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ภาคผนวก ง

สำเนาใบรับรองการสอบเทียบเครื่องมือ

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# THAI METEOROLOGICAL DEPARTMENT

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

## Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 8 March, 2023

Certification No. 078/23

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Type : Vantage Pro 2 Model No. : 6152C

Mfg Code : Display BD190415073 Transmitter BD190415073

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

**VERIFIED**

BY

DATE Mar 13, 2023

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1014.2 hPa

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

: HOOK GAGE NO 1425 : Wind Aloft Plotting Board

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

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

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

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

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

STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220015

Calibrated by :

Signature

(Authorised Signatory)

Mr. Watcharapol Subwat

Mr. [Redacted] [Redacted]

for the Chief

Mechanical Engineer

Sub-Standard Instrument



## THAI METEOROLOGICAL DEPARTMENT

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

### The Result of Calibration

Certification No. 078/23

8 March, 2023

Page : 2 of 6

Standard  Ultrasonic Anemometer  m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacumm	Velocity	Velocity	Correction
	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.00	-	-	-	6.7	0.30
9.02	-	-	-	8.9	0.12
11.01	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.8	0.21
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.3	0.72

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

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau





# THAI METEOROLOGICAL DEPARTMENT

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

## The Result of Calibration

Certification No. 078/23

8 March, 2023

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
761.92	762.9	-0.98
761.58	762.5	-0.92
761.88	762.9	-1.02
762.57	763.5	-0.93
764.09	765.1	-1.01
764.13	765.3	-1.17
762.06	763.2	-1.14
761.45	762.6	-1.15
761.32	762.5	-1.18
759.85	761.2	-1.35
760.22	761.3	-1.08
760.46	761.5	-1.04
760.82	761.8	-0.98
761.26	762.2	-0.94
761.42	762.5	-1.08
761.81	762.9	-1.09
761.96	763.0	-1.04
762.54	763.6	-1.06
762.69	763.7	-1.01
758.55	759.6	-1.05

Average

-1.06

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau







# THAI METEOROLOGICAL DEPARTMENT

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

## The Result of Calibration

Certification No. 078/23

8 March, 2023

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.5	45.5	0.0
30.4	30.3	0.1
15.8	15.8	0.0

Calibrated by :



Mr. Watcharapol Subwat  
Mechanical Engineer

Calibration & Test Section  
Meteorological Instruments Bureau





# THAI METEOROLOGICAL DEPARTMENT

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

## The Result of Calibration

Certification No. 078/23

8 March, 2023

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
85.75	82	3.75
64.53	63	1.53
46.79	45	1.79

Calibrated by :



Mr. Watcharapol Subwat  
Mechanical Engineer

Calibration & Test Section  
Meteorological Instruments Bureau





Date of Issue 8 March, 2023

Certification No. 078/23

Page : 6 of 6

## ใบรับรอง

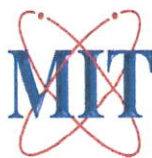
หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152 C Mfg. Code. BD190415073 ทำการสอบเทียบกับแก้ว ฝนแบบแก้วดวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของ เครื่องมือ ( 0.01 in/ TIP)



ลงชื่อ.....

(นายวัชรพล ทรัพย์วัฒน์)

วิศวกรชำนาญการ



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

214 Bangwaek Rd. Bangpai Bangkae Bangkok 10160  
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



## CALIBRATION CERTIFICATE

Certificate No. : L202209274-002

Date Issued : 17-Oct-22

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

**Equipment** : Digital Pressure Gauge

**Manufacturer** : DWYER

**Model** : DPGA-00

**Serial No.** : 071515-30

**ID No./Tag No.** : ENSS 16102

**Date Received** : 05-Oct-22

**Date Calibrated** : 14-Oct-22

**Calibrated by** : Mr. Saruth Srichutikul

Calibration Method or Calibration Procedure Used

In-house method : CP-07 base on DKD-R 6-1: Edition 3 2014.



This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

### Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.

Approved by:



( Mr. Sarayuth Tochua)



Page 1 of 2



Certificate No : L202209274-002

Environment      Ambient Temperature :     $(25 \pm 2)^{\circ}\text{C}$   
Relative Humidity :     $(50 \pm 15)\%\text{RH}$

UUC Reading	STD Reading (inHg)	STD Reading (inHg)	UUC Error	Uncertainty
inHg	Before Adjusted	After Adjusted	inHg	$\pm$ inHg
-30.00	-29.763 *	-	-0.237	0.026
-25.00	-24.886	-	-0.114	0.026
-20.00	-19.875	-	-0.125	0.026
-15.00	-14.879	-	-0.121	0.026
-10.00	-9.883	-	-0.117	0.026
-5.00	-4.898	-	-0.102	0.026
0.00	0.000	-	0.000	0.025

Marked \* are not included in the NSC-ONSC accreditation schedule for our laboratory.

**STD = Standard**

**UUC = Unit Under Calibration**

<b>Calibrated condition :</b>	Pressure Medium	Air : Density = $1.19 \text{ kg/m}^3$ @ $20^{\circ}\text{C}$ , 1 bar
	Mounting Position	Vertical
	Reference Level	at the end of pressure port
	Conversion Factor	Multiply by $3.386\ 389 \text{ E}+03$ - Pa unit

<b>Description of UUC :</b>	Range	$(-30)-0$ inHg
	Calibration Range	$(-30)-0$ inHg
	Resolution	0.01 inHg

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

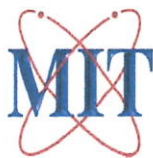
**Measurement Standards Used & Traceability :**

The International System of Units (SI) through

iRPC Certificate No. CL1-P210086 for Reference Pressure Monitor Serial No. 1598, Due 08-Nov-22

**End of Certificate**

Page 2 of 2



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

214 Bangwaek Rd. Bangpai Bangkae Bangkok 10160  
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



## CALIBRATION CERTIFICATE

Certificate No. : AD2207-106-0001

Date Issued : 13-Jul-22

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

**Equipment** : Digital Thermo-Hygrometer

**Manufacturer** : TESTO

**Model** : 608-H1

**Serial No.** : 45051841

**ID No./Tag No.** : ENSS16105

**Date Received** : 08-Jul-22

**Date Calibrated** : 08-Jul-22

**Calibrated by** : Mr. Apiwat Peanrungrot

### Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

### Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.

Approved by:



( Mr. Nathapong Krudaum)



Page 1 of 2

**Certificate No. :** AD2207-106-0001

**Environment :** Ambient Temperature :  $(25 \pm 2) ^\circ\text{C}$   
Relative Humidity :  $(50 \pm 15)\% \text{RH}$

Function : Temperature Measurement

Humidity Control :  $(50 \pm 15) \% \text{RH}$

STD	UUC Reading	UUC Error	Measurement
Reading ( $^\circ\text{C}$ )	( $^\circ\text{C}$ )	( $^\circ\text{C}$ )	Uncertainty ( $\pm^\circ\text{C}$ )
19.99	20.1	0.11	0.35
24.99	24.8	-0.19	0.35
29.99	29.5	-0.49	0.35

Function : Humidity Measurement

Temperature Control :  $(25 \pm 5) ^\circ\text{C}$

STD	UUC Reading	UUC Error	Measurement
Reading ( $\% \text{RH}$ )	( $\% \text{RH}$ )	( $\% \text{RH}$ )	Uncertainty ( $\pm\% \text{RH}$ )
20.04	21.7	1.66	2.5
49.98	51.5	1.52	2.5
74.97	73.2	-1.77	2.5

**STD = Standard**

**UUC = Unit Under Calibration**

<b>Description of UUC :</b>	Range	0 to 50 $^\circ\text{C}$ Internal Sensor /	10 to 95 $\% \text{RH}$
	Resolution	0.1 $^\circ\text{C}$ /	0.1 $\% \text{RH}$

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

**Measurement Standards Used & Traceability :**

The International System of Units (SI) through

MIT Certificate No. AD2111-077-0001 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 11-Nov-22

MIT Certificate No. AD2111-079-0001 for Digital Humidity Meter Serial No. D1650010, Due 13-Dec-22

**End of Certificate**



บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

## รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

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

วันที่ : 24 กุมภาพันธ์ 2566

รายชื่ออุปกรณ์ / เครื่องมือ : CO Analyzer

บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T300

หมายเลขอุปกรณ์ / เครื่องมือ : 5881

TEST VALUES			
API MODEL T300			
		BEFORE	AFTER
1	RANGE 1 - 1000 PPM	50.0	50.0
2	STABILITY $\leq 1$ PPM	0.01	0.01
3	CO MEASURE 2500 - 4800 mV	3909.3	4017.3
4	CO REFERENCE 2000 - 4800 mV	3376.8	3472.5
5	MR RATIO 1.1 - 1.3	1.161	1.2
6	PRESEURE 25 - 35 in - Hg-A	28.8	29.0
7	SAMPLE FLOW $800 \pm 10\%$ cc/min	848	828
8	SAMPLE TEMP $48 \pm 4$ °C	48.4	46.7
9	BENCH TEMP $48 \pm 2$ °C	48.0	48.0
10	WHEEL TEMP $68 \pm 2$ °C	68.0	67.9
11	BOX TEMP AMBIENT $\pm 5$ °C	33.4	38.3
12	PHT DRIVE 250 - 4750 mV	2541.7	2360.6
13	CO SLOPE $1.0 \pm 0.3$	1.056	1.020
14	CO OFFSET $0.0 \pm 0.3$	-0.049	-0.049
15	CO READING (AMBIENT) PPM	0.283	0.021
16	ELECTRICAL TEST $40 \pm 2$ PPM	40.0	40.3
17	VOLTAGE TEST +5 V +12 V +15 V -15 V	5.18 /12.16 /16.29 /-15.20	5.18 /12.16 /16.29 /-15.20
18	ZERO GAS 0.00 PPM	0.103	0.034
19	SPAN GAS 40.0 PPM	42.590	40.143

