cm	111.6 mS/cm	-0.3 mS/cm	2.00	0.67 mS/cm

The End of Certificate



หมายเลขอ้างอิง: 141200015083

เลขที่ใบงาน: WO-00018779

การสอบ (น)		การสอบ (ฟ)		หมายเหตุ
07 Mar 2024		07 Mar 2024		
ปกติ	ผิดปกติ	ปกติ	ผิดปกติ	
รวมการตรวจ				
General				
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Spectrophotometer				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
pH Meter and Conductivity Meter				
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Turbidimeter				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Automatic titrator				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Mr. Pongpisut Suebchantha

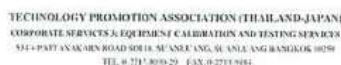
Canine Encephalitis

Wafar Investments Limited
PKSM Technology Limited

2533 หมู่ที่ 9 ตำบลบ้านทราย กรุงเทพมหานคร 10250
2533 Sukhumvit Road, Bangchak, Prachinburi, Bangkok 10250
Phone: +66 2639 7000 Email: info.col@scientific-buchak.com Website: www.buch.com/scientific-buchak.com

Delivering Growth – in Asia and Beyond.

CAL-FM-R31-03: 20 Jul 2022



Cert. No.: 23LM127
Page: 1 of 2

Equipment :	DO Meter with Sensor
Manufacturer :	YSI
Model :	5000
Serial No. :	17E101765
ID No. :	D2017068
Submitted by :	SGS (Thailand) Limited 1/206, 1/211 Moo 1 T.Ban Chang, A.Ban Chang, Rayong 21130
Location :	TFA On Site Calibration Laboratory
Received Order :	27 July 2023
Calibrated Date :	31 July 2023
Ambient Temperature :	(26 ± 10) °C
Relative Humidity :	(50 ± 30) %
AC Line Voltage :	(220 ± 22) V

Calibrated by: Brocha Hlahit

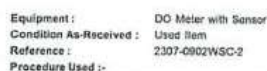
Approved by :

() Pornthippa Tameyakul
() Maloo Buksruea
(/) Suwit Injai

Issue Date : 8 August 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than on bill, except with the prior written approval of the local or Corporate Secretary. **Equipment Calibration and Testing Bureau**



Cert. No.: 23LM127
Page: 2 of 2

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

- | <u>Instrument</u> | <u>Serial No.</u> | <u>Cert. No.</u> | <u>Traceable</u> | <u>Due Date</u> |
|------------------------|-------------------|------------------|------------------|-----------------|
| 1) Digital Thermometer | 2189080 | 221285 | TPA | 21 Oct 2023 |
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Remark: TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function : Temperature measurement

This instrument was connected with temperature sensor, S/N.: D2017006

Calibration Point	Immersion Depth	Standard Temperature	UUC ^a Reading	Error	Uncertainty	Coverage Factor
(°C)	(mm)	(°C)	(°C)	(°C)	(± °C)	k
20.00	100	20.008	19.93	-0.078	0.15	2.00

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 %.

-000-

A 0056944

a 1174201

Page 3 of 3

APPROVED SIGNATORY :

The stability and uniformity was taken into account in the measurement uncertainty stated. The above results are valid exclusively for calibration samples as mentioned in the report. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with GUM requirements.

JRC Selfing	(°C)	20.0
JUC Feeding	(°C)	29.0
Reference Thermometer	(°C)	Position 1 20.080 Position 2 20.006 Position 3 20.175 Position 4 20.116 Position 5 19.957 Position 6 20.114 Position 7 19.863 Position 8 20.085 Position 9 20.091
Stability	(°C)	0.289
Uniformity	(°C)	0.371
Uncertainty	(°C)	0.45

Results (without adjustment)

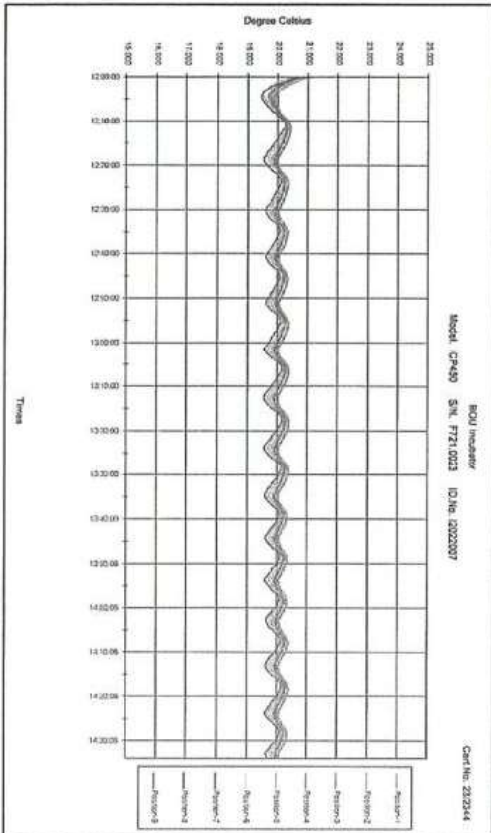
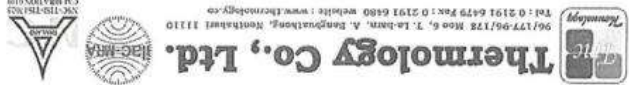
Site Calibration

Jun 23, 2023

Order No.

Order No. 23060304

CALIBRATION CERTIFICATE



This document is issued in accordance with the standards of the International Laboratory for the Protection of the Environment (ILPE) and is not to be used for any other purpose. The information contained herein may not be reproduced without the prior written approval of the laboratory.

Page 1 of 3

This certificate is payable to 51 unit.

Data Acquisition with Sensor Model 34872A S/N: MY49010059, Certificate No. QF23-0916, Calibrated by
 Int Co., Ltd. ONAC Calibration No. 0292, Due Date Apr 18, 2024.

Standard

WI-17: The reference thermometer was placed into the chamber and measurement was performed based on AS-2653. The temperature scale in use at this laboratory is the International Temperature Scale of 1990.

Calibration Method

Description		Model		Serial No.		Date of Receipt		Date of Calibration		Environment		Temperature		Relative Humidity	
BOD incubator	IC450	F721.0023	10220007	Jun 21, 2023	Jun 21, 2023	24.8 °C	51.4 %RH	24.8 °C	51.4 %RH	(Max)	(Max)	26.1 °C	50.8 %RH	(Max)	(Max)

10208, 10211 Moo 1, T. Ban Chang, A. Ban Chang Rayong 21130 Thailand.

UNIVERSITY OF CALIFORNIA

Jun 23, 2023

Order No.

Order No. 23060304

CALIBRATION CERTIFICATE

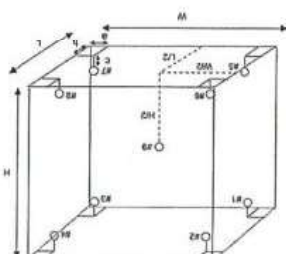


reference sensor should preferably be located at the geometric center of the chamber.

- 1) Dimension ($\text{W} \times \text{L} \times \text{H}$) is $104 \times 60 \times 72$ cm

Note.

Position of reference thermistors were placed



(ustawienie trójkąt) surdosa

UNIVERSITY OF CALIFORNIA

0202 12 100

Order No. 23050304

Order No. 23050304

CALIBRATION CERTIFICATE





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
334/4 PATTANAKARN ROAD 501 IL, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2711-300-29 FAX. 0-2719-5401



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 : 2309-0247/VSC-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-CHS by direct measurement with standard
voltage calibrator and direct measurement with
certified reference material (CRM)
- CP-CHS by comparison with standard thermometer

Calibrated by : Warakorn Lengagatrakul

Approved by :

(✓) Saitip Mesingmal
() Warakorn Lengagatrakul
() Porpan Palpin

Issue Date : 12 September 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced without the full, except with the prior written
Approval of the Technical Services Department, Calibration and Testing Services.

A 0058173



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	23B908	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 6.985	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	Coverage factor
	pH	mV	mV	pH	(1mV)	k
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

Saitip

a 1179502



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 (±)	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	-183.9	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 (± °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 %.

-000-

Saitip

a 1179501



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



Certificate of Calibration

Equipment : pH / Conductivity Meter
Manufacturer : Mettler Toledo
Model : S213
Serial No. : B902060027
ID No. : P2019019
Condition As-Received: Used Item
Received Date : 14 May 2024
Calibration Date : 15 May 2024
Reference : 2405-0423WSC-1
Submitted by : SGS (Thailand) Limited
1/209, 1/211 Moo 1, T.Ban Chang,
A.Ban Chang, Rayong 21130

Ambient Temperature : $(25 \pm 2.5) ^\circ\text{C}$
Relative Humidity : $(50 \pm 15) \%$
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with DC voltage standard and direct measurement with certified reference material (CRM)
- CP-CH8 by comparison with temperature standard

Calibrated by : Warakorn Lemgagrakul

Approved by : 

() Unnopphol Harachai
() Ponpan Paipim
(✓) Sathip Meangmai

Issue Date : 17 May 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.



Cert.No.: 24CH568
Page.: 2 of 3

Condition of this calibration result

- Reference Standard Instrument
Instrument
1) Document Process Calibrator
2) Ref. Standard Thermometer
Serial No. 54030049 13RC116 23E2802
ID No. 4982054 11RC044 23R08
Cert. No. 23E2802 23R08
Due Date 27 Aug 2024 26 July 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	823319	20 Jun 2024
pH 4.008	CPA chem	970851	25 Apr 2026
pH 6.986	CPA chem	970852	25 Apr 2026
pH 9.997	CPA chem	970853	25 Apr 2025

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 Document Process Calibrator at pH (1.7,4.7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (-mV)	Coverage factor k
			mV	pH		
pH Meter S/N : B902060027	pH 1.680	314.73	314.6	1.680	0.058	2.00
	4.000	177.48	177.4	4.000	0.058	2.00
	7.000	0.00	0.0	7.000	0.058	2.00
	10.000	-177.48	-177.4	10.000	0.058	2.00



Cert.No.: 24CH568
Page: 3 of 3

Calibration Results

Function : pH Measurement

Performing four buffers standard curve by using buffer nominal pH (1,7,4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor k
pH Electrode	1.679	1.682	316.0	0.0050	2.05
S/N: 8512743	4.008	4.008	181.2	0.0048	2.05
	6.986	6.989	7.8	0.0084	2.00
	9.997	9.998	-186.0	0.0070	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe:

- Model : InLab®Expert Pro-ISM

- Serial No. : 8512743

- 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 (± °C)	Coverage factor k
25.0	25.002	25.1	0.098	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-



บริษัท ไนเนติกส์ คอร์ปอเรชั่น จำกัด
KINETICS CORPORATION LTD.