## หมายเหตุ

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

VERIFIED

BY

DATE Mar 07, 2022

( คุณพรชัย ผาติวนารักษ์ )

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณพรชัย ผาติวนารักษ์

โทรศัพท์ : 0-2515-8987

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



# MULTI POINT CALIBRATION REPORT

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

EQUIPMENT NAME : CO Analyzer

MANUFACTURER : Teledyne - API

MODEL : T300

SERIAL NO : 5881

STANDARD GAS CONCENTRATION (PPM) : 4512

CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) : 1550

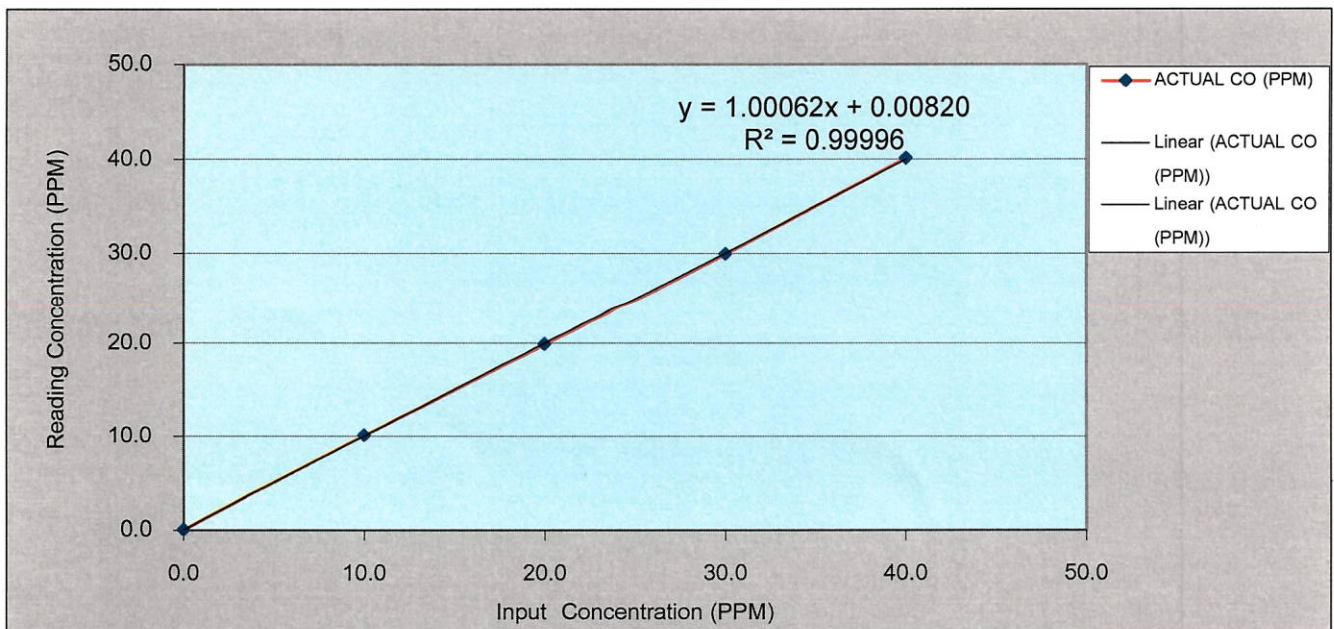
CERTIFIED DATE : Mar 10 ,2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10 ,2029

## CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL (PPM)	ACTUAL CO (PPM)	ERROR CO (PPM)	% ERROR CO
ZERO	0.00	0.034	0.034	0.00
1	10.00	10.077	0.077	0.770
2	20.00	19.928	-0.072	-0.360
3	30.00	29.921	-0.079	-0.263
4	40.00	40.143	0.143	0.358
AVERAGE (%)				0.505



CALIBRATED BY : คุณพรชัย ผาติวนารักษ์

DATE : 24 /02 /2566

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณพรชัย ผาติวนารักษ์ โทรศัพท์ : 02-515-8987

# CERTIFICATE OF ANALYSIS

## Grade of Product: EPA Protocol

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

**Expiration Date: Mar 10, 2029**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	G1	+/- 0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	+/- 0.6% NIST Traceable	03/04/2021
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	07060227	EB0079116	100.3 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Jul 23, 2023
PRM	12386	D685025	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%	Feb 20, 2020
GMIS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	16010203	KAL003087	97.69 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Dec 23, 2021
NTRM	08012341	KAL004716	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

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

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 N1KD579	NDIR	Feb 26, 2021
Nicolet iS50 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet iS50 FTIR AUP2010245 NO2	FTIR	Feb 22, 2021
Nicolet iS50 FTIR AUP2010245 SO2	FTIR	Feb 18, 2021

Triad Data Available Upon Request

### NOTES:

Gross Weight: 28.1 Kg  
Net Weight: 4.6 Kg

Approved for Release



**รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ**

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

รายชื่ออุปกรณ์ / เครื่องมือ : CO Analyzer

รุ่นของอุปกรณ์ / เครื่องมือ : T300

วันที่ : 7 กุมภาพันธ์ 2565

บริษัทผู้ผลิต : Teledyne API

หมายเลขอุปกรณ์ / เครื่องมือ : 5881

TEST VALUES			
API MODEL T300		BEFORE	AFTER
1	RANGE 1 - 1000 PPM	50	50
2	STABILITY $\leq 1$ PPM	0.15	0.21
3	CO MEASURE 2500 - 4800 mV	4489.4	4501.1
4	CO REFERENCE 2000 - 4800 mV	3873.5	3885.3
5	PRESEEURE 25 - 35 in - Hg-A	29.0	28.9
6	SAMPLE FLOW $800 \pm 10\%$ cc/min	837	835
7	SAMPLE TEMP $48 \pm 4$ °C	46.6	46.5
8	BENCH TEMP $48 \pm 2$ °C	48	48
9	WHEEL TEMP $68 \pm 2$ °C	68.3	67.9
10	BOX TEMP AMBIENT $\pm 5$ °C	38.8	37.3
11	SLOPE $1.0 \pm 0.3$	1.065	1.069
12	OFFSET $0.0 \pm 0.3$	-0.045	0.436
13	CO READING (AMBIENT) PPM	1.339	0.115
14	VOLTAGE TEST +5 V +12 V +15 V -15 V	-	-
15	ZERO GAS 0.00 PPM	0.750	0.001
16	SPAN GAS 40.0 PPM	41.574	40.029

หมายเหตุ

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บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด



( คุณพรชัย ผาติวนารักษ์ )

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณพรชัย ผาติวนารักษ์

โทรศัพท์ : 0-2515-8987

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



บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

## รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

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

วันที่ : 27 กุมภาพันธ์ 2566

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

บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T200

หมายเลขอุปกรณ์ / เครื่องมือ : 7534

TEST VALUES			
API MODEL T200			
		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	STABILITY	≤ 1 PPB	0.43
3	SAMPLE FLOW	500 ± 10% cc/min	488
4	OZONE FLOW	80 ± 10% cc/min	79
5	PMT	mV	24.8
6	NORM PMT	mV	11.1
7	A ZERO	-20 To 150 MV	30.6
8	HPVS	400 - 900 V	650
9	RX CELL TEMP	50 ± 1 °C	50.0
10	BOX TEMP	AMBIENT ± 5 °C	30.9
11	PMT TEMP	7 ± 2 °C	7.0
12	MOLY TEMP	315 ± 5 °C	314.6
13	RX CELL PRESSURE	<10 in - Hg-A	7.4
14	SAMPLE PRESSURE	25 - 35 in - Hg-A	28.9
15	NOX SLOPE	1.0 ± 0.3	1.019
16	NOX OFFSET	-50 To 150	4.3
17	NO SLOPE	1.0 ± 0.3	1.023
18	NO OFFSET	-50 To 150	-0.30
19	NO SAMPLE READING	PPB	-5.4
20	NO2 SAMPLE READING	PPB	7.0
21	NOX SAMPLE READING	PPB	1.4
22	OPTIC TEST	2000 ± 1000 mV	2280.4
23	ELECTRICAL TEST	2000 ± 1000 mV	1762.9
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.48 /12.89 /15.61 /-15.38
25	ZERO GAS NO/NO <sub>x</sub>	0.00/0.00 PPB	-1.1 /- 2.4
26	SPAN GAS NO/NO <sub>x</sub>	400.00/400.00 PPB	424.1/ 425.5
			399.9 /401.0