รายงานผลการวัดและบันทึกข้อมูลการตรวจวัดทางวิทยาศาสตร์

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

รหัสอุปกรณ์ / เครื่องมือ : NO_x Analyzer

รุ่นอุปกรณ์ / เครื่องมือ : 7200

วันที่ : 24 กรกฎาคม 2566

บริษัทผู้ผลิต : Teconne API

หมายเลขอุปกรณ์ / เครื่องมือ : 1652

TEST VALUES		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	STABILITY	≤ 1 PPB	0.2
3	SAMPLE FLOW	500 ± 10% ccm/min	491
4	OZONE FLOW	80 ± 10% ccm/min	80
5	PAT	mV	44.7
6	NORM PMT	mV	31.0
7	A ZERO	-20 To 150 uV	47.4
8	HPVS	400 - 900 V	723
9	FX CELL TEMP	50 ± 1 °C	30.0
10	BOX TEMP	AMBIENT ± 5 °C	28.3
11	PMT TEMP	7 ± 2 °C	6.8
12	MCL V TEMP	315 ± 5 °C	314.8
13	FX CELL PRESSURE	<10 in -Hg-A	9.2
14	SAMPLE PRESSURE	25 - 35 in -Hg-A	29.0
15	INOX SLOPE	1.0 ± 0.3	1.150
16	INOX OFFSET	-50 To 150	3.0
17	NO SLOPE	1.0 ± 0.3	1.080
18	NO OFFSET	-50 To 150	1.8
19	NO SAMPLE READING	PPB	2.3
20	NO2 SAMPLE READING	PPB	57.7
21	INOX SAMPLE READING	PPB	50.0
22	OPTIC TEST	2000 ± 1000 mV	2219.6
23	ELECTRICAL TEST	2000 ± 1000 mV	2307.9
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.26 / 12.33 / 15.82 / -15.21
25	ZERO GAS NONOK	0.000.00 PPB	-3.3 / 3.8
26	SPAN GAS NONOK	400.00400.00 PPB	450.5 / 474.3

หมายเหตุ

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

- ตรวจสอบเช็ค, Healy Temp Warning, Relay Board Warning, Ozone Gen use Sample Flow, Nitrogen/Gas Inlet / Outlet/Pressure

- ทำการปรับ Pressure Sensor 0-15 PSIA ที่วัน 1 ชิ้น

ลงนาม/ตำแหน่ง (Signature)

ต้องการข้อมูลเพิ่มเติมเกี่ยวกับเครื่องมือวัดทางวิทยาศาสตร์ : กรุณาติดต่อ บริษัท ไนเนติกส์ จำกัด โทร : 0-2515-8987
เลขที่ 308 ถนนวิเศษวิทยา แขวงจันทราภิรมย์ เขตจตุจักร กรุงเทพมหานคร 10900 โทรศัพท์ : 0-2515-8989 โทรสาร : 0-2515-8988 E-Mail : info@kinetics.co.th



Airgas Specialty Gases
Airgas USA, LLC
Airgas Station Road
Bliss 2
Plumsteadville, PA 19349
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04N99E15A0522
Cylinder Number: CCT45169
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12021
Gas Code: CO, NO, NOX, SO2, BALN
Reference Number: 180-402045691-1
Cylinder Volume: 144.4 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 660
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 2017)" document EPA-821-R-17-010. This document describes the procedures used for the calibration of this cylinder. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There is no significant impact on the use of this calibration mixture. All concentrations are on a mole fraction basis.

Do Not Use This Cylinder Below 100 psig. Use 0.7 megapascals.

ANALYTICAL RESULTS				
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
NOX	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	G1	+/- 0.5% NIST Traceable
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	+/- 0.6% NIST Traceable
NITROGEN	Balance			03/04/2021

CALIBRATION STANDARDS		
Type	Lot ID	Cylinder No
NTRM	07000227	E80079116
PRM	12366	D685025
GMS	12426689	CC323707
NTRM	16010203	KAL03097
NTRM	06012341	KAL04716
The SRM, PRM or RCM noted above is only in reference to the GMS used in this assay and not part of the analysis.		

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 NTKD576	NDIR	Feb 26, 2021
Nicor 850 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicor 850 FTIR AUP2010245 NO2	FTIR	Feb 22, 2021
Nicor 850 FTIR AUP2010245 SO2	FTIR	Feb 18, 2021

Triad Data Available Upon Request

NOTES:
Gross Weight: 28.1 Kg
Net Weight: 4.6 Kg



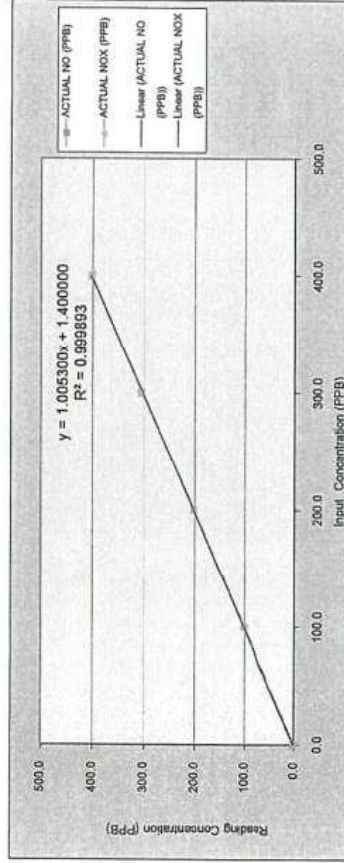
Approved for Release

MULTI-POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd		SERIAL NO : 1652	
EQUIPMENT NAME : NO _x Analyzer		CYLINDER NO : C7245169	
MANUFACTURER : Teledyne - API	MODEL : T200	CERTIFIED DATE : Mar 10, 2021	
STANDARD GAS CONCENTRATION (PPM) : 53.40		EXPIRED DATE : Mar 10, 2029	
CYLINDER PRESSURE (psig) : 1420		CERTIFIED BY : AIRGAS SPECIALTY GASES	

CALIBRATION RESULTS

CALIBRATION RESULTS						
POINT NO	IDEAL (PPM)	ACTUAL NO (PPM)	ERROR NO (PPM)	% ERROR NO	ACTUAL NO _x (PPM)	% ERROR NO _x
ZERO	0.0	0.5	0.5	0.9	0.9	-
1	100.0	101.0	1.0	1.0	101.7	1.7
2	200.0	202.2	2.2	1.1	202.5	1.3
3	300.0	305.4	5.4	1.8	305.6	1.9
4	400.0	401.4	1.4	-0.1	401.6	0.4
AVERAGE (%)				1.0		1.3



CALIBRATED BY : คุณวรัญ ภาณุวัฒน์
การรับรองทางเทคนิคเพิ่มเติม : คุณวรัญ ภาณุวัฒน์ โทรศัพท์ : 02-515-0907
DATE : 24 มิถุนายน 2566

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทน์นอก เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8989 โทรสาร : 0-2515-8988 E-Mail : info@medics.co.th



บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการสอบเทียบเครื่องมือการวัดทางอุตสาหกรรม

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

วันที่ : 29 มีนาคม 2567

รหัสอุปกรณ์ / เครื่องมือ : NO_x Analyzer

บริษัทผู้ผลิต : Teledyne API

รุ่นอุปกรณ์ / เครื่องมือ : T200

หมายเลขอุปกรณ์ / เครื่องมือ : 2199

ASGM 17004

	API MODEL : T200	TEST VALUES	
		BEFORE	AFTER
1	RANGE	50 - 20,000 PPM	500.0
2	STABILITY	≤ 1 PPM	0.4
3	SAMPLE FLOW	500 ± 10% c/min	511
4	OZONE FLOW	80 ± 10% c/min	85
5	PMF	n/v	96.1
6	NOCPU PMF	n/v	0.2
7	A ZERO	-20 To 150 uV	99.4
8	HPDS	400 - 900 V	694
9	RX CELL TEMP	50 ± 1 °C	50.0
10	BOX TEMP	AMBIENT ± 5 °C	32.5
11	PMF TEMP	7 ± 2 °C	6.8
12	MOLY TEMP	315 ± 5 °C	314.0
13	RX CELL PRESSURE	<10 k - HgA	30.1
14	SAMPLE PRESSURE	25 - 35 k - HgA	30.1
15	NOX SLOPE	1.0 ± 0.3	2.494
16	NOX OFFSET	-50 To 150	11.9
17	NO SLOPE	1.0 ± 0.3	2.289
18	NO OFFSET	-50 To 150	-1.1
19	NO SAMPLE READING	PPM	0.1
20	NO2 SAMPLE READING	PPM	11.2
21	NOX SAMPLE READING	PPM	11.3
22	OPTIC TEST	2000 ± 1000 mV	2399.0
23	ELECTRICAL TEST	2000 ± 1000 mV	2039.0
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	4.47 / 12.10 / 15.45 / -15.16
25	ZERO GAS NONOX	0.000/00 PPM	0.5 / 5.0
26	SPAN GAS NONOX	400.00/400.00 PPM	754.6 / 782.3

หมายเหตุ

- Sample Flow Warning RX Cell Warning

- ขั้วกรองเก็บ PNEU SENS 1 B0.

- ขั้วกรองเก็บ Sintered Filter 3 Pin, Spring 3 Pin, O-ring 6 Pin, Filter 47 mm, วนับ

- ขั้วสาร Calibrate Multi-Point

ลงนามเจ้าหน้าที่ (Signature)

ผลการสอบเทียบนี้มีความถูกต้อง เปรียบเทียบได้กับ : คุณสมบัติมาตรฐาน

โทรศัพท์ : 0-2515-8987

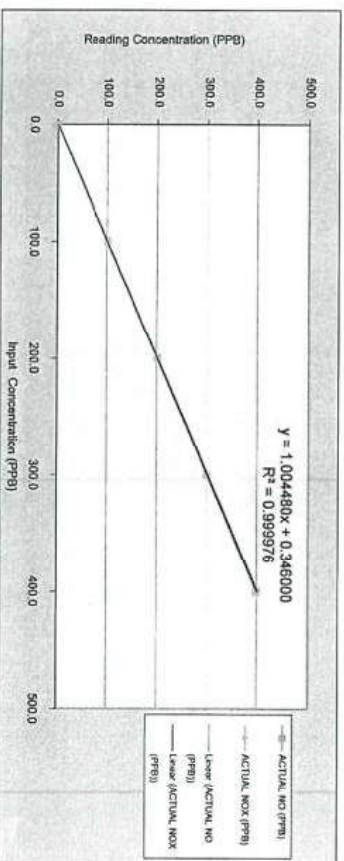
เลขที่ 388 ตามประกาศนียบัตรตรวจสอบผลการสอบเทียบ : 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : info@kinetics.co.th

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.		MODEL : T200		SERIAL NO : 2199	
EQUIPMENT NAME : NO _x Analyzer		STANDARD GAS CONCENTRATION (PPM) : 53.40		CYLINDER NO : OC745169	
MANUFACTURER : Teledyne API		CYLINDER PRESSURE (psig) : 1550		CERTIFIED DATE : Mar 10 2021	
STANDARD GAS CONCENTRATION (PPM) : 53.40		CERTIFIED BY : AIRGAS SPECIALTY GASES		EXPIRED DATE : Mar 10 2029	

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS					
	total (ppm)	actual no (ppm)	error no (ppm)	% error no	actual no ₂ (ppm)	error no ₂ (ppm)
ZERO	0.0	0.0	0.0	0.0	0.1	0.0
1	100.0	100.8	0.8	0.8	101.0	1.0
2	200.0	200.6	-0.7	0.3	201.0	1.0
3	300.0	300.1	0.1	0.0	302.9	2.9
4	400.0	399.0	-1.0	-0.3	401.3	1.3
AVERAGE (%)				0.4		0.7



CALIBRATED BY : คุณสมบัติมาตรฐาน

DATE : 29 /03 /2567

ผลการสอบเทียบนี้มีความถูกต้อง เปรียบเทียบได้กับ : คุณสมบัติมาตรฐาน โทรศัพท์ : 02-515-8987

เลขที่ 388 ตามประกาศนียบัตรตรวจสอบผลการสอบเทียบ : 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : info@kinetics.co.th



บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด
KINETICS CORPORATION LTD.