## หมายเหตุ

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

VERIFIED

BY

DATE Mar 07, 2023

( คุณพรชัย ผาติวนารักษ์ )

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณพรชัย ผาติวนารักษ์

โทรศัพท์ : 0-2515-8987

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



## MULTI POINT CALIBRATION REPORT

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

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

MANUFACTURER : Teledyne - API

MODEL : T200

SERIAL NO : 7534

STANDARD GAS CONCENTRATION (PPM) : 53.4

CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) : 1550

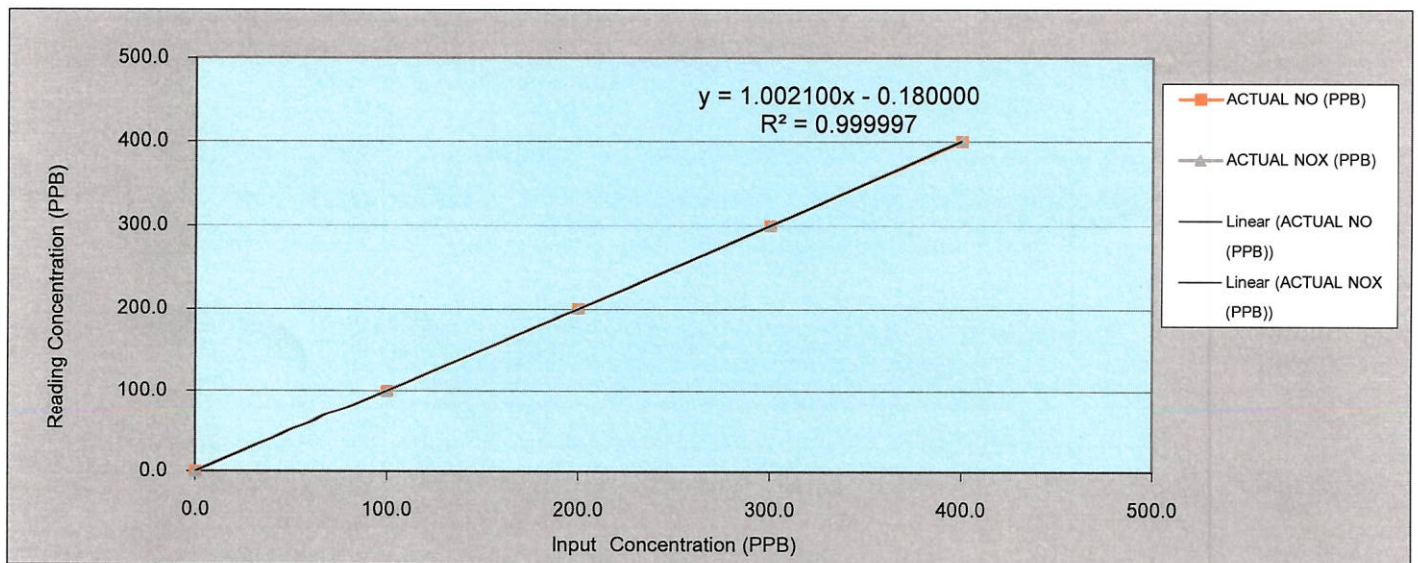
CERTIFIED DATE : Mar 10,2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10,2029

### CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS						
	IDEAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO	ACTUAL NO <sub>x</sub> (PPB)	ERROR NO <sub>x</sub> (PPB)	% ERROR NO <sub>x</sub>
ZERO	0.0	0.0	0.0	0.0	0.0	0.1	0.0
1	100.0	99.9	-0.1	-0.1	100.0	0.0	0.0
2	200.0	199.9	-0.7	0.0	200.1	0.1	0.0
3	300.0	299.9	-0.1	-0.0	300.1	0.1	0.0
4	400.0	399.9	-0.1	0.0	401.0	1.0	0.3
AVERAGE (%)				0.0			0.0



CALIBRATED BY : คุณพรชัย ผาติวนารักษ์

DATE : 27 /02 /2566

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณพรชัย ผาติวนารักษ์ โทรศัพท์ : 02-515-8987

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

# CERTIFICATE OF ANALYSIS

## Grade of Product: EPA Protocol

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

**Expiration Date: Mar 10, 2029**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	G1	+/- 0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	+/- 0.6% NIST Traceable	03/04/2021
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	07060227	EB0079116	100.3 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Jul 23, 2023
PRM	12386	D685025	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%	Feb 20, 2020
GMIS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	16010203	KAL003087	97.69 PPM SULFUR DIOXIDE/NITROGEN	+/-0.8%	Dec 23, 2021
NTRM	08012341	KAL004716	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

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

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 N1KD579	NDIR	Feb 26, 2021
Nicolet iS50 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet iS50 FTIR AUP2010245 NO2	FTIR	Feb 22, 2021
Nicolet iS50 FTIR AUP2010245 SO2	FTIR	Feb 18, 2021

Triad Data Available Upon Request

### NOTES:

Gross Weight: 28.1 Kg  
Net Weight: 4.6 Kg

Approved for Release



รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

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

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

รุ่นของอุปกรณ์ / เครื่องมือ : T200

วันที่ : 7 กุมภาพันธ์ 2565

บริษัทผู้ผลิต : Teledyne API

หมายเลขอุปกรณ์ / เครื่องมือ : 7534

TEST VALUES			
API MODEL T200			
		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500
2	STABILITY	≤ 1 PPB	0.15
3	SAMPLE FLOW	500 ± 10% cc/min	485
4	OZONE FLOW	80 ± 10% cc/min	86
5	PMT	mV	10.1
6	NORM PMT	mV	23.5
7	A ZERO	-20 To 150 MV	19.1
8	HPVS	400 - 900 V	650
9	RX CELL TEMP	50 ± 1 °C	50.0
10	BOX TEMP	AMBIENT ± 5 °C	32.7
11	PMT TEMP	7 ± 2 °C	7.0
12	MOLY TEMP	315 ± 5 °C	315.6
13	RX CELL PRESSURE	<10 in - Hg-A	4.6
14	SAMPLE PRESSURE	25 - 35 in - Hg-A	28.6
15	NOX SLOPE	1.0 ± 0.3	0.992
16	NOX OFFSET	-50 To 150	-7.5
17	NO SLOPE	1.0 ± 0.3	0.983
18	NO OFFSET	-50 To 150	-8.1
19	NO SAMPLE READING	PPB	0.2
20	NO2 SAMPLE READING	PPB	15.2
21	NOX SAMPLE READING	PPB	15.4
22	OPTIC TEST	2000 ± 1000 mV	2304.7
23	ELECTRICAL TEST	2000 ± 1000 mV	2115.1
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	-
25	ZERO GAS NO/NO <sub>x</sub>	0.00/0.00 PPB	1.0 / 1.3
26	SPAN GAS NO/NO <sub>x</sub>	400.00/400.00 PPB	518 / 523.4
			0.0 / 0.0
			399.3 / 399.4

หมายเหตุ

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บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด



( คุณพรชัย ผาติวนารักษ์ )

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณพรชัย ผาติวนารักษ์

โทรศัพท์ : 0-2515-8987

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



บริษัท ไอแอนดีคอนซัลแทนท์ (ประเทศไทย) จำกัด  
1035/66 ถนนศรีนครินทร์ แขวงอ่อนนุช เขตสวนหลวง กรุงเทพมหานคร 10250  
โทร. 0 2322 1852-54 โทรสาร. 0 2322 1852 ต่อ 100

I&E CONSULTANT (THAILAND) CO., LTD.  
1035/66 Srinakarin Road, Onnut Suanluang, Bangkok 10250  
Tel. +66 2322 1852-54 Fax. +66 2322 1852 ext.100

## รายงานผลการปรับเทียบระบบควบคุมอัตราการไหลอากาศบริสุทธิ์ MASS FLOW CONTROL STANDARD GAS CALIBRATION REPORT

### Calibration Instrument

เครื่องมือตรวจวัด : เครื่องมือควบคุมการสอบเทียบ  
Instrument  
รุ่น : 4010  
Model  
ชื่อ : SABIO  
Manufacturer

หมายเลขเครื่อง : 08500311  
Serial No  
ย่านการตรวจวัด : 0 - 100 CCPM  
Measuring Range  
ลูกค้า : SGS (THAILAND) LIMITED  
Customer

วันที่เข้าปรับเทียบ : 16 พฤษภาคม 2565  
Date of Calibration

### Result of Calibration

Flow Rate Volume (Multi Gas Calibrator Display)		Sensor Reading			
		Before		After	
Flow Set (CCPM)	Monitor (CCPM)	CCPM	%Error	CCPM	%Error
10.00	10.00	10.94	8.55	10.13	1.28
20.00	20.00	21.63	7.55	20.21	1.04
30.00	30.00	32.38	7.34	30.27	0.89
40.00	40.00	43.02	7.02	40.28	0.70
50.00	50.00	53.44	6.44	50.32	0.64
60.00	60.00	64.04	6.30	60.37	0.61
70.00	70.00	74.37	5.87	70.41	0.58
80.00	80.00	84.84	5.70	80.39	0.49
90.00	90.00	96.20	6.44	90.34	0.38
100.00	100.00	107.22	6.73	100.29	0.29
AVERAGE DIFFERENCE (%)		6.7956		0.6891	
Interception		-0.2690		-0.1874	
Correlation		1.0000		1.0000	