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.
วันที่ : 20 กรกฎาคม 2566
รายชื่ออุปกรณ์ / เครื่องมือ : CO Analyzer
รุ่นอุปกรณ์ / เครื่องมือ : T300
หมายเลขอุปกรณ์ / เครื่องมือ : 1885

TEST VALUES		
API MODEL T300	BEFORE	AFTER
1 RANGE 1 - 1000 PPM	50.0	50.0
2 STABILITY ≤ 1 PPM	0.009	0.012
3 CO MEASURE 2500 - 4800 mV	3677.5	3764.6
4 CO REFERENCE 2000 - 4800 mV	3163.2	3070.8
5 MIX RATIO 1.1 - 1.3	1.233	1.234
6 PRESSURE 25 - 33 in - Hg-A	29.2	29.3
7 SAMPLE FLOW 800 \pm 10% cc/min	806	820
8 SAMPLE TEMP 48 \pm 4 °C	45.5	45.4
9 BENCH TEMP 48 \pm 2 °C	48.0	48.0
10 WHEEL TEMP 68 \pm 2 °C	68.0	68.0
11 BOX TEMP AMBIENT \pm 5 °C	32.2	35.1
12 PHT DRIVE 250 - 4750 mV	3316.2	3311.0
13 CO SLOPE 1.0 \pm 0.3	0.882	0.905
14 CO OFFSET 0.0 \pm 0.3	0.024	0.024
15 CO READING (AMBIENT) PPM	0.852	0.308
16 ELECTRICAL TEST 40 \pm 2 PPM	1100.000	40.132
17 VOLTAGE TEST +5 V +12 V +15 V -5 V	5.20 / 12.24 / 16.71 / -15.32	5.20 / 12.24 / 16.71 / -15.32
18 ZERO GAS 0.00 PPM	0.490	0.002
19 SPAN GAS 40.0 PPM	43.073	40.006

หมายเหตุ

- ทำการเปลี่ยน Spring 1 ชิ้น, Sealed Filler 1 ชิ้น, O-ring 2 ชิ้น

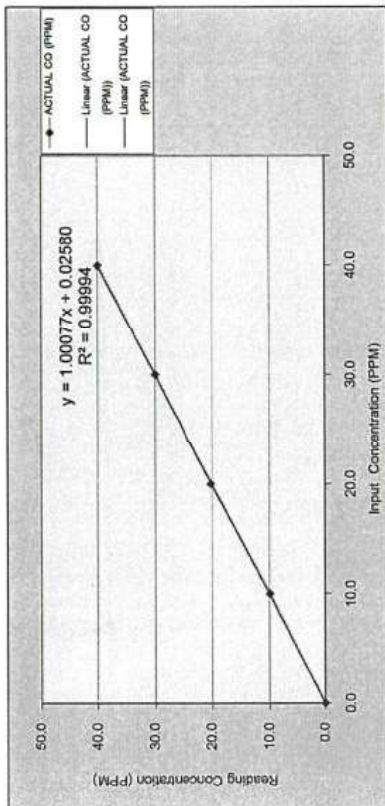
ต้องการข้อมูลเพิ่มเติมหรือทางด้านการเทคนิค กรุณาติดต่อ : คุณพรชัย มาลีวนรักษ์ โทร : 0-2515-8997
เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทน์นอก เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8998 E-Mail : info@kinetics.co.th

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.	
EQUIPMENT NAME : CO Analyzer	
MANUFACTURER : Teledyne - API	MODEL : T300
SERIAL NO : 1885	
STANDARD GAS CONCENTRATION (PPM) : 4512	
CYLINDER PRESSURE (psig) : 1420	
CYLINDER NO : C0745169	
CERTIFIED DATE : Mar 10, 2021	
EXPIRED DATE : Mar 10, 2029	

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS		
	IDEAL (PPM)	ACTUAL CO (PPM)	% ERROR CO
ZERO	0.00	0.002	0.00
1	10.00	9.939	-0.061
2	20.00	20.251	1.255
3	30.00	30.008	0.027
4	40.00	40.006	0.015
AVERAGE (%)			0.476



CALIBRATED BY : คุณพรชัย มาลีวนรักษ์

DATE : 20 กรกฎาคม 2566

ต้องการข้อมูลเพิ่มเติมหรือทางด้านการเทคนิค กรุณาติดต่อ : คุณพรชัย มาลีวนรักษ์ โทร : 02-515-8997

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทน์นอก เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8998 E-Mail : info@kinetics.co.th

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04N199E15A0622
Cylinder Number: CC745169
Laboratory: 124 - Plymouthville - PA
PGVP Number: A12021
Gas Code: CO,NO,NOX,SO2,BALN
Reference Number: 160-402045691-1
Cylinder Volume: 144.4 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 680
Certification Date: Mar 10, 2021
Expiration Date: Mar 10, 2029

Certification performed in accordance with EPA Tolerability Protocol for Analytical and Certification of Gas Sampling Standards (May 2017) document EPA-821-R-07-001. Analytical Methodology does not require correction for analytical interference. This cylinder has been analyzed and found to meet the stated specifications with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a weight basis unless otherwise noted.

Do Not Use This Calibration Mixture (CGM) as a Reference Gas.

ANALYTICAL RESULTS			
Component	Requested Concentration	Actual Concentration	Total Relative Uncertainty
NOX	53.00 PPM	53.40 PPM	+/- 1.1% NIST Traceable
NITRIC OXIDE	53.00 PPM	53.40 PPM	+/- 1.1% NIST Traceable
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	+/- 0.5% NIST Traceable
CARBON MONOXIDE	4500 PPM	4512 PPM	+/- 0.5% NIST Traceable
Balance			
CALIBRATION STANDARDS			
Type	Lot ID	Cylinder No	Expiration Date
NITRM	07060227	ER0078116	Jul 23, 2023
PPM	12386	D666026	Feb 26, 2021
GAIS	124206869	CC323707	Aug 15, 2021
NITRM	16010203	KAL003007	Dec 23, 2021
NITRM	08012341	KAL004716	Jun 07, 2024
The SRM, PPM or RGM noted above is only in reference to the GAS used in the assay and not part of the analysis.			
ANALYTICAL EQUIPMENT			
Instrument/Make/Model		Analytical Principle	Last Multipoint Calibration
SIEMENS ULTASAT 8 N10059		NDIR	Feb 26, 2021
Nicolet IS60 FTR ALU2010245 NO		FTR	Feb 11, 2021
Nicolet IS60 FTR ALU2010245 NO2		FTR	Feb 22, 2021
Nicolet IS60 FTR ALU2010245 SO2		FTR	Feb 18, 2021

Triad Data Available Upon Request
NOTES:
Gross Weight: 28.1 Kg
Net Weight: 4.5 Kg



Approved for Release

Page 1 of 160-402045691-1

โรงงานการผลิตและจำหน่ายแก๊สอุตสาหกรรม

ผู้ค้า / ลูกค้า : SGS (Thailand) Co., Ltd.
รหัสลูกค้า / รหัสสินค้า : CO Analyzer
โทรศัพท์ / แฟกซ์ : 1300

วันที่ : 20 พฤษภาคม 2566
บริษัท / บริษัท : Theodora API
หมายเลข / รหัสสินค้า : 2350

API MODEL T300		TEST VALUES	
		BEFORE	AFTER
1	RANGE	1 - 1000 PPM	50.0
2	STABILITY	≤ 1 PPM	0.00
3	CO MEASURE	2000 - 4600 mV	3471.0
4	CO REFERENCE	2000 - 4600 mV	2304.2
5	IR RATIO	1.1 - 1.3	-
6	PRESSURE	25 - 35 in-Hg-A	29.6
7	SAMPLE FLOW	800 ± 10%, cc/min	783.9
8	SAMPLE TEMP	48 ± 4 °C	44.8
9	BENCH TEMP	48 ± 2 °C	48.0
10	WHEEL TEMP	68 ± 2 °C	38.0
11	BOX TEMP	AMBIENT ± 5 °C	36.4
12	PRT DRY	250 - 4750 mV	-
13	CO SLOPE	1.0 ± 0.3	0.958
14	CO OFFSET	0.0 ± 0.3	-0.007
15	CO READING (AMBIENT)	PPM	0.21
16	ELECTRICAL TEST	40 ± 2 PPM	0.30
17	VOLTAJE TEST	+5 V +12 V -15 V	5.23 / 12.23 / 16.58 / -15.17
18	ZERO GAS	0.00 PPM	-0.07
19	SPAN GAS	40.0 PPM	40.01

หมายเหตุ :
- หัววัดเป็น Spring 1 ชิ้น, Standard Filter 1 ชิ้น, O-ring 2 ชิ้น

สำหรับการซ่อมแซมและเปลี่ยนชิ้นส่วนโปรด กรุณาติดต่อ : ศูนย์บริการลูกค้า

โทรศัพท์ : 0-2515-8987

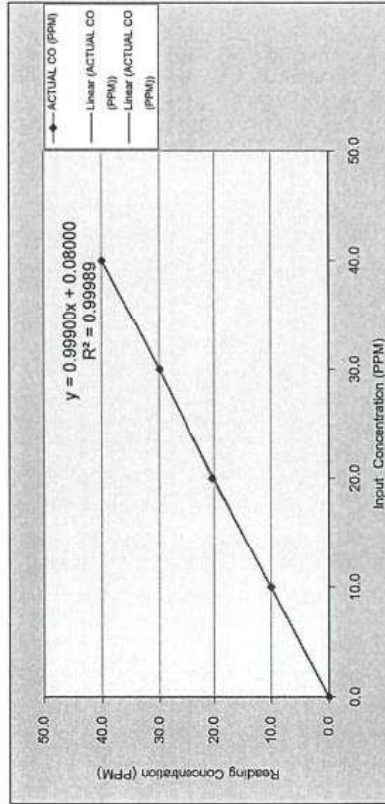
รหัส 388 ถนนรัชดาภิเษก แขวงจันทริกชนม เขตจตุจักร กรุงเทพมหานคร 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : info@kinetics.co.th

MULTI-POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.	
EQUIPMENT NAME : CO Analyzer	
MANUFACTURER : Teledyne - API	MODEL : T300
STANDARD GAS CONCENTRATION (PPM) : 4512	CYLINDER NO : CC745169
CYLINDER PRESSURE (psig) : 1420	CERTIFIED DATE : Mar 10, 2021
CERTIFIED BY : AIRGAS SPECIALTY GASES	EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS		
	IDEAL (PPM)	ACTUAL CO (PPM)	% ERROR CO
ZERO	0.00	0.02	0.00
1	10.00	10.00	0.00
2	20.00	20.35	0.35
3	30.00	29.92	-0.08
4	40.00	40.01	0.01
AVERAGE (%)			0.51



CALIBRATED BY : คุณพรชัย มาลีวนาภิรักษ์

DATE : 20 กุมภาพันธ์ 2566

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณพรชัย มาลีวนาภิรักษ์ โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทน์หลวง เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8989 โทรสาร : 0-2515-8988 E-Mail : info@linetec.co.th

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number: E04N198E15A0522
 Cylinder Number: CC745169
 Laboratory: 124 - Plumsteadville - PA
 PGPV Number: A12021
 Gas Code: CO,NO,NOX,SO2,BALN
 Reference Number: 180-402045691-1
 Cylinder Volume: 144.4 CF
 Cylinder Pressure: 2018 PSIG
 Valve Outlet: 660
 Certification Date: Mar 10, 2021
 Expiration Date: Mar 10, 2029

Certification performed in accordance with "EPA Testability Procedures for Analytical Methodology" and "EPA Testability Procedures for Gas Analysis" (May 2017) documents EPA 600/R-12/031, using the assay procedures listed. Analytical Methodology does not require correction for impurities in the sample gas. The impurities listed below are not 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 notice. All concentrations are on a mole/mole basis unless otherwise noted.
 Do Not Use This Certificate Below 100 psig, i.e. 6.7 megapascals.

ANALYTICAL RESULTS				
Component	Requested Concentration	Actual Concentration	Protocol Method	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
NTRM	07050227	EB0079116	100.3 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%
PRM	12386	DB85026	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%
GMS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%
NTRM	16012003	KAL003067	97.68 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.9%
NTRM	09012341	KAL004716	4557 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%
The SRM, PRM or PGM listed above is only in reference to the GMS used in this assay and not part of the analysis.				
ANALYTICAL EQUIPMENT				
Instrument/Model	Analytical Principle		Last Multipoint Calibration	
SIEMENS ULTRAMAT 6 MHD579	NDIR		Feb 26, 2021	
Nicolet S50 FTIR AUP2010245 NO	FTIR		Feb 11, 2021	
Nicolet S50 FTIR AUP2010245 NO2	FTIR		Feb 22, 2021	
Nicolet S50 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

บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

ราชบัณฑิตยสถานและศูนย์ปฏิบัติการสิ่งแวดล้อมจังหวัดภูเก็ตพัฒนาภาคใต้

ผู้ค้า / ผู้ขาย : SGS (Thailand) Co., Ltd.