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


### Reference Standard Instrument

เครื่องมือสอบเทียบ : DeyCal (High)  
Instrument  
รุ่น : DCL-MH  
Model  
ชื่อ : BIOS  
Manufacturer  
หมายเลขเครื่อง : 3222  
Serial No.  
ย่านการตรวจวัด : 30 l/min  
Measuring Range

เครื่องมือสอบเทียบ : DryCal (Low)  
Instrument  
รุ่น : Defender 520-L  
Model  
ชื่อ : BIOS  
Manufacturer  
หมายเลขเครื่อง : 122189  
Serial No.  
ย่านการตรวจวัด : 500ml/min  
Measuring Range

**Result**      ☒ Accepted  
                         ☐ Not Accepted

ผู้ดำเนินการ :   
Service By  
( สุริยะ เลือยไธสง )  
Service Engineer

ผู้ตรวจสอบ :   
Approved By  
( สุชาติ พุทธอวยชัย )  
Service Manager

Doc. No. : -







บริษัท ไอแอนค็อนซัลแทนท์ (ประเทศไทย) จำกัด  
1035/66 ถนนศรีนครินทร์ แขวงอ่อนนุช เขตสวนหลวง กรุงเทพมหานคร 10250  
โทร. 0 2322 1852-54 โทรสาร. 0 2322 1852 ต่อ 100

I&E CONSULTANT (THAILAND) CO., LTD.  
1035/66 Srinakarin Road., Onnut Suanluang, Bangkok 10250  
Tel. +66 2322 1852-54 Fax. +66 2322 1852 ext.100

## รายงานผลการปรับเทียบระบบควบคุมอัตราการไหลอากาศบริสุทธิ์ MASS FLOW CONTROL ZERO AIR CALIBRATION REPORT

### Calibration Instrument

เครื่องมือตรวจวัด : เครื่องมือควบคุมการสอบเทียบ  
Instrument  
รุ่น : 4010  
Model  
ยี่ห้อ : SABIO  
Manufacturer

หมายเลขเครื่อง : 08500311  
Serial No  
ย่านการตรวจวัด : 0 - 10 LPM  
Measuring Range  
ลูกค้า : SGS (THAILAND) LIMITED  
Customer

วันที่เข้าปรับเทียบ : 16 พฤษภาคม 2565  
Date of Calibration

### Result of Calibration

Flow Rate Volume (Multi Gas Calibrator Display)		Sensor Reading			
		Before		After	
Flow Set (LPM)	Monitor (LPM)	LPM	%Error	LPM	%Error
1.00	1.000	1.051	4.853	1.011	1.088
2.00	2.000	2.104	4.943	2.019	0.941
3.00	3.000	3.132	4.215	3.026	0.859
4.00	4.000	4.135	3.265	4.028	0.695
5.00	5.000	5.122	2.382	5.030	0.596
6.00	6.000	6.113	1.849	6.031	0.514
7.00	7.000	7.113	1.589	7.034	0.483
8.00	8.000	8.123	1.514	8.029	0.361
9.00	9.000	9.213	2.312	9.024	0.266
10.00	10.000	10.300	2.913	10.019	0.190
AVERAGE DIFFERENCE (%)		2.9833		0.5994	
Interception		-0.0426		-0.0204	
Correlation		0.9999		1.0000	


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

### Reference Standard Instrument

เครื่องมือสอบเทียบ : DeyCal (High)  
Instrument  
รุ่น : DCL-MH  
Model  
ยี่ห้อ : BIOS  
Manufacturer  
หมายเลขเครื่อง : 3222  
Serial No.  
ย่านการตรวจวัด : 30 U/min  
Measuring Range

เครื่องมือสอบเทียบ : DryCal (Low)  
Instrument  
รุ่น : Defender 520-L  
Model  
ยี่ห้อ : BIOS  
Manufacturer  
หมายเลขเครื่อง : 122189  
Serial No.  
ย่านการตรวจวัด : 500mU/min  
Measuring Range

Result ☒ Accepted  
☐ Not Accepted

ผู้ดำเนินการ :   
Service By  
( สุริยะ เลื่อยไธสง )  
Service Engineer

ผู้ตรวจสอบ :   
Approved By  
( สุชาติ พุทธอวยชัย )  
Service Manager

Doc. No. : -



## CERTIFICATE OF ANALYSIS

### Grade of Product: EPA PROTOCOL STANDARD

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

Expiration Date: Oct 21, 2025

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

#### ANALYTICAL RESULTS

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

#### CALIBRATION STANDARDS

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

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

#### ANALYTICAL EQUIPMENT

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

#### Triad Data Available Upon Request

NOTES: PO# 5222004798

Gross Weight: 17.2 Kg

Net Weight: 2.7 Kg

Cylinder: 80A



Approved for Release





## Certificate of Calibration

### Customer

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

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

### Unit Under Calibration Details

Measurement item : Sound Level Meter  
Manufacturer : Cirrus  
Model : CR:171B  
Serial Number : G078141  
ID : ENSL 16125  
Resolution : 0.1 dB  
Microphone Class : 1  
Microphone Model : MK224  
Microphone S/N : 205147A  
Preamplifier Model : -  
Preamplifier S/N : 7759F  
Instrument Status : Used

### Calibration Environment and Details

Temperature :  $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$   
Humidity :  $50\% \text{RH} \pm 20\% \text{RH}$   
Barometric Pressure :  $1013 \text{ hPa} \pm 10 \text{ hPa}$   
Received Date : 7 March 2023  
Calibrated Date : 13 March 2023  
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests  
Location of Calibration : Lab Acoustic

### Reference Standard

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

### Note

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

Calibrated By :   
Mr. Noppadon Luangart  
Calibration Officer

Approved By :   
Mr. Pacit Mathavorn  
Calibration Engineer Supervisor

Issue Date : 13 March 2023



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

Certificate No : 23-SLM-086

Request No : Req-2023-0575

1. Indication at the calibration check frequency

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

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

2. Self-generated noise, Microphone installed

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

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

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

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

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



Certificate No : 23-SLM-086

Request No : Req-2023-0575

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

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

6. Frequency and time weightings at 1kHz

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

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

Certificate No : 23-SLM-086

Request No : Req-2023-0575

## 7. Long Term Stability

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

## 8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 20-140	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)		
139.00	139	139.0	0.0	0.3	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	69.0	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	44.1	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	29.1	0.1		0.8
24.00	24	24.2	0.2		0.8



Certificate No : 23-SLM-086

Request No : Req-2023-0575

### 9. Level linearity including the level range control

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

### 10. Tone burst response

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

### 11. Peak C Sound level

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

Certificate No : 23-SLM-086

Request No : Req-2023-0575

## 12. Overload indication

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

## 13. High Level Stability

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

End of Certificate



## Certificate of Calibration

### Customer

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

Certificate No : 23-SLM-089

Request No : Req-2023-0583

### Unit Under Calibration Details

Measurement item :	Sound Level Meter	Microphone Class :	1
Manufacturer :	Cirrus	Microphone Model :	MK224
Model :	CR:171B	Microphone S/N :	211825D
Serial Number :	G078137	Preamplifier Model :	MK:170
ID :	ENSL 16126	Preamplifier S/N :	0799
Resolution :	0.1 dB	Instrument Status :	Used

### Calibration Environment and Details


Temperature : 23 °C ± 2 °C  
Humidity : 50 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 7 March 2023  
Calibrated Date : 13 March 2023  
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests  
Location of Calibration : Lab Acoustic


### Reference Standard

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

### Note

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

Calibrated By :   
Mr. Noppadon Luangart  
Calibration Officer

Approved By :   
Mr. Pacit Mathavorn  
Calibration Engineer Supervisor

Issue Date : 13 March 2023



Certificate No : 23-SLM-089

Request No : Req-2023-0583

1. Indication at the calibration check frequency

UUC Setting	Nominal Level (dB)	Before Adjust		Adjust		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 20-140		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
Calibrator Setting							
1000 Hz 94.00 dB	94.03	93.7	-0.33	93.8	-0.23	0.20	0.3

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

2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY ( $\pm$ dB)
FAST / 20-140		
UUC Weighting		
A	17.2	0.10

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

UUC Setting	Measured (dB)	UNCERTAINTY ( $\pm$ dB)
FAST / 20-140		
UUC Weighting		
A	-	0.10
C	16.8	0.10
Z	29.4	0.10

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

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



Certificate No : 23-SLM-089

Request No : Req-2023-0583

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

UUC Setting	Deviation from various Frequency			UNCERTAINTY	Acceptance
FAST / 20-140	Weighting Response curve				Limit
STD Setting	A (dB)	C (dB)	Z (dB)	( ± dB)	( ± dB)
63 Hz	0.3	0.0	0.0	0.2	1.0
125 Hz	0.2	0.0	0.0		1.0
250 Hz	0.1	0.0	0.0		1.0
500 Hz	0.1	0.0	0.0		1.0
1000 Hz	0.0	0.0	0.0		0.7
2000 Hz	-0.2	0.0	0.0		1.0
4000 Hz	-0.4	-0.2	0.0		1.0
8000 Hz	-0.4	-0.3	-0.2		+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 REF (dB)	Measured		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / 20-140		UUC (dB)	ERR (dB)		
UUC Weighting					
A	114.00	114.0	0.0	0.2	0.2
C	114.00	114.0	0.0		0.2
Z	114.00	114.0	0.0		0.2

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

Certificate No : 23-SLM-089

Request No : Req-2023-0583

### 7. Long Term Stability

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

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

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 20-140	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)		
139.00	139	139.0	0.0	0.3	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	69.0	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	34.1	0.1		0.8
29.00	29	29.1	0.1		0.8
24.00	24	24.2	0.2		0.8



Certificate No : 23-SLM-089

Request No : Req-2023-0583

#### 9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance
FAST / A	REF	UUC	ERR	( ± dB)	Limit
UUC Range	(dB)	(dB)	(dB)		( ± dB)
20-140	29.2	29.5	0.3	0.3	0.8
	114	114.0	0.0		0.8

#### 10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance
A / 20-140	Toneburst	Ref	UUC	ERR	( ± dB)	Limit
UUC Time Response	(ms)	(dB)	(dB)	(dB)		( ± dB)
Fast	200	136.0	136.0	0.0	0.3	0.5
	2	119.0	118.9	-0.1		+1.0, -1.5
	0.25	110.0	109.9	-0.1		+1.0, -3.0
Slow	200	129.6	129.5	-0.1		0.5
	2	110.0	109.9	-0.1		+1.0, -3.0
SEL	200	130.0	130.0	0.0		0.5
	2	110.0	109.9	-0.1		+1.0, -1.5
	0.25	101.0	100.9	-0.1		+1.0, -3.0

#### 11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance
FAST / C / 20-140	REF	UUC	ERR	( ± dB)	Limit
STD Setting	(dB)	(dB)	(dB)		( ± dB)
Complete cycle	135.4	135.2	-0.20	0.2	2.0
Positive half cycle	134.4	134.2	-0.20		1.0
Negative half cycle	134.4	134.2	-0.20		1.0

Certificate No : 23-SLM-089

Request No : Req-2023-0583

## 12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 20-140	UUC		Limit
STD Setting	(dB)	( ± dB)	( ± dB)
Positive one-half cycle	141.3		
Negative one-half cycle	141.4		
Deviated	-0.1	0.2	1.5

## 13. High Level Stability

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

**End of Certificate**

## Certificate of Calibration

### Customer

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

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

### Unit Under Calibration Details

Measurement item : Sound Level Meter  
Manufacturer : Cirrus  
Model : CR:171B  
Serial Number : G078138  
ID : ENSL 16127  
Resolution : 0.1 dB  
Microphone Class : 1  
Microphone Model : MK224  
Microphone S/N : 202157A  
Preamplifier Model : MK:170  
Preamplifier S/N : 0805  
Instrument Status : Used

### Calibration Environment and Details


Temperature : 23 °C ± 2 °C  
Humidity : 50 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 7 March 2023  
Calibrated Date : 13 March 2023  
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests  
Location of Calibration : Lab Acoustic


### Reference Standard

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

### Note

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

Calibrated By :   
Mr. Noppadon Luangart  
Calibration Officer

Approved By :   
Mr. Pacit Mathavorn  
Calibration Engineer Supervisor

Issue Date : 13 March 2023



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



Certificate No : 23-SLM-088

Request No : Req-2023-0582

1. Indication at the calibration check frequency

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

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

2. Self-generated noise, Microphone installed

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

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

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

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

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

Certificate No : 23-SLM-088

Request No : Req-2023-0582

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

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

6. Frequency and time weightings at 1kHz

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

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



Certificate No : 23-SLM-088

Request No : Req-2023-0582

### 7. Long Term Stability

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

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

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 20-140	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)		
139.00	139	139.0	0.0	0.3	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	69.0	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	54.1	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



Certificate No : 23-SLM-088

Request No : Req-2023-0582

#### 9. Level linearity including the level range control

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

#### 10. Tone burst response

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

#### 11. Peak C Sound level

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

Certificate No : 23-SLM-088

Request No : Req-2023-0582

## 12. Overload indication

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

## 13. High Level Stability

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

End of Certificate

INNOVATIVE INSTRUMENT CALIBRATION LAB  
 INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE  
 7/139 MOO 13, SOI SUNTINAKORN 11 TAMBON BANG KAE0,  
 AMPHOE BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND  
 TEL: (66)0-2116-5860-1 FAX: (66)0-2116-7140



## Certificate of Calibration

### Customer

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

Certificate No : 23-SLM-041

Request No : Req-2023-0295

### Unit Under Calibration Details

Measurement item :	Sound Level Meter	Microphone Class :	1
Manufacturer :	Cirrus	Microphone Model :	MK224
Model :	CR:161B	Microphone S/N :	206565A
Serial Number :	G078054	Preamplifier Model :	KM:170
ID :	ENSL 16122	Preamplifier S/N :	0824
Resolution :	0.1 dB	Intrument Status :	Used

### Calibration Environment and Details

Temperature : 23 °C ± 2 °C  
 Humidity : 50 %RH ± 20 %RH  
 Barometric Pressure : 1013 hPa ± 10 hPa  
 Received Date : 2 February 2023  
 Calibrated Date : 9 February 2023  
 Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests  
 Location of Calibration : Lab Acoustic

### Reference Standard

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

### Note

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

Calibrated By :

Mr. Noppadon Luangart  
 Calibration Officer

Approved By :

Mr. Pacit Mathavorn  
 Calibration Engineer Supervisor

Issue Date : 9 February 2023





Certificate No : 23-SLM-041

Request No : Req-2023-0295

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		Adjust		UNCERTAINTY	Acceptance
FAST / A / 20-140	Level	UUC	ERR	UUC	ERR	( ± dB)	Limit
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)		( ± dB)
1000 Hz 94.00 dB	93.81	93.7	-0.11	93.8	-0.01	0.20	0.3

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

2. Self-generated noise, Microphone installed

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

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

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

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

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

Certificate No : 23-SLM-041

Request No : Req-2023-0295

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

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

6. Frequency and time weightings at 1kHz

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

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



Certificate No : 23-SLM-041

Request No : Req-2023-0295

### 7. Long Term Stability

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

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

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)
FAST / A / 20-140	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)		
139.00	139	139.0	0.0	0.3	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	69.0	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	39.0	0.0		0.8
34.00	34	34.0	0.0		0.8
29.00	29	29.1	0.1		0.8
24.00	24	23.9	-0.1		0.8



Certificate No : 23-SLM-041

Request No : Req-2023-0295

### 9. Level linearity including the level range control

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

### 10. Tone burst response

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

### 11. Peak C Sound level

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

Certificate No : 23-SLM-041

Request No : Req-2023-0295

## 12. Overload indication

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

## 13. High Level Stability

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

**End of Certificate**

INNOVATIVE INSTRUMENT CALIBRATION LAB  
 INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE  
 7/139 MOO 13, SOI SUNTINAKORN II TAMBON BANG KAE0.  
 AMPH0E BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND  
 TEL: (66)0-2116-5860-1 FAX: (66)0-2116-7140



## Certificate of Calibration

### Customer

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

Certificate No : 22-ACT-427

Request No : Req-2022-1212

### Unit Under Calibration Details

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

### Calibration Environment and Details

Temperature : ( 23  $\pm$  2  $^{\circ}$ C )  
 Humidity : ( 50  $\pm$  20 %RH )  
 Barometric Pressure : ( 1013  $\pm$  10.0 hPa )  
 Received Date : 5 July 2022  
 Calibration Date : 20 July 2022  
 Location of Calibration : LAB 1 Acoustic

Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators



Reference Standard	Model	Serial Number	Traceable	Due Calibration
Sound Calibrator	SV 35A	58079	EEI	31 May 2023
THD Multimeter	2015	1047765	NIMT	2 February 2023

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

### Note

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

Calibrated By :

Mr. Noppadon Luangart  
 Service Calibration Engineer

Approved By :

Mr. Pacit Mathavorn  
 Calibration Engineer Supervisor

Issue Date : 20 July 2022



Certificate No : 22-ACT-427

Request No : Req-2022-1212

**Sound pressure level**

**Calibration Results : Without Adjustment**

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty ( ± dB)	Acceptance limit Class 1 ( ± dB)
	Measured	Error	Measured	Error		
94 dB / 1000 Hz	93.97	-0.03	-	-	0.11	0.25

**Frequency of Sound pressure level**

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

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

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

**Note :**

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

**End of Calibration**

## CERTIFICATE OF CALIBRATION

**Certificate No.:** C0-0408006/22

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

**Customer** SGS (THAILAND) LIMITED  
100 Nanglinchee Road, Chongnonsee,  
Yannawa, Bangkok 10120 Thailand

<b>Equipment</b>	pH Meter		
<b>Manufacturer</b>	HANNA	<b>Model</b>	HI98195
<b>Serial No.</b>	04160034101	<b>ID No.</b>	ENWA19105
<b>Description</b>	Range : 0 - 14 pH, Resolution : 0.01 pH		