รายชื่ออุปกรณ์ / เครื่องมือ : CO Analyzer

ศูนย์ข้อมูลการพิมพ์ / เครื่องมือ : T300

เลขที่ : 16 กุมภาพันธ์ 2567

บริษัทผู้ผลิต : Telodyne AP

หมายเลขอุปกรณ์ / เครื่องมือ : 5881

API MODEL T300		TEST VALUES	
		BEFORE	AFTER
1	RANGE	1 - 1000 PPM	50.0
2	STABILITY	≤ 1 PPM	0.01
3	CO MEASURE	2500 - 4800 mV	3815
4	CO REFERENCE	2000 - 4800 mV	3351
5	PH RATIO	1.1 - 1.3	1.2
6	PRESSURE	25 - 35 in - Hg-A	28.9
7	SAMPLE FLOW	800 ± 10% cc/min	827
8	SAMPLE TEMP	48 ± 4 °C	46.5
9	BENCH TEMP	48 ± 2 °C	48
10	WHEEL TEMP	68 ± 2 °C	65
11	BOX TEMP	AMBIENT ± 5 °C	34.6
12	PHT DRIVE	250 - 4750 mV	2430
13	CO SLOPE	1.0 ± 0.3	1.059
14	CO OFFSET	0.0 ± 0.3	-0.049
15	CO READING (AMBIENT)	PPM	0.732
16	ELECTRICAL TEST	40 ± 2 PPM	40.3
17	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.24V /12.15 /16.40 /15.25
18	ZERO GAS	0.00 PPM	-0.326
19	SPAN GAS	40.0 PPM	40.341
			39.997

WATER

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

- Yinyu Calibrates Multi-Point

LEHRSTUHL FÜR VERGLEICHENDE LITERATURWISSENSCHAFT

ชื่อโครงการวิจัย/ชื่อเรื่อง : องค์ความรู้ด้านเทคนิคการปลูกข้าวโพด

โทรศัพท์ : 0-2515-8967

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

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd

EQUIPMENT NAME : CO Analyzer

MANUFACTURER : Teledyne - AP

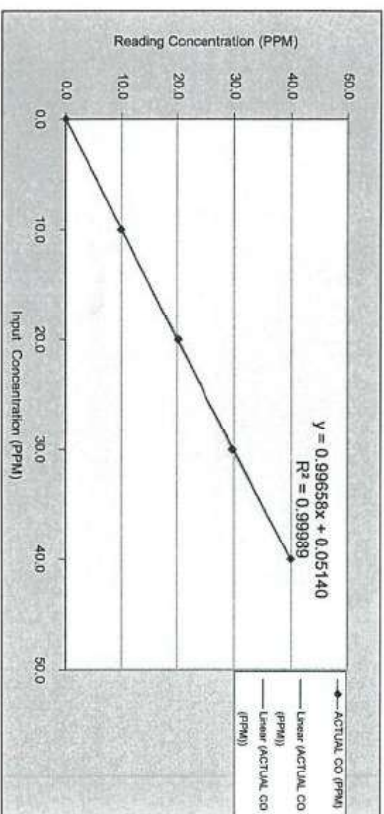
STANDARD GAS CONCENTRATION (PPM) :

CYLINDER PRESSURE (psig) : 1550

CERTIFIED BY : AIRGAS SPECIALTY GASES

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS		
	IDEAL (PPM)	ACTUAL CO (PPM)	% ERROR CO
ZERO	0.00	0.064	0.00
1	10.00	9.932	-0.680
2	20.00	20.198	0.990
3	30.00	29.724	-0.920
4	40.00	38.897	-0.003
AVERAGE (%)			0.648



CALIBRATED BY : กุศลวิมล นิ่มนง

ต้องการข้อมูลทางตำแหน่งเทคนิคเพิ่มเติม : กรุณามาคอม มาหาเรา โทรที่ : 02-515-8998

DATE : 16/02/2567

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



Customer service report

บริษัท เคส ซี เอส (ประเทศไทย) จำกัด

Manufacturer
Teledyne API

Equipment
CO Analyzer

Model
T300

Quotation

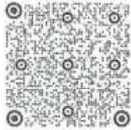
S/N

5881

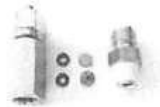
• Checking Date •
16/02/2567

• Problem

B2



contact us



• Correlation working / Remark

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

• Repair parts •

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

Technician / Engineer



Mr. Sujit



บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

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

รายชื่ออุปกรณ์ / เครื่องมือ : NO_x Analyzer

รุ่นของอุปกรณ์ / เครื่องมือ : T200

วันที่ : 16 กุมภาพันธ์ 2567

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	0.31
3	SAMPLE FLOW	500 ± 10% cc/min	494
4	OZONE FLOW	80 ± 10% cc/min	87
5	PMT	mV	178.4
6	NORM PMT	mV	-2.2
7	A ZERO	-20 To 150 mV	147.1
8	HPVS	400 - 900 V	660
9	RX CELL TEMP	50 ± 1 °C	50.1
10	BOX TEMP	AMBIENT ± 5 °C	29.2
11	PMT TEMP	7 ± 2 °C	6.8
12	MOLY TEMP	315 ± 5 °C	316.0
13	RX CELL PRESSURE	<10 in - Hg-A	4.5
14	SAMPLE PRESSURE	25 - 35 in - Hg-A	28.6
15	NOX SLOPE	1.0 ± 0.3	1.034
16	NOX OFFSET	-50 To 150	20.4
17	NO SLOPE	1.0 ± 0.3	1.002
18	NO OFFSET	-50 To 150	-0.2
19	NO SAMPLE READING	PPB	-0.8
20	NO2 SAMPLE READING	PPB	5.5
21	NOX SAMPLE READING	PPB	4.7
22	OPTIC TEST	2000 ± 1000 mV	2628.0
23	ELECTRICAL TEST	2000 ± 1000 mV	2665.0
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.08 / 11.99 / 15.27 / -15.16
25	ZERO GAS NONOX	0.000/0.00 PPB	-2.1 / -7.8
26	SPAN GAS NONOX	400.00/400.00 PPB	403.0 / 402.8

หมายเหตุ

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

- ทำการ Calibrate Multi-Point

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณอนุชคน นพาราช

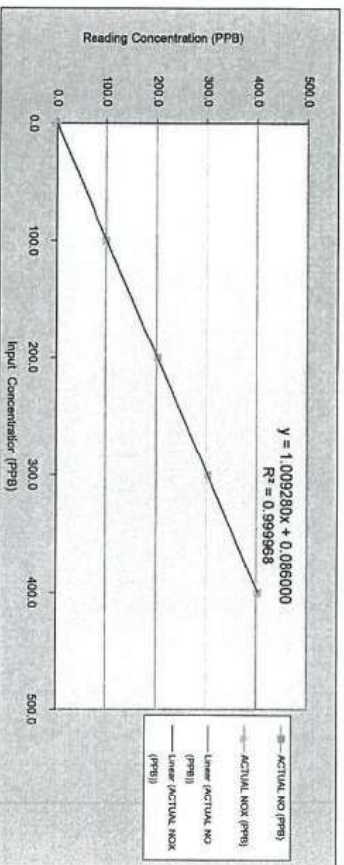
เลขที่ 388 ถนนรัตนาธิเบศ แขวงจันทรมารยม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : info@kinetics.co.th

MULTI-POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.		
EQUIPMENT NAME : NO _x Analyzer		
MANUFACTURER : Teledyne - API	MODEL : 7200	SERIAL NO : 7533
STANDARD GAS CONCENTRATION (PPM) : 53.40		CYLINDER NO : C0745169
CYLINDER PRESSURE (Psi) : 1550		CERTIFIED DATE : Mar 10, 2021
CERTIFIED BY : AIRGAS SPECIALTY GASES		EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS				
	REAL (PPM)	ACTUAL NO (PPM)	ERROR NO (PPM)	% ERROR NO	ACTUAL NO _x (PPM)
ZERO	0.0	0.0	0.0	0.0	0.0
1	100.0	100.6	0.6	0.6	100.3
2	200.0	202.1	-0.7	1.1	202.6
3	300.0	304.0	4.0	1.3	304.0
4	400.0	403.0	3.0	0.8	402.8
AVERAGE (%)				1.0	0.9



CALIBRATED BY : คุณอรุณ นามราช

DATE : 16/02/2567

ที่ตั้งการสอบเทียบ: กรุงเทพมหานคร: กรุงเทพมหานคร โทรศัพท์: 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทระนอก เขตจตุจักร กรุงเทพฯ 10000 โทรศัพท์: 0-2515-8999 โทรสาร: 0-2515-8988 E-Mail: info@kinetics.co.th

KINETICS
Environmental Science Services Ltd.

Customer service report

บริษัท เคทีเอส จำกัด (มหาชน) จำกัด

Manufacturer
Teledyne API

Equipment
NO_x Analyzer

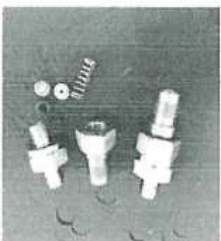
Model
7200

S/N
7533

Quotation

• Checking Date •
16/02/2567

• Problem

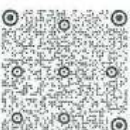


- Correlation working / Remark
- 1. ทดสอบผ่าน Sintered Filter 3 ชิ้น, Spring 3 ชิ้น O-ring 6 ชิ้น
- 2. ทดสอบ Calibrate Multi-point

• Repair parts •

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

contact us



B2

Technician / Engineer



Mr. Sujir



บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการสอบเทียบและเปรียบเทียบอุปกรณ์วัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.
วันที่ : 16 กุมภาพันธ์ 2567
รายชื่อผู้แปล / เครื่องมือ : NO_x Analyzer
บริษัทผู้ผลิต : Teledyne API
หมายเลขอุปกรณ์ / เครื่องมือ : 7534

TEST VALUES		
API MODEL T200		
	BEFORE	AFTER
1 RANGE	50 - 30,000 PPB	500.0
2 STABILITY	≤ 1 PPB	0.02
3 SAMPLE FLOW	500 ± 10% cc/min	472
4 OZONE FLOW	80 ± 10% cc/min	80
5 PMT	mV	51.2
6 INDM PMT	mV	3.5
7 A ZERO	-20 To 150 mV	23.7
8 HPVS	400 - 900 V	650
9 RX CELL TEMP	50 ± 1 °C	50.0
10 BOX TEMP	AMBIENT ± 5 °C	29.9
11 PMT TEMP	7 ± 2 °C	7.0
12 MOLY TEMP	315 ± 5 °C	315.1
13 RX CELL PRESSURE	<10 n-Hg-A	4.5
14 SAMPLE PRESSURE	25 - 35 n-Hg-A	28.7
15 NOX SLOPE	1.0 ± 0.3	0.944
16 NOX OFFSET	-50 To 150	19.5
17 NO SLOPE	1.0 ± 0.3	0.907
18 NO OFFSET	-50 To 150	-0.70
19 NO SAMPLE READING	PPB	-0.2
20 NO2 SAMPLE READING	PPB	1.0
21 NOX SAMPLE READING	PPB	12.7
22 OPTIC TEST	2000 ± 1000 mV	13.6
23 ELECTRICAL TEST	2000 ± 1000 mV	2827.0
24 VOLTAGE TEST	+5 V +12 V +15 V -16 V	2470.0
25 ZERO GAS NONOX	0.000.00 PPB	5.24 / 12.01 / 15.35 / 15.16
26 SPAN GAS NONOX	400.00400.00 PPB	0.2 / 2.4
		397.6 / 401.0

หมายเหตุ

- PMT Temp Warning ปรากฏเป็น TEC Cooler Driver BD.
- ปรากฏเป็น Strainer Filter 3 นิ้ว, Spring 3 นิ้ว, O-ring 6 นิ้ว
- ปรากฏ Cartridge Multi-Point

ลงนามเจ้าหน้าที่ (Signature)

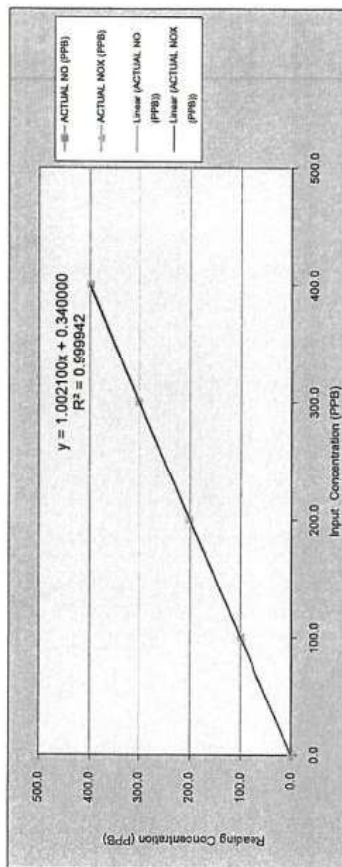
ผลการสอบเทียบเป็นไปตามเกณฑ์คุณภาพผลิตภัณฑ์คุณภาพอากาศ
เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทระนอก เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8998 โทรสาร : 0-2515-8999 E-Mail : info@kinetics.co.th

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.
EQUIPMENT NAME : NO_x Analyzer
MANUFACTURER : Teledyne - API
MODEL : T200
SERIAL NO : 7534
STANDARD GAS CONCENTRATION (PPM) : 53.4
CYLINDER NO : CC/45169
CERTIFIED DATE : Mar 10, 2021
EXPIRED DATE : Mar 10, 2029
CERTIFIED BY : AIRGAS SPECIALTY GASES

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS				
	IDEAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO	% ERROR NO _x
ZERO	0.0	0.0	0.0	0.0	0.0
1	100.0	99.4	-0.6	-0.6	-0.4
2	200.0	200.9	0.9	0.5	2.6
3	300.0	300.7	0.7	0.2	1.5
4	400.0	397.6	-2.4	-0.6	0.1
AVERAGE (%)					0.6



CALIBRATED BY : คุณวราณ มาหาจ

DATE : 16 /02 /2567

ดำเนินการสอบเทียบด้วยเครื่องมือ : คุณวราณ มาหาจ โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทระนอก เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8998 โทรสาร : 0-2515-8999 E-Mail : info@kinetics.co.th



Customer service report

บริษัท เค 3 เอล (ประเทศไทย) จำกัด

Manufacturer
Teledyne API
Equipment
NOx Analyzer
Model
T200

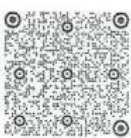
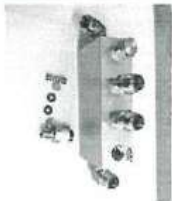
S/N
7534
Quotation
Q-82-2024-038-SV

Checking Date

16/02/2567

Problem

- พบปัญหา PMT Temp Warning ค่าผิดปกติ -2.5



B2

contact us

Correlation working / Remark

1. PMT Temp Warning ที่ทำงาน TEC Cooler Driver BD
2. ที่ทำงาน Sintered Filter 3 ชิ้น, Spring 3 ชิ้น O-ring 6 ชิ้น
3. ที่งาน Calibrate Multi-point

Repair parts

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

Mfr. Sign

Technician / Engineer



บริษัท ไอคอนอิเล็กทรอนิกส์ (ประเทศไทย) จำกัด
102566 ถนนวิภาวดี แขวงวิภาวดี เขตจตุจักร กรุงเทพมหานคร 10250
Tel. 0 2022 8855 54 ext.101

IEE CONSULTANT (THAILAND) CO., LTD.
103546 ถนนวิภาวดี แขวงวิภาวดี เขตจตุจักร กรุงเทพมหานคร 10250
Tel. +66 2022 8855 54 ext.100

รายงานผลการรับเทียบระบบควบคุมอัตราการไหลอากาศบริสุทธิ์ MASS FLOW CONTROL ZERO AIR CALIBRATION REPORT

Calibration Instrument

เครื่องมือวัด : เครื่องวัดมวลอากาศบริสุทธิ์
รุ่น : 4010
Model : S4BC
Manufacturer : S4BC
วันที่รับเทียบ : 11 พฤษภาคม 2566
วันที่สอบเทียบ : 11 พฤษภาคม 2566

Result of Calibration

Flow Rate Volume (Multi Gas Calibrator Display)		Sensor Resulting			
Flow Set (LPM)	Monitor (LPM)	Before		After	
		LPM	%Error	LPM	%Error
1.00	1.000	1.038	3.661	1.010	0.590
2.00	2.000	2.082	3.890	2.011	0.697
3.00	3.000	3.096	3.101	3.021	0.695
4.00	4.000	4.096	2.344	4.025	0.621
5.00	5.000	5.086	1.691	5.030	0.596
6.00	6.000	6.079	1.300	6.032	0.531
7.00	7.000	7.089	1.255	7.030	0.427
8.00	8.000	8.110	1.356	8.023	0.287
9.00	9.000	9.187	2.035	9.003	0.033
10.00	10.000	10.270	2.629	9.991	-0.009
AVERAGE DIFFERENCE (%)		2.353		0.4587	
Interception		-0.0162		-0.0239	
Correlation		0.9999		1.0000	

Calibration Tolerance

% Difference be should + / - 1 % of Full Scale
User Manual of Reference

Reference Standard Instrument

เครื่องมือมาตรฐาน : DryCal (High)
รุ่น : DCL-HH
รุ่น : B05
Manufacturer : B05
วันที่สอบเทียบ : 3222
Serial No. : 30 Unit
ผลการรับเทียบ : 30 Unit
Measuring Range : 500ml/min
Result : ☒ Accepted
☐ Not Accepted

Doc. No. :-



บริษัท ไอเอสคอนซัลแตนท์ (ประเทศไทย) จำกัด
1035/66 ถนนพหลโยธิน แขวงจตุจักร กรุงเทพมหานคร 10250
Tel. 0 2322 1832-54 ถึง 100

IEE CONSULTANT (THAILAND) CO., LTD.
1035/66 ถนนพหลโยธิน แขวงจตุจักร กรุงเทพมหานคร 10250
Tel. 0 2322 1832-54 ถึง 100

รายงานผลการปรับเทียบระบบควบคุมอัตราการไหลของแก๊ส

MASS FLOW CONTROL STANDARD GAS CALIBRATION REPORT

Calibration Instrument

เครื่องมือตรวจวัด : เครื่องมือควบคุมการไหลของแก๊ส
รุ่น : 4010
Model : SABIO
Manufacturer : SSGS (THAILAND) LIMITED
Serial No. : 08500311
Serial No. : 0 - 100 CCPMA
Measuring Range : 0 - 100 CCPMA
Measuring Range : SSGS (THAILAND) LIMITED

วันที่ส่งเข้าปรับเทียบ : 11 พฤษภาคม 2566
Date of Calibration

Result of Calibration

Flow Rate Volume (Multi Gas Calibrator Display)		Sensor Reading			
Flow Set (CCPMA)	Monitor (CCPMA)	Before	After	Before	After
10.00	10.00	10.80	9.85	7.41	7.52
20.00	20.00	21.59	19.97	7.56	7.56
30.00	30.00	32.25	30.05	6.98	6.98
40.00	40.00	42.79	40.01	6.52	6.52
50.00	50.00	53.37	49.84	6.66	6.66
60.00	60.00	63.97	59.82	6.21	6.21
70.00	70.00	74.53	69.65	6.08	6.08
80.00	80.00	85.00	79.60	5.88	5.88
90.00	90.00	95.45	89.64	5.71	5.71
100.00	100.00	107.46	100.10	5.94	5.94
AVERAGE DIFFERENCE (%)		6.5751	-0.3410	0.0351	0.0351
Interception		-0.1778	1.0000	0.9999	0.9999
Correlation		0.9999	1.0000	0.9999	0.9999

Calibration Tolerance : % Difference be should $\pm 1\%$ of Full Scale
User Manual of Reference

Reference Standard Instrument

เครื่องมือมาตรฐาน : DryCal (High)
รุ่น : DCL-HH
Model : BIOS
Manufacturer : BIOS
Serial No. : 3222
Measuring Range : 30 U/min
เครื่องมือมาตรฐาน : DryCal (Low)
รุ่น : Defender 520-L
Model : BIOS
Manufacturer : BIOS
Serial No. : 122189
Measuring Range : 500ml/min

Result : ☒ Accepted
☐ Not Accepted

ผู้ดำเนินการ :
Service By

Doc. No. : -

Page 1 of 1



บริษัท ไอเอสคอนซัลแตนท์ (ประเทศไทย) จำกัด
1035/66 ถนนพหลโยธิน แขวงจตุจักร กรุงเทพมหานคร 10250
Tel. 0 2322 1832-54 ถึง 100

IEE CONSULTANT (THAILAND) CO., LTD.
1035/66 ถนนพหลโยธิน แขวงจตุจักร กรุงเทพมหานคร 10250
Tel. 0 2322 1832-54 ถึง 100

รายงานผลการปรับเทียบระบบผลิตก๊าซโอโซน

OZONE GENERATOR CALIBRATION REPORT

Calibration Instrument

เครื่องมือตรวจวัด : เครื่องมือควบคุมการไหลของแก๊ส
รุ่น : 4010
Model : SABIO
Manufacturer : SSGS (THAILAND) LIMITED
Serial No. : 08500311
Serial No. : 0 - 100 CCPMA
Measuring Range : 0 - 100 CCPMA
Measuring Range : SSGS (THAILAND) LIMITED

วันที่ส่งเข้าปรับเทียบ : 11 พฤษภาคม 2566
Date of Calibration

Result of Calibration

Flow Rate Volume (Multi Gas Calibrator Display)		Sensor Reading			
Flow Set (PPB)	Monitor (PPB)	Before	After	Before	After
0.0	0.0	0.0	0.0	0.0	0.0
100.0	100.0	96.0	96.0	4.0	4.0
200.0	200.0	190.0	190.0	-10.0	-10.0
300.0	300.0	283.0	283.0	-17.0	-17.0
400.0	400.0	372.0	372.0	-28.0	-28.0
500.0	500.0	457.0	457.0	-43.0	-43.0
600.0	600.0	544.0	544.0	-56.0	-56.0
700.0	700.0	626.0	626.0	-74.0	-74.0
800.0	800.0	704.0	704.0	-96.0	-96.0
AVERAGE DIFFERENCE (%)		-41.0000	-19.975896	-10.0000	-10.0000
Interception		-19.975896	0.999578	2.315293	2.315293
Correlation		0.999578	0.999578	0.999578	0.999578

Calibration Tolerance : % Difference be should $\pm 3\%$ PPB At 5 LPM
User Manual of Reference

Reference Standard Instrument

เครื่องมือมาตรฐาน : Ozone Primary Standard
รุ่น : Tanabyte Engineering Inc.
Manufacturer : Tanabyte Engineering Inc.
Serial No. : 0 - 1500 PPB
Measuring Range : 0 - 1500 PPB
เครื่องมือมาตรฐาน : SAC-734
รุ่น : SAC-734
Model : 0140
Serial No. : 0140

Result : ☒ Accepted
☐ Not Accepted

Doc. No. :

Page 1 of 1

Certificate of Calibration

Customer : SCGS (Thailand) Limited
Name : 100 Nanglindee Road, Chongnoet, Yamma Bangkok 10120
Address :
Certificate No : 25-SLM-311
Request No : Req-2023-1904

Unit Under Calibration Details

Measurement Item : Sound Level Meter
Manufacturer : Cirrus
Model : CR-161B
Serial Number : 0078436
ID : ENSL 16135
Resolution : 0.1 dB
Microphone Class : 1
Microphone Model : MK234
Microphone S/N : 209930D
Preamplifier Model : MK170
Preamplifier S/N : 0926
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 : 4 September 2023
Calibrated Date : 19 September 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	S/N	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Multi-frequency Calibrator	Quest	Quest-cal	EFA000234	25 July 2024	TSI
Audio Generator	Svanck	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 %.