**Environmental Conditions**

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

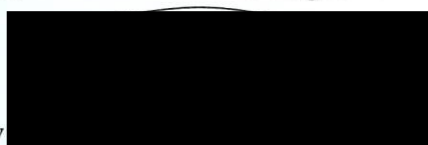
**Calibration Location** Jayhawks Laboratory (CL&GL)

**Received Date** 4 August 2022

**Calibration Date** 5 August 2022

**Date of Issue** 8 August 2022

**Checked by**



Act as Technical Manager

**Approved by**



Representative of Managing Director

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

( Dr. Ekachai Puttitwong )





**Certificate No.:** C0-0408006/22

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

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

**Reference Standard:**

Type	pH Value	Lot No.	Due Date	Traceability
pH Standard Solution	4.01	081020	Jan. 22, 2023	NIMT
	7.01	020221	Jan. 18, 2023	
	10.00	091020	Dec. 24, 2022	

Type	Model	Serial No.	Certificate No.	Due Date	Traceability
Digital Thermometer with Sensor	1523 / 5622	1709138 / 4605984-005	10-1006004/22	Jun. 9, 2023	THC

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

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

**Measurement Results:**
**Calibration of pH Electrode (Serial No.: K3409432)**

pH Standard Solution ( pH )	Measured Value		Uncertainty ( ± pH )
	( pH )	( mV )	
4.01	4.00	167.3	0.013
7.01	7.01	-9.2	0.013
10.00	10.01	-181.7	0.013

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

Temperature stability of micro bath :  $25 \pm 0.2^{\circ}\text{C}$ 

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

- End of Certificate -



# CERTIFICATE OF CALIBRATION

**Certificate No.:** T0-0408014/22

**Page** 1 **of total** 2 **pages**
**Customer** SGS (THAILAND) LIMITED  
100 Nanglinchee Road, Chongnonsee,  
Yannawa, Bangkok 10120 Thailand

**Equipment** Digital Thermometer with Probe

**Manufacturer** HANNA **Model** HI98195

**Serial No.** 04160034101 **ID No.** ENWA19105

**Description** Temperature range : 20 °C to 50 °C, Resolution of UUC : 0.01 °C

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

**Calibration Location** Blue Devils Laboratory (TL)

**Received Date** 4 August 2022

**Calibration Date** 4 August 2022

**Date of Issue** 8 August 2022

**Checked by**


Act as Technical Manager

**Approved by**


Representative of Managing Director

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

( Dr. Ekachai Puttitwong )

**VERIFIED**
**BY**

**DATE**

Aug 15, 2022

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



**Certificate No.:** T0-0408014/22

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

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

**Reference Standard Instruments:**

Type	Model	Serial No.	Cert. No.	Due Date	Traceability
Thermometer Readout	1529-R	B7C853	I0-1011001/21	Nov. 10, 2022	THC
Platinum Resistance Thermometer	5626	4854	C0A30047	Oct. 22, 2023	FLUKE
Liquid Bath	XORTS-40A	XO111019	I0-0306002/21	Jun. 3, 2023	THC

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

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

**Measurement Results:** ( X ) Without Adjustment

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

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
75	20.001	20.02	-0.019	0.015
75	30.001	30.02	-0.019	0.015
75	50.001	50.03	-0.029	0.015

UUC : Unit Under Calibration

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


- End of Certificate -

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



# Accuracy Calibration Certificate

## Customer

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

## Weighing Device

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

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

## Procedure


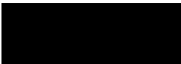
Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)  
METTLER TOLEDO Work Instruction: CP/W002/20

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

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

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

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

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

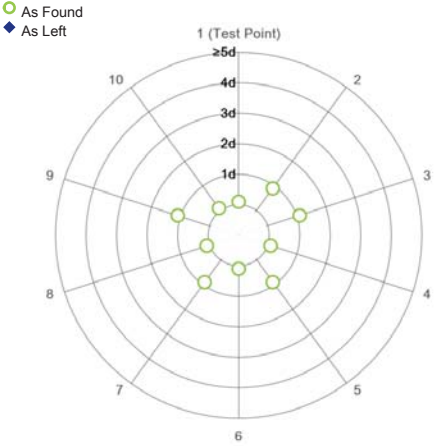
# Measurement Results

## Repeatability

Test Load: 70 g

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

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

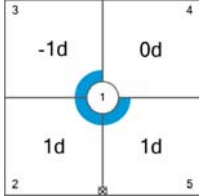
The results of this graph are based upon the absolute values of the differences from the mean value.

## Eccentricity

Test Load: 100 g

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

Maximum Deviation	0.0001 g	N/A
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As Found

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

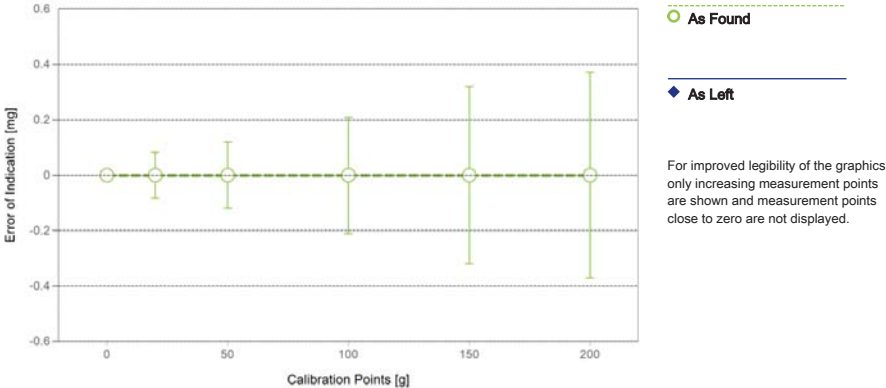


Error of Indication

As Found

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

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



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

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

Test Equipment

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

Weight Set 1: OIML E2

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

Thermo Hygrometer

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

Remarks

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

End of Accredited Section

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

Measurement Uncertainty of the Weighing Instrument in Use

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

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

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

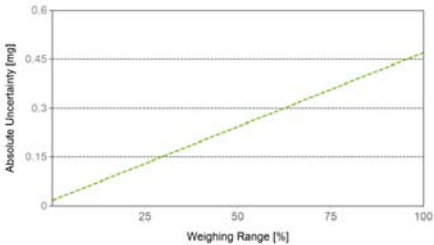
Linearization of Uncertainty Equation

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

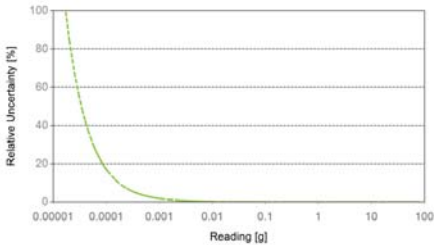
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

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

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



As Found



As Left

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

GWP®  
Certificate



As  
Found



As  
Left



The weighing device meets the given process requirements.

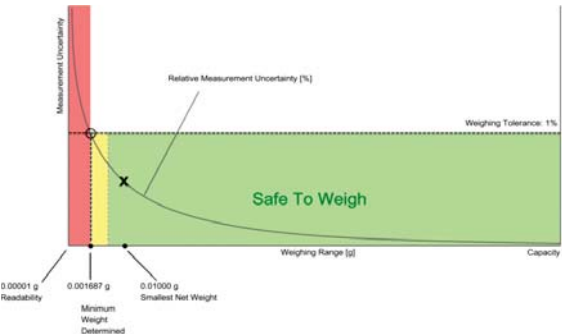
The weighing device meets the given process requirements.

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

Process Requirements

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

Safe Weighing Range



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


# Minimum Weight

## As Found Minimum Weight Table

Range 1

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

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


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

## As Left Minimum Weight Table

Range 1

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

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

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

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







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




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

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

# Measurement Results













## Results Summary

	Repeatability	Eccentricity	Error of Indication
As Found			
As Left			

-  = Passed  
 = Failed  
 = Safety Factor not met

## Repeatability













Test Load: 70 g

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

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

## Eccentricity

Test Load: 100 g

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

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



Error of Indication

As Found

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

As Left

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

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



## Certificate of Calibration

**Equipment:** CONDUCTIVITY METER  
**Model:** HQ14d  
**Serial No. (or ID.):** 141200015083 (C2015003)  
**Manufacturer:** HACH  
**Electrode Serial No.** 150122587009  
**Condition:** In Condition

**Certificate No.:** C24230047  
**Issued Date:** 8 March 2023  
**Job No.:** KSPR2303450  
**Page:** 1 of 2  
**Model :** CDC401 **Brand :** HACH

**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:** Miss.Orawan Khlaiphloi  
**Calibration Date:** 8 March 2023  
**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. 838312, 838313, 838316

(Miss Orawan Khlaiphloi)

Person in charge

(Mr. Nitinun Srihawan)

Authorized signatory

This certificate is issued 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.

บริษัท ดีเคเอส เทคโนโลยี จำกัด  
DKSH Technology Limited  
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2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260  
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth – In Asia and Beyond.