Certificate No : 25-SLM-311
Request No : Req-2023-1904

1. Indication at the calibration check frequency						
UUC Setting	Nominal	Before Adjust		After Adjust		Acceptance Limit
		Level	UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)
FAST / A / 20-140						
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)	(± dB)
1000 Hz 94 dB	93.95	92.8	-1.15	94.0	+0.05	0.2

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus Model CR-315, S/N. 88350

2. Self-generated noise, Microphone installed		
UUC Setting	Measured	UNCERTAINTY
FAST / 20-140		
UUC Weighting	(dB)	(± dB)
A	16.7	0.1

3. Self-generated noise, Microphone replaced by the electrical input signal device		
UUC Setting	Measured	UNCERTAINTY
FAST / 20-140		
UUC Weighting	(dB)	(± dB)
A	UR	0.1
C	16.0	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 / 20-140					
STD Setting	(dB)	(dB)	(dB)	(± dB)	
125 Hz	0.4	0.2	0.1	0.6	1.0
1000 Hz	0.0	0.0	0.0	0.6	0.7
4000 Hz	-0.8	-0.6	-0.4	0.6	1.0
8000 Hz	-0.8	-0.6	-0.4	0.7	+1.5 -2.5

Certificate No : 23-SLM-311
Request No : Req-2023-1904

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

5. Electrical signal test of frequency weightings, weighting network response with relative to 2.0 Hz	UUC Setting		Deviation from various Frequency				UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	FAST / 20-140 STD Setting		Weighting Response curve					
			A (dB)	C (dB)	Z (dB)			
	63 Hz		0.5	0.1	0.1			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	0.1	0.0			1.0
	1000 Hz		0.0	0.0	0.0		0.2	0.7
	2000 Hz		-0.1	0.0	0.0			1.0
	4000 Hz		-0.3	-0.2	0.0			1.0
	8000 Hz		-0.5	-0.3	-0.1			+1.5, -2.5
	16000 Hz		0.2	0.3	-0.2			+2.5, -16.0

6. Frequency and time weightings at 1kHz

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

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

Certificate No : 23-SLM-311
Request No : Req-2023-1904

7. Long Term Stability

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / A / 20-140			
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 (dB)	Deviation		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
FAST / A / 20-140					
STD dB					
139.00	139	139.0	0.0		0.8
134.00	134	134.0	0.0		0.8
129.00	129	129.0	0.0		0.8
124.00	124	124.0	0.0		0.8
119.00	119	119.0	0.0		0.8
114.00	114	114.0	0.0		0.8
109.00	109	109.0	0.0		0.8
104.00	104	104.0	0.0		0.8
99.00	99	99.0	0.0		0.8
94.00	94	94.0	0.0		0.8
89.00	89	89.2	0.2		0.8
84.00	84	84.0	0.0		0.8
79.00	79	79.0	0.0	0.3	0.8
74.00	74	74.0	0.0		0.8
69.00	69	69.0	0.0		0.8
64.00	64	64.0	0.0		0.8
59.00	59	59.1	0.1		0.8
54.00	54	54.0	0.0		0.8
49.00	49	49.1	0.1		0.8
44.00	44	44.0	0.0		0.8
39.00	39	39.1	0.1		0.8
34.00	34	34.1	0.1		0.8
29.00	29	29.0	0.0		0.8
24.00	24	24.1	0.1		0.8
20.00	20	19.7	-0.3		0.8

Certificate No : 23-SLM-311
 Request No : Req-2023-1904

UUC Setting	STD	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		REF	UUC		
FAST / A		(dB)	(dB)	(dB)	
UUC Range		25.5	25.4	-0.1	0.8
20-140		114	114.0	0.0	0.8

10. Tone burst response

UUC Setting		STD Toneburst (ms)	Anticipated		Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
A / 20-140			Ref		UUC (dB)	ERR (dB)		
UUC Time Response								
Fast		200	136.0	135.8	-0.2		0.5	
	2	119.0	118.1	-0.9			+1.0, -1.5	
	0.25	110.0	109.4	-0.6			+1.0, -1.0	
Slow		200	129.6	129.3	-0.3	0.2	0.5	
	2	110.0	109.2	-0.8			+1.0, -1.0	
	200	120.0	129.7	-0.3			0.5	
SEL	2	110.0	109.2	-0.8			+1.0, -1.5	
	0.25	101.0	100.5	-0.5			+1.0, -1.0	

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		REF	UUC	ERR	ERR
FAST / C / 20-140		(dB)	(dB)	(dB)	(dB)
STD Setting		135.4	136.9	+1.50	2.0
Complete cycle		134.4	135.2	+0.80	1.0
Positive half cycle		134.4	135.2	+0.80	1.0
Negative half cycle		134.4	135.2	+0.80	1.0

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

ISA-208-SLM-401 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-311
 Request No : Req-2023-1904

UUC Setting	Measured	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / A / 20-140			
STD Setting	(dB)	(± dB)	(± dB)
Positive one-half cycle	148.5		
Negative one-half cycle	148.2		
Deviated	0.3	0.2	1.5

12. Overload indication

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

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

ISA-208-SLM-401 Rev.0 Issue date 01/07/19

Unit Under Calibration Details

Measurement Item : Sound Level Meter

Manufacturer : Cirrus

Model : CR161B

Serial Number : G079769

ID : ENSL18157

Resolution : 0.1 dB

Microphone Class : 1

Microphone Model : MK224

Microphone S/N : 211825D

Preamplifier Model : MK1170

Preamplifier S/N : 0832

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 : 4 September 2023

Calibrated Date : 19 September 2023

Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-1 : 2013 Electroacoustics - Sound level meters - Part 1: Periodic tests

Location of Calibration : Lab Acoustic

Reference Standard

Instrument : Standard Microphone

Brand : GRAS

Model : 40AN

SN : 188273

Due calibration : 6 October 2023

Traceability : GRAS

Instrument : Multifrequency Calibrator

Brand : Quest

Model : Quest-cal

SN : EFA000234

Due calibration : 25 July 2024

Traceability : TSI

Instrument : Audio Generator

Brand : Svanvik

Model : Svan401

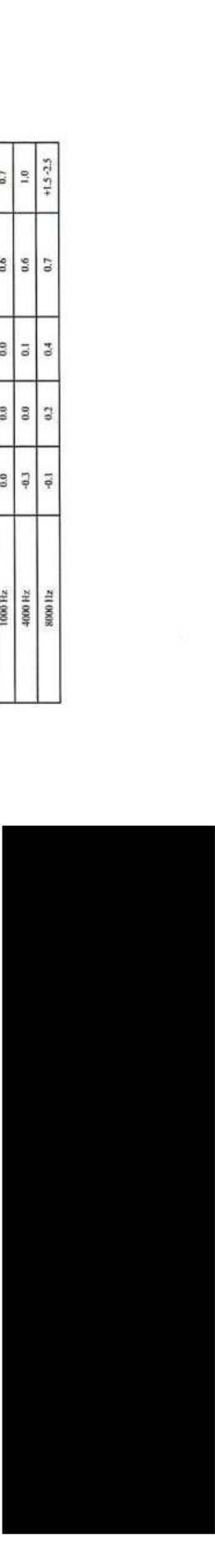
SN : 131

Due calibration : 12 October 2023

Traceability : 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 %.



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)		
FAST / A / 20-140							
Calibrator Setting							
1000 Hz 94 dB	93.95	93.6	-0.35	94.0	+0.05	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR-515, SN: 881350

2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 20-140		
UUC Weighting		
A	18.6	0.1

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

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 20-140		
UUC Weighting		
A	UR	0.1
C	18.3	0.1
Z	29.6	0.1

4. Acoustic signal test of frequency weightings

UUC Setting	Deviation from various Frequency Weighting Response curve	Without Windscreen			Acceptance Limit (± dB)
		UNCERTAINTY			
		A	C	Z	
FAST / 20-140					
STD Setting					
125 Hz	0.2	0.1	0.0	0.6	1.0
1000 Hz	0.0	0.0	0.0	0.6	0.7
4000 Hz	-0.3	0.0	0.1	0.6	1.0
8000 Hz	-0.1	0.2	0.4	0.7	+1.5 -2.5

Certificate No : 23-SLM-310
Request No : Reg-2023-1903

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

UIC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST /20-140	A (dB)	C (dB)	Z (dB)	0.2	1.0
STD Setting					1.0
63 Hz	0.2	0.1	0.1		1.0
125 Hz	0.2	0.1	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	0.2	0.3	-0.3	+2.5, -16.0	

6. Frequency and time weightings at 1kHz

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

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

Certificate No : 23-SLM-310
Request No : Reg-2023-1903

7. Long Term Stability

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

8. Level linearity on the reference level range

UIC Setting	Anticipated	Deviation	UNCERTAINTY	Acceptance Limit
FAST /A /20-140	REF (dB)	UIC (dB)	ERR (dB)	(± dB)
STD dB				
119.00	119	119.0	0.0	0.8
114.00	114	114.0	0.0	0.8
109.00	109	109.0	0.0	0.8
104.00	104	104.0	0.0	0.8
99.00	99	99.0	0.0	0.8
94.00	94	94.0	0.0	0.8
89.00	89	89.0	0.0	0.8
84.00	84	84.0	0.0	0.8
79.00	79	79.0	0.0	0.8
74.00	74	74.0	0.0	0.8
69.00	69	69.0	0.0	0.8
64.00	64	64.0	0.0	0.8
59.00	59	59.0	0.0	0.8
54.00	54	54.0	0.0	0.8
49.00	49	49.0	0.0	0.8
44.00	44	44.0	0.0	0.8
39.00	39	39.1	0.1	0.8
34.00	34	34.0	0.0	0.8
29.00	29	29.2	0.2	0.8
24.00	24	24.4	0.4	0.8
19.00	21	23.4	0.4	0.8

Certificate No : 23-SLM-310
Request No : Req-2023-1903

Certificate No : 23-SLM-310
Request No : Req-2023-1903

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
		UUC (dB)	ERR (dB)		
FAST / A	REF (ms)	28.8	0.2	0.3	0.8
UUC Range		114	114.0	0.0	0.8

10. Tone burst response

UUC Setting	STD	Toneburst (ms)	Measured		UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
			UUC (dB)	ERR (dB)		
FAST	2	200	136.0	136.0	0.0	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	200	129.6	129.6	0.0	0.5
		2	110.0	110.0	0.0	+1.0, -3.0
		200	130.0	130.0	0.0	0.5
SEL	2	2	110.0	110.0	0.0	+1.0, -1.5
		200	101.0	101.0	0.0	+1.0, -3.0
		0.25	101.0	101.0	0.0	+1.0, -3.0

11. Peak C Sound level

UUC Setting	STD	Measured		UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
		UUC (dB)	ERR (dB)		
FAST / C / 20-140	REF (dB)	135.4	+0.30	2.0	2.0
Complete cycle		134.4	-0.10	1.0	1.0
Positive half cycle		134.4	-0.10	1.0	1.0
Negative half cycle		134.4	-0.10	1.0	1.0

12. Overload indication

UUC Setting	Measured	UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
	UUC (dB)		
FAST / A / 20-140	141.6	0.2	1.5
STD Setting	141.3	0.2	1.5
Positive one-half cycle	0.3	0.1	0.1
Negative one-half cycle	0.0	0.1	0.1
Deviated	0.0	0.1	0.1

13. High Level Stability

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

End of Certificate



Certificate of Calibration

Customer
Name : SCS (Thailand) Limited
Address : 100 Nangliedee Road, Chongnong, Yommaru Bangkok 10120
Certificate No : 24-SLM-051
Request No : Req-2024-0225

Unit Under Calibration Details

Measurement Item : Sound Level Meter
Manufacturer : CTRCUS
Model : CR-161B
Serial Number : G2080136
ID : ENSL 18161
Resolution : 0.1 dB
Calibration Environment and Details
Temperature : 23 °C ± 2 °C
Humidity : 50 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 30 January 2024
Calibrated Date : 15 February 2024
Calibration Procedure : In-house method (CPS-M-01) based on IEC 61672-1:2013 Electroacoustics - Sound level meters - Part 1: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard
Instrument : Brand : Model : SN : Due calibration : Traceability :
Standard Microphone : GRAS : 40AN : 188273 : 21 August 2024 : GRAS
Multifrequency Calibrator : Quest : Quest-cal : EFA000214 : 26 July 2024 : TSI
Audio Generator : Svanck : Svan401 : 131 : 9 October 2024 : 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 %.



Certificate No : 24-SLM-051
Request No : Req-2024-0225

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust	After Adjust	Uncertainty	Acceptance Limit
FAST / A / 20-140	Level (dB)	UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)
1000 Hz 94 dB	94.03	93.6	-0.43	94.0	-0.03
					0.20
					0.20

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR-215, SN. 89411

2. Self-generated noise, Microphone installed

UUC Setting	Measured	Uncertainty
FAST / 20-140	(dB)	(± dB)
UUC Weighting	(dB)	(dB)
A	16.1	0.10

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

UUC Setting	Measured	Uncertainty
FAST / 20-140	(dB)	(± dB)
UUC Weighting	(dB)	(dB)
A	19.7	0.10
C	19.7	0.10
Z	23.6	0.10

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY	Acceptance Limit
	A	C	Z	(\pm dB)	(\pm dB)
FAST / 20-140					
STD Setting	(dB)	(dB)	(dB)		
125 Hz	0.4	0.2	0.1	0.60	1.0
1000 Hz	0.0	0.0	0.0	0.60	0.7
4000 Hz	0.5	0.6	0.7	0.60	1.0
8000 Hz	0.7	0.6	0.9	0.70	+1.5 -2.5

Certificate No : 24-SLM-031
Request No : Req-2024-0225

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

UUC Setting	Deviation from various Frequency				UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
	Weighting Response curve					
	A (dB)	C (dB)	Z (dB)			
FAST / 20-140						
STD Setting						
63 Hz	0.3	0.0	0.0			1.0
125 Hz	0.2	0.1	0.0			1.0
250 Hz	0.2	0.1	0.0			1.0
500 Hz	0.1	0.1	0.0			1.0
1000 Hz	0.0	0.0	0.0		0.20	0.7
2000 Hz	-0.2	0.0	0.0			1.0
4000 Hz	-0.2	-0.2	-0.1			1.0
8000 Hz	-0.5	-0.4	-0.1			+1.5, -2.5
16000 Hz	0.1	0.3	-0.3			+2.5, -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		Acceptance Limit (\pm dB)
		UUC	ERR	
		(dB)	(dB)	
FAST / 20-140				
UUC Weighting				
A	114.00	114.0	0.0	0.20
C	114.00	114.0	0.0	0.20
Z	114.00	114.0	0.0	0.20

UUC Setting	STD	Measured		Acceptance Limit (\pm dB)
		UUC	ERR	
		(dB)	(dB)	
20-140 / A				
UUC Time Response				
Fast	114.00	114.0	0.0	0.10
Slow	114.00	114.0	0.0	0.10
Leq	114.00	114.0	0.0	0.10

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-208-SLM-01 Rev.02 Issue date: 7/11/23

Certificate No : 24-SLM-031
Request No : Req-2024-0225

7. Long Term Stability

UUC Setting	Measured	UUC	Acceptance Limit (\pm dB)
FAST / A / 20-140			
STD Setting			
Initial		114.0	
Final		114.0	
Deviated		0.0	0.10

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		Acceptance Limit
		REF	ERR	
FAST / A / 20-140				
139.00	139	139.0	0.0	0.8
134.00	134	134.0	0.0	0.8
129.00	129	129.0	0.0	0.8
124.00	124	124.0	0.0	0.8
119.00	119	119.0	0.0	0.8
114.00	114	114.0	0.0	0.8
109.00	109	109.0	0.0	0.8
104.00	104	104.0	0.0	0.8
99.00	99	99.0	0.0	0.8
94.00	94	94.0	0.0	0.8
89.00	89	89.0	0.0	0.8
84.00	84	84.0	0.0	0.8
79.00	79	79.0	0.0	0.8
74.00	74	74.0	0.0	0.8
69.00	69	69.1	0.1	0.8
64.00	64	64.1	0.1	0.8
59.00	59	59.1	0.1	0.8
54.00	54	54.1	0.1	0.8
49.00	49	49.1	0.1	0.8
44.00	44	44.1	0.1	0.8
39.00	39	39.1	0.1	0.8
34.00	34	34.1	0.1	0.8
29.00	29	29.2	0.2	0.8
24.00	24	24.2	0.2	0.8
20.00	20	20.4	0.4	0.8

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-208-SLM-01 Rev.02 Issue date: 7/11/23



Certificate No : 24-SLM-051
Request No : Req-2024-0225

UUC Setting	STD		Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	REF	UUC	ERR			
FAST / A						
UUC Range	(dB)	(dB)	(dB)			
20-140	28.10	28.5	0.4		0.30	0.8
	114	114.0	0.0			0.8

10. Tone burst response

UUC Setting	STD Toneburst (ms)	Anticipated Ref (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
			UUC	ERR		
A / 20-140						
UUC Time Response						
200		136.0	136.0	0.0		0.5
Fast	2	119.0	118.9	-0.1		+1.0, -1.5
	0.25	110.0	109.5	-0.2		+1.0, -3.0
200		129.6	129.5	-0.1		0.5
Slow	2	110.0	109.8	-0.2		+1.0, -3.0
	200	130.0	130.0	0.0		0.5
	2	110.0	109.9	-0.1		+1.0, -1.5
SEL	0.25	101.0	100.9	-0.1		+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated REF (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC	ERR		
FAST / C / 20-140					
STD Setting	(dB)	(dB)	(dB)		
Complete cycle	135.4	135.3	-0.10		2.0
Positive half cycle	134.4	134.2	-0.20	0.20	1.0
Negative half cycle	134.4	134.2	-0.20		1.0



Certificate No : 24-SLM-051
Request No : Req-2024-0225

UUC Setting	Measured UUC	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / A / 20-140			
STD Setting	(dB)		
Positive one-half cycle	143.3		
Negative one-half cycle	143.3		
Derivated	0.0	0.20	1.5

12. Overload indication

UUC Setting	Measured UUC	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / A / 20-140			
STD Setting	(dB)		
Initial	139.0		
Final	139.0		
Derivated	0.0	0.10	0.10

Note :

Function	Maximum-permitted Uncertainty of measurement
1. Indication at the calibration check frequency	Not applicable
2. Self-generated noise, Microphone installed	Not applicable
3. Self-generated noise, Microphone replaced by the electrical input signal device	Not applicable
4. Acoustic signal test of frequency weightings at 10 Hz to 4 kHz	0.60 dB
4. Acoustic signal test of frequency weightings at >4 kHz to 10 kHz	0.70 dB
5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz	0.20 dB
6. Frequency and time weightings at 1kHz	0.20 dB
7. Long Term Stability	0.10 dB
8. Level linearity on the reference level range	0.30 dB
9. Level linearity including the level range control	0.30 dB
10. Tone burst response	0.20 dB
11. Peak C Sound level	0.35 dB
12. Overload indication	0.25 dB
13. High Level Stability	0.10 dB

- Acceptance limit and Maximum-permitted Uncertainty was IEC 61075-1:2013

End of Certificate



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL BP. 38/0367

CALIBRATION CERTIFICATE

Submitted by : SGS (Thailand) Limited.

Address : 100 Nangliachue Road, Chongnonsue, Yannawa, Bangkok 10120.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Level Meter

Manufacturer : Cirrus

Model : CR-161B

Serial No. : G080132

Microphone : MK 224 No.211770D

Preamplifier : No.5638F

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$ Relative Humidity : $(50 \pm 15) \%$ Ambient Pressure : $(101.325 \pm 1.5) \text{ kPa}$

Standards used :

1. Band Pass Filter Wavetek 752A S/N 90010494.
2. Condenser Microphone Brüel&Kjær 4180 S/N 2889871.
3. Decade Attenuator Ando AL-205 S/N 06464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
6. Digital Multimeter Fluke 8520A S/N 4985007.
7. Multifunction Acoustic Calibrator Brüel&Kjær 4226 S/N 2810358.
8. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.

Date of Receipt : 12 Mar. 2024

Date of Calibration : 28-29 Mar. 2024

1 / 9

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

FM.BI.MTC.002 Rev.5

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

Office
196 Phahonyothin Road, Lalyao, Chulachak,
Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5215, 5225, 5217
(66) 08 1889 6827
E-mail : mtcc@tistr.or.th Website : www.tistr.or.th

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL BP. 38/0367

9. Power Amplifier Brüel&Kjær 2706 S/N 1517650.

10. Speaker Tannoy Limited, Great Britain Patent No. 215300.

11. Digital Multimeter Agilent 34401A S/N MY44005560.

12. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

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

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

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

Date of Calibration : 28-29 Mar. 2024

2 / 9

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

FM.BI.MTC.002 Rev.5

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

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

Office
196 Phahonyothin Road, Lalyao, Chulachak,
Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5215, 5225, 5217
(66) 08 1889 6827

1. Absolute Sensitivity

Reference Acoustic	Measured value	Deviation value	Acceptance limit	Uncertainty	Maximum-permitted uncertainty
Signal (dB)	(dB)	value (dB)	Class 1 (±dB)	(±dB)	of measurement (±dB)
93.70	93.8	0.1	0.7	0.48	N/A

Note: No adjustment.

2. Self-generated noise

2.1 Normal test

Measured value	Uncertainty	Maximum-permitted uncertainty
(dB)	(±dB)	of measurement (±dB)
19.2	0.10	N/A

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

Frequency	Measured value	Uncertainty	Maximum-permitted uncertainty
Weighting	(dB)	(±dB)	of measurement (±dB)
A-Weight	under-range	-	N/A
C-Weight	21.1	0.10	N/A
Flat	30.8	0.10	N/A

Note: The under-range means the indicator cannot display the value because it is under the setting range 20-140 dB.

Date of Calibration : 28-29 Mar. 2024

3 / 9

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

Head Office
35 Mu. 3 Tambon Khlong Ha, Amphoe Khlong Luang,
668 Mu. 2 Tambon Bangsoonnai, Amphoe Maeng Sanitprakan,
Changwat Pathumthani 12120, Thailand
Tel. (661) 0 2577 9036
Fax. (661) 0 2577 9049

Office/Laboratory
196 Phrakongkathin Road, Latyao, Chulabuk,
Bangkok 10900, Thailand
Tel. (661) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (661) 0 2577 9049

Office
196 Phrakongkathin Road, Latyao, Chulabuk,
Bangkok 10900, Thailand
Tel. (661) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (661) 0 2577 9049

PHBLATC002 Rev.5

3. Acoustical signal test of frequency weightings

Frequency	Deviation from frequency response (dB)	Acceptance limit	Uncertainty	Maximum-permitted uncertainty
(Hz)	A-weight C-weight Flat	class 1 (dB)	(±dB)	of measurement (±dB)
125	0.7 0.4 0.4	±1.0	0.45	0.6
1 000	-0.5 -0.5 -0.5	±0.7	0.45	0.6
8 000	0.9 1.0 1.3	+1.5; -2.5	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency	Deviation from frequency response (dB)	Acceptance limit	Uncertainty	Maximum-permitted uncertainty
(Hz)	A-weight C-weight Flat	class 1 (dB)	(±dB)	of measurement (±dB)
63	0.7 0.1 0.0	±1.0	0.20	0.6
125	0.3 0.0 0.0	±1.0	0.20	0.6
250	0.2 0.0 0.0	±1.0	0.20	0.6
500	0.1 0.0 0.0	±1.0	0.20	0.6
1 000	0.0 0.0 0.0	±0.7	0.20	0.6
2 000	-0.1 0.0 0.0	±1.0	0.20	0.6
4 000	-0.3 -0.2 0.0	±1.0	0.20	0.6
8 000	-0.5 -0.3 -0.1	+1.5; -2.5	0.20	0.7
16 000	0.1 0.3 -0.2	+2.5; -16.0	0.20	1.0

Date of Calibration : 28-29 Mar. 2024

4 / 9

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

Head Office
35 Mu. 3 Tambon Khlong Ha, Amphoe Khlong Luang,
668 Mu. 2 Tambon Bangsoonnai, Amphoe Maeng Sanitprakan,
Changwat Pathumthani 12120, Thailand
Tel. (661) 0 2577 9036
Fax. (661) 0 2577 9049

Office/Laboratory
196 Phrakongkathin Road, Latyao, Chulabuk,
Bangkok 10900, Thailand
Tel. (661) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (661) 0 2577 9049

Office
196 Phrakongkathin Road, Latyao, Chulabuk,
Bangkok 10900, Thailand
Tel. (661) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (661) 0 2577 9049

PHBLATC002 Rev.5



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL BP. 38/0367

5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	114.0	0.0	0.1	0.10	0.1
End	114.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	114.0	0.0	0.2	0.20	0.2
C-weight	114.0	0.0	0.2	0.20	0.2
Flat	114.0	0.0	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	114.0	0.0	0.1	0.20	0.2
Slow	114.0	0.0	0.1	0.20	0.2
Leq	114.0	0.0	0.1	0.20	0.2

Date of Calibration : 28-29 Mar. 2024

5/9

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

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

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

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

FM.BLMTC.002 Rev.5



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL BP. 38/0367

7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
138	138.0	0.0	0.8	0.30	0.3
137	137.0	0.0	0.8	0.30	0.3
136	136.0	0.0	0.8	0.30	0.3
135	135.0	0.0	0.8	0.30	0.3
134	134.0	0.0	0.8	0.30	0.3
129	129.0	0.0	0.8	0.30	0.3
124	124.0	0.0	0.8	0.30	0.3
119	119.0	0.0	0.8	0.30	0.3
114	114.0	0.0	0.8	0.30	0.3
109	109.0	0.0	0.8	0.30	0.3
104	104.0	0.0	0.8	0.30	0.3
99	99.0	0.0	0.8	0.30	0.3
94	94.0	0.0	0.8	0.30	0.3
89	89.2	0.2	0.8	0.30	0.3
84	84.0	0.0	0.8	0.30	0.3
79	79.0	0.0	0.8	0.30	0.3
74	74.0	0.0	0.8	0.30	0.3
69	68.9	-0.1	0.8	0.30	0.3
64	63.9	-0.1	0.8	0.30	0.3
59	58.9	-0.1	0.8	0.30	0.3
54	53.9	-0.1	0.8	0.30	0.3

Date of Calibration : 28-29 Mar. 2024

6/9

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

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

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

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

FM.BLMTC.002 Rev.5



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL. BP. 38/0367

7. Level linearity on the reference level range (cont.)

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
49	49.0	0.0	0.8	0.30	0.3
44	43.9	-0.1	0.8	0.30	0.3
39	38.9	-0.1	0.8	0.30	0.3
34	34.0	0.0	0.8	0.30	0.3
29	29.1	0.1	0.8	0.30	0.3
24	24.3	0.3	0.8	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
20-140	114.0	114.0	0.0	0.8	0.30	0.3

Date of Calibration : 28-29 Mar. 2024

7/9 of

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

Head Office

35 Mu. 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2517 9036
Fax. (66) 0 2517 9009

Office/Laboratory

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

Office

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

PMIL.MTC.02 Rev.5



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL. BP. 38/0367

8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
20-140	25.0	25.1	0.1	0.8	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration, T _b (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 1 (dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Fast	200	136.0	0.0	±0.5	0.20	0.3
	2	118.9	-0.1	+1.0, -1.5	0.20	0.3
	0.25	109.9	-0.1	+1.0, -3.0	0.20	0.3
Slow	200	129.6	0.0	±0.5	0.20	0.3
	2	110.0	0.0	+1.0, -3.0	0.20	0.3
	200	130.0	0.0	±0.5	0.20	0.3
SEL	2	110.0	0.0	+1.0, -1.5	0.20	0.3
	0.25	101.0	0.0	+1.0, -3.0	0.20	0.3

Date of Calibration : 28-29 Mar. 2024

8/9 of

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

Head Office

35 Mu. 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2517 9036
Fax. (66) 0 2517 9009

Office/Laboratory

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

Office

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

PMIL.MTC.02 Rev.5



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL. BP. 38/0367

10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	135.4	135.4	0.0	2.0	0.20	0.35
Positive half cycle	134.4	134.2	-0.2	1.0	0.20	0.35
Negative half cycle	134.4	134.2	-0.2	1.0	0.20	0.35

11. Overload indication

Measured value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle			
138.7	133.7	0.0	1.5	0.20
				0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	139.0	0.0	0.1	0.10	0.1
End	139.0				



Unauthorized use of TISTR logo and name

9 / 9

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

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Phangnga, Changwat Phangnga 92120, Thailand
Tel. (66) 0 2571 9036
Fax. (66) 0 2571 9009

Office/Laboratory
6/8 Mu 2 Tambon Bangproeng, Amphoe Muang Samutprakan, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9440
Email : mtcc@tistr.or.th Website : www.tistr.or.th

Office
196 Phatongyothin Road, Lamyao, Chaiyachulabangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
(66) 08 1889 6827

PMBLATC 002 Rev.5

INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
139 MU 13, SOI SINTANAKORN II TAMBON BANGKAPHO,
AMPHOE BANGPHU SAKHIT PRAKAN PROVINCE 10640 THAILAND
TEL. (66) 0 2160-5500 F.A.S. (66) 0 2160-7140



Page : 1/6

Certificate of Calibration

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

Certificate No : 24-SLM-042
Request No : Req-2024-0227

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : CIBRUS
Model : CR161B
Serial Number : G080148
ID : ENSL18166
Resolution : 0.1 dB

Microphone Class : 1
Microphone Model : MK224
Microphone S/N : 205274A
Preamplifier Model : -
Preamplifier S/N : 6042F
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 : 30 January 2024
Calibrated Date : 13 February 2024
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61572-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	S/N	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	21 August 2024	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	26 July 2024	TSI
Audio Generator	Scantek	Scantek01	131	9 October 2024	W.K. Electric

Note

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

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-208-SLM-01 Rev.02 Issue date 7/11/23



Certificate No : 24-SLM-042
Request No : Req-2024-0227

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)		
FAST / A / 20-140							
Calibrator Setting	94.03	93.7	-0.33	94.0	-0.03	0.20	0.30
1000 Hz 94 dB							

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR-515, SN: 80411

2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 20-140		
UUC Weighting		
A	16.5	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	15.8	0.10
C	15.8	0.10
Z	29.2	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	(dB)	(dB)	(dB)	(± dB)	(± dB)
125 Hz	0.6	0.4	0.4	0.60	1.0
1000 Hz	0.0	0.0	0.0	0.60	0.7
4000 Hz	-0.5	-0.3	-0.2	0.60	1.0
8000 Hz	-0.1	0.0	0.2	0.70	+1.5 -2.5



Certificate No : 24-SLM-042
Request No : Req-2024-0227

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

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				(± dB)	(± dB)
63 Hz	0.3	0.0	0.0		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	-0.1		1.0
1000 Hz	0.0	-0.1	-0.1	0.20	0.7
2000 Hz	-0.2	-0.1	-0.1		1.0
4000 Hz	-0.4	-0.2	-0.1		1.0
8000 Hz	-0.5	-0.4	-0.1		+1.5, -2.5
16000 Hz	0.1	0.3	-0.3		+2.5, -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD REF (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
FAST / 20-140					
UUC Weighting	(dB)	(dB)	(dB)	(± dB)	(± dB)
A	114.00	114.0	0.0		0.20
C	114.00	114.0	0.0	0.20	0.20
Z	114.00	114.0	0.0		0.20

UUC Setting	STD REF (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
20-140 / A					
UUC Time Response	(dB)	(dB)	(dB)	(± dB)	(± dB)
Fast	114.00	114.0	0.0		0.10
Slow	114.00	114.0	0.0	0.20	0.10
Leq	114.00	114.0	0.0		0.10

Certificate No : 24-SLM-042
Request No : Req-2024-0227

7. Long Term Stability

UUC Setting	Measured		UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
	REF	UUC (dB)		
FAST / A / 20-140				
STD Setting				
Initial		114.0		
Final		114.0		
Deviated		0.0	0.10	0.10

8. Level linearity on the reference level range

UUC Setting	Anticipated REF	Deviation		UNCERTAINTY	Acceptance Limit
		UUC	ERR		
FAST / A / 20-140					
139.00	139	139.0	0.0		0.8
134.00	134	134.0	0.0		0.8
129.00	129	129.0	0.0		0.8
124.00	124	124.0	0.0		0.8
119.00	119	119.1	0.1		0.8
114.00	114	114.0	0.0		0.8
109.00	109	109.0	0.0		0.8
104.00	104	104.1	0.1		0.8
99.00	99	99.0	0.0		0.8
94.00	94	94.1	0.1		0.8
89.00	89	89.1	0.1		0.8
84.00	84	84.0	0.0		0.8
79.00	79	79.1	0.1		0.8
74.00	74	74.1	0.1		0.8
69.00	69	69.1	0.1		0.8
64.00	64	64.1	0.1		0.8
59.00	59	59.1	0.1		0.8
54.00	54	54.1	0.1		0.8
49.00	49	49.1	0.1		0.8
44.00	44	44.1	0.1		0.8
39.00	39	39.1	0.1		0.8
34.00	34	34.1	0.1		0.8
29.00	29	29.2	0.2		0.8
24.00	24	24.2	0.2		0.8
20.00	20	20.4	0.4		0.8

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-208-SLM-01 Rev 02 Issue date: 7/11/23

Certificate No : 24-SLM-042
Request No : Req-2024-0227

9. Level linearity including the level range control

UUC Setting	STD REF (dB)	Measured		UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
		UUC (dB)	ERR (dB)		
FAST / A					
UUC Range	24.90	25.1	0.2		0.8
20-140	114	114.0	0.0	0.30	0.8

10. Tone burst response

UUC Setting	STD Toneburst (ms)	Anticipated Ref (dB)	Measured		UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
			UUC (dB)	ERR (dB)		
A / 20-140						
UUC Time Response	200	136.0	136.0	0.0		0.5
Fast	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	0.20	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 REF	Measured		UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
		UUC (dB)	ERR (dB)		
FAST / C / 20-140					
STD Setting					
Complete cycle	135.4	135.7	+0.30		2.0
Positive half cycle	134.4	134.2	-0.20	0.30	1.0
Negative half cycle	134.4	134.2	-0.20		1.0

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-208-SLM-01 Rev 02 Issue date: 7/11/23



Certificate No : 24-SIAH-042
Request No : Req-2024-0227

12. Overload indication

UUC Setting	Measured UUC	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / A / 20-140			
STD Setting	(dB)	(± dB)	
Positive one-half cycle	148.3		
Negative one-half cycle	148.1		
Deviated	0.2	0.20	1.5

13. High Level Stability

UUC Setting	Measured UUC	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / A / 20-140			
STD Setting	(dB)	(± dB)	
Initial	139.0		
Final	139.0		
Deviated	0.0	0.10	0.10

Note :

Function	Maximum-permitted Uncertainty of measurement
1. Indication at the calibration check frequency	Not applicable
2. Self-generated noise, Microphone installed	Not applicable
3. Self-generated noise, Microphone replaced by the electrical input signal device	Not applicable
4. Acoustic signal test of frequency weightings at 10 Hz to 4 kHz	0.60 dB
4. Acoustic signal test of frequency weightings at ≥4 kHz to 10 kHz	0.20 dB
5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz	0.20 dB
6. Frequency and time weightings at 1kHz	0.20 dB
7. Long Term Stability	0.10 dB
8. Level linearity on the reference level range	0.30 dB
9. Level linearity including the level range control	0.30 dB
10. Tone burst response	0.30 dB
11. Peak C Sound level	0.35 dB
12. Overload indication	0.25 dB
13. High Level Stability	0.10 dB

- Acceptance limit and Maximum permitted Uncertainty was IEC 61072-1:2013

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.

PM-208-ACT-01 Rev.02 Issue date:11/23



Certificate of Calibration

Customer

Name : SGS (Thailand) Limited
Address : 100 Nangliwong Road, Oongnonsi, Yanwara Bangkok
10120

Certificate No : 24-ACT-100

Request No : Req-2024-1408

Unit Under Calibration Details

Measurement item : Acoustic Calibrator
Manufacturer : CIRRUS
Model : CR-515
Serial Number : 88373
ID : ENSL 19176
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 : 24 June 2024
Calibration Date : 4 July 2024
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	58099	EEL	12 June 2025
THD Multimeter	2015	1047765	NIMT	16 January 2025

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 %.



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-208-ACT-02 Rev.03 Issue date: 5/6/24

SGS (Thailand) Limited

100 Nanglinchee Road Chongnonsee
Yannawa Bangkok 10120
t : + 66 (0)2 678 18 13
f : + 66 (0)2 678 13 62
e : sgs.thailand@sgs.com

Rama 3 Branch :

Laboratory Services
41/23 Soi 59 Rama 3 Road
Chongnonsee Yannawa Bangkok 10120
t : + 66 (0)2 683 05 41 294 74 85-90
f : + 66 (0)2 683 07 58 294 74 84
e : lab.thailand@sgs.com

Rayong Branch :

1/209, 1/211 Moo 1
Tambon Ban Chang
A. Ban chang Rayong 21130
t : + 66 (0)38 685 260 - 4
f : + 66 (0)38 685 258

Hatyai Branch :

59, 61 Soi 10 Phetkasem Road
Hatyai Songkhla 90110
t : + 66 (0)74 345 876 - 8
f : + 66 (0)74 345 880

Sriracha Office :

144 - 146 Sriracha Nakorn 1 Road
Sriracha Chonburi 20110
t : + 66 (0)38 770 721-2 770 926-30
f : + 66 (0)38 324 786

Chiangmai Office :

Room No. S107 The Office Plus Building
55 Moo 7 T. Suthep A. Muang
Chaingmai 50200
t : + 66 (0)53 807 042 807 028-9
f : + 66 (0)53 807 029

Nakhorn Ratchasima Office :

1340/46 Suranaree Road
Tambon Nai-Muang A. Muang
Nakhornratchasima 30000
t : + 66 (0)44 922 521-2
f : + 66 (0)44 922 520

WHEN YOU NEED TO BE SURE

SGS