CAL-FM-C24-09: 12 Sep 2022



Certificate No.: C24230047

Page: 2 of 2

### Calibration Results:

#### Before Adjustment

Standard Conductivity Solution	Unit Under Calibration Reading	Correction	Coverage Factor ( k )	Uncertainty ( ± )
25.000 $\mu\text{S/cm}$	24.8 $\mu\text{S/cm}$	0.200 $\mu\text{S/cm}$	2.00	0.21 $\mu\text{S/cm}$
1413.0 $\mu\text{S/cm}$	1422 $\mu\text{S/cm}$	-9.0 $\mu\text{S/cm}$	2.00	9.0 $\mu\text{S/cm}$
111.3 mS/cm	110.6 mS/cm	0.70 mS/cm	2.00	0.67 mS/cm

#### After Adjustment ; at 1413 $\mu\text{S/cm}$

Standard Conductivity Solution	Unit Under Calibration Reading	Correction	Coverage Factor ( k )	Uncertainty ( ± )
25.000 $\mu\text{S/cm}$	25.1 $\mu\text{S/cm}$	-0.100 $\mu\text{S/cm}$	2.00	0.21 $\mu\text{S/cm}$
1413.0 $\mu\text{S/cm}$	1413 $\mu\text{S/cm}$	0.0 $\mu\text{S/cm}$	2.00	9.0 $\mu\text{S/cm}$
111.3 mS/cm	109.9 mS/cm	1.40 mS/cm	2.00	0.67 mS/cm

The End of Certificate

บริษัท ดีเคเอส เทคโนโลยี จำกัด  
DKSH Technology Limited  
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260  
2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260  
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth – In Asia and Beyond.

CAL-FM-C24-09: 12 Sep 2022

## ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: KSPR2303450

ชนิดเครื่องมือ: CONDUCTIVITY METER

รุ่น: HQ14d

หมายเลขเครื่อง: 141200015083

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
08 Mar 2023			08 Mar 2023		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด ( ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด – เปิด เครื่อง (On-Off Swicth)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		Spectrophotometer			
<input type="checkbox"/>	<input type="checkbox"/>	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวหมุนเลือกความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. ช่องวัดหลายตัวอย่าง (Carousel Module)	<input type="checkbox"/>	<input type="checkbox"/>	
		pH Meter and Conductivity Meter			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด ( Electrode and Connection Cable )	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl )	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาจับอิเล็กโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
		Turbidimeter			
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่องสว่างของแสง (>= 2.5 ไม่นเกิน 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
		Automatic titrator			
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาพ Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ : Electrode วัดอุณหภูมิได้ 24.8 °C โดย Control Waterbath ที่ 25.0  $\pm$  0.1 °C

Miss.Orawan Khlaiphloi

Service Engineer





## CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022 Cert No. 22/2279  
Site Calibration Order No. 22060270

Customer SGS (Thailand) Limited.  
1/209, 1/211 Moo 1, T. Ban Chang, A. Ban Chang Rayong 21130 Thailand.

Place of Calibration Sample Area

Description Incubator  
Model i250DS  
Serial No. i250402-0810-0319  
ID.No. I2010004  
Date of Receipt Jun 21, 2022  
Date of Calibration Jun 21, 2022

### Environment

Temperature	(Min)	22.8	°C	(Max)	24.6	°C
Relative Humidity	(Min)	64.1	%RH	(Max)	71.5	%RH

### Calibration Method

WI-17: The reference thermometer was placed into the chamber and measurement was performed based on AS-2853.  
The temperature scale in use at this laboratory is the International Temperature Scale of 1990.

### Standard

1) Data Acquisition with Sensor Model 34972A S/N. MY49013906, Certificate No. QR22-0228, Calibrated by Quality Reborn Co., Ltd., ONAC Calibration No. 0292.

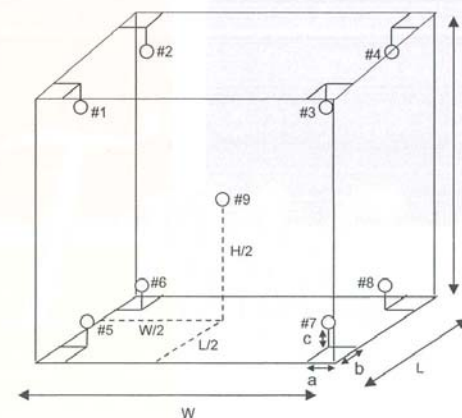
This certificate is traceable to SI unit.



## CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022 Cert No. 22/2279  
Site Calibration Order No. 22060270

Results (without adjustment)



Position of reference thermometers were placed

### Note.

- 1). Dimension (W x L x H) is 50 x 50 x 105 cm
- 2). Stability - greatest one half of difference between max peak and min peak of each reference probe measured temperature obtained during the calibration interval.
- 3). Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions. The reference sensor should preferably be located at the geometric center of the chamber.



## CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022

Cert No. 22/2279

Site Calibration

Order No. 22060270

Results (without adjustment)

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability $\pm$ (°C)	Uniformity (°C)	Uncertainty $\pm$ (°C)
20.0	19.8	Position 1	20.184	0.377	0.323	0.67
		Position 2	20.144			
		Position 3	20.279			
		Position 4	20.013			
		Position 5	20.079			
		Position 6	20.075			
		Position 7	19.983			
		Position 8	20.075			
		Position 9	20.050			

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.

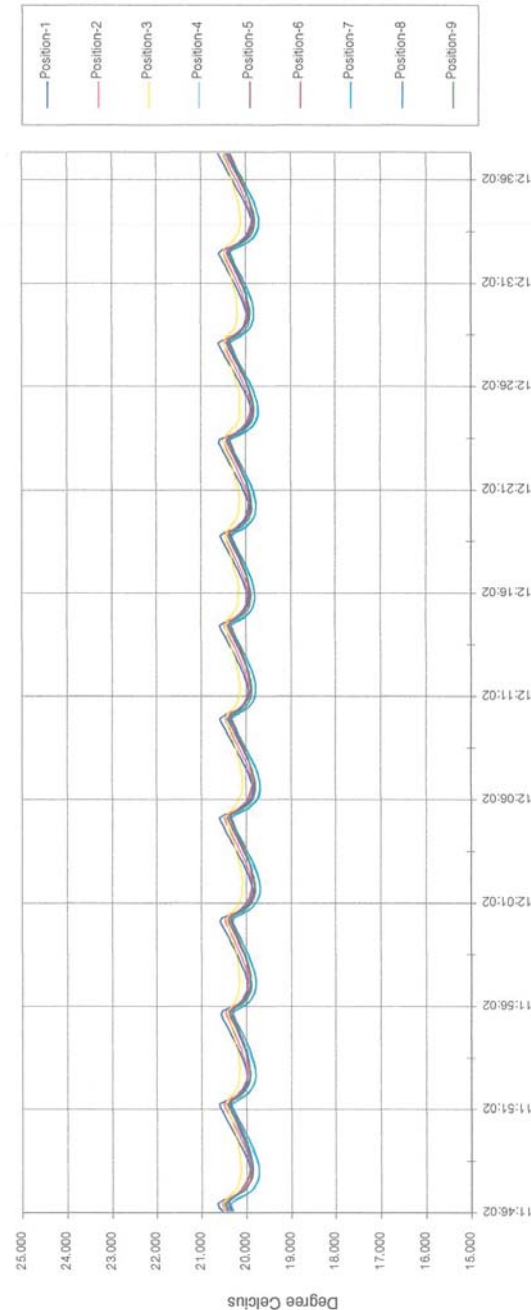
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with ONAC requirements.

APPROVED SIGNATORY :

(MR. JATURAPAT THONGSOOKCHOTE)

Cert.No. 22/2279

Incubator  
Model. 1250DS S/N. 12S0402-0810-0319 ID.No. 12010004





## CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022 Cert No. 22/2281  
Site Calibration Order No. 22060270

Customer SGS (Thailand) Limited.  
1/209, 1/211 Moo 1, T. Ban Chang, A. Ban Chang Rayong 21130 Thailand.

Place of Calibration Hot Lab

Description Oven  
Model UF110  
Serial No. B415.2321  
ID.No. O2016001

Date of Receipt Jun 21, 2022  
Date of Calibration Jun 21, 2022

### Environment

Temperature (Min) 23.3 °C (Max) 28.7 °C  
Relative Humidity (Min) 42.5 %RH (Max) 69.7 %RH

### Calibration Method

WI-17: The reference thermometer was placed into the chamber and measurement was performed based on AS-2853.  
The temperature scale in use at this laboratory is the International Temperature Scale of 1990.

### Standard

1) Data Acquisition with Sensor Model 34972A S/N. MY59003190, Certificate No. QR22-1088, Calibrated by Quality Reborn Co., Ltd., ONAC Calibration No. 0292.

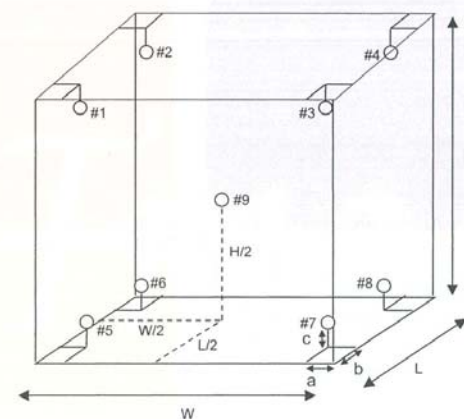
This certificate is traceable to SI unit.



## CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022 Cert No. 22/2281  
Site Calibration Order No. 22060270

Results (without adjustment)



Position of reference thermometers were placed

### Note.

- 1). Dimension (W x L x H) is 56 x 40 x 48 cm
- 2). Stability - greatest one half of difference between max peak and min peak of each reference probe measured temperature obtained during the calibration interval.
- 3). Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions. The reference sensor should preferably be located at the geometric center of the chamber.





## CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022

Cert No. 22/2281

Site Calibration

Order No. 22060270

Results (without adjustment)

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability ±(°C)	Uniformity (°C)	Uncertainty ±(°C)
85.0	85.0	Position 1	84.779	0.082	0.430	0.32
		Position 2	84.555			
		Position 3	85.157			
		Position 4	84.836			
		Position 5	85.284			
		Position 6	84.715			
		Position 7	84.565			
		Position 8	84.750			
		Position 9	84.866			

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability ±(°C)	Uniformity (°C)	Uncertainty ±(°C)
104.0	104.0	Position 1	103.762	0.116	0.654	0.35
		Position 2	103.462			
		Position 3	104.257			
		Position 4	103.817			
		Position 5	104.544			
		Position 6	103.709			
		Position 7	103.584			
		Position 8	103.744			
		Position 9	103.902			



## CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022

Cert No. 22/2281

Site Calibration

Order No. 22060270

Results (without adjustment)

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability ±(°C)	Uniformity (°C)	Uncertainty ±(°C)
150.0	150.0	Position 1	150.015	0.174	1.202	0.45
		Position 2	149.385			
		Position 3	150.550			
		Position 4	149.883			
		Position 5	151.160			
		Position 6	149.731			
		Position 7	149.921			
		Position 8	149.666			
		Position 9	149.982			

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability ±(°C)	Uniformity (°C)	Uncertainty ±(°C)
180.0	180.0	Position 1	180.268	0.197	1.407	0.50
		Position 2	179.383			
		Position 3	180.787			
		Position 4	179.960			
		Position 5	181.398			
		Position 6	179.758			
		Position 7	180.456			
		Position 8	179.570			
		Position 9	180.042			

# CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022

Cert No. 22/2281

### Site Calibration

Order No. 22060270

The stability and uniformity was taken into account in the measurement uncertainty stated.

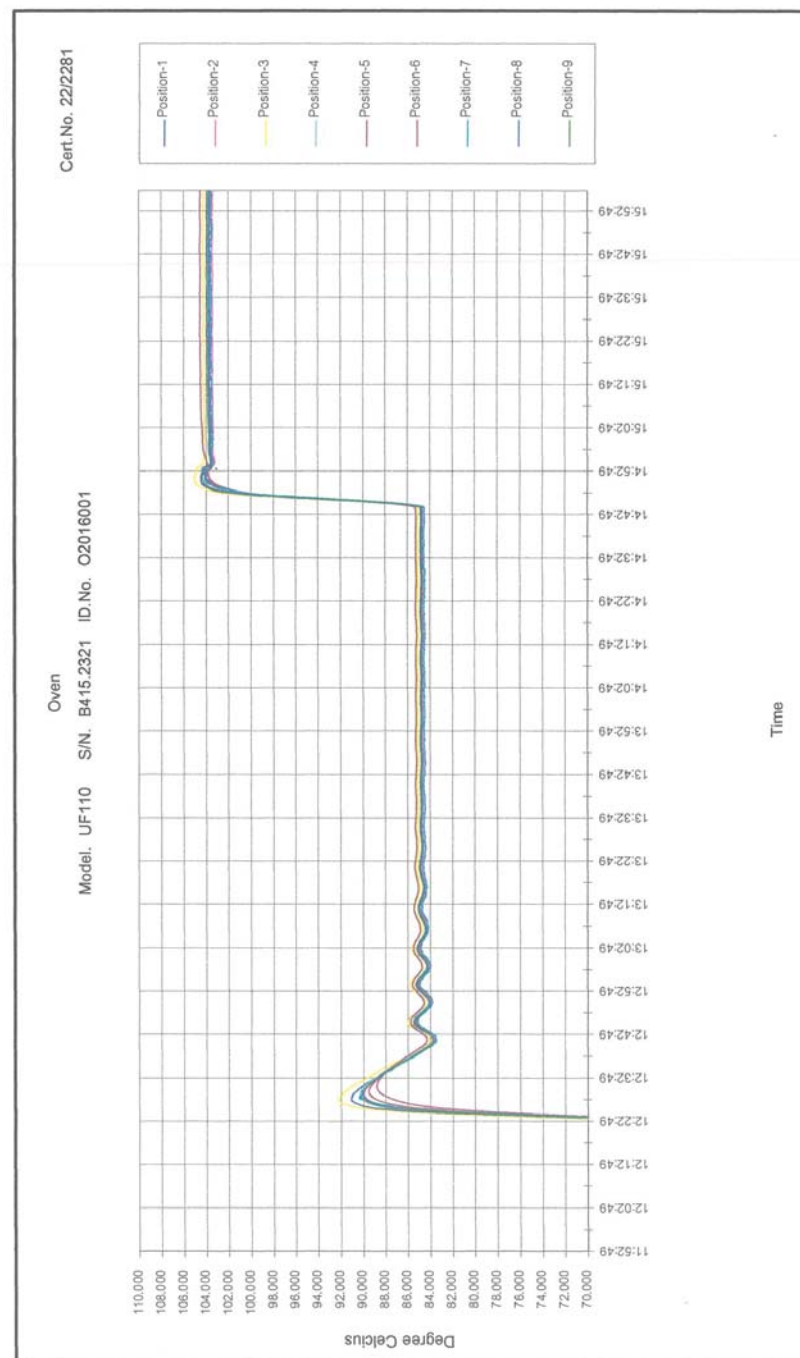
The above results are valid exclusively for calibration samples as mentioned in the report.

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 ONAC requirements.

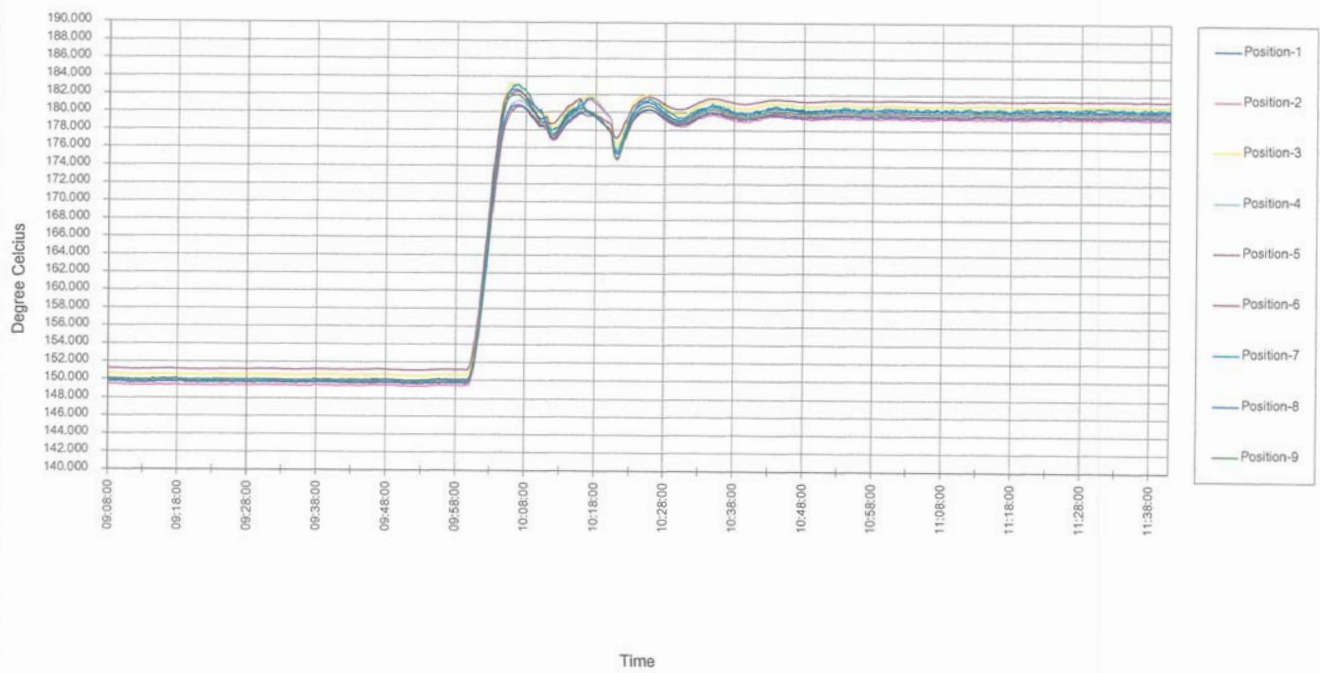
APPROVED SIGNATORY :

(MR. JATURAPAT THONGSOOKCHOTE)

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Cert.No. 22/2281







TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert.No.: 22CHO553

Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Spectrophotometer  
**Manufacturer :** Hach  
**Model :** DR5000  
**Serial No. :** 1215327  
**ID No. :** S2020021  
**Condition As-Received:** Used Item  
**Received Date :** 22 September 2022  
**Calibration Date :** 23 September 2022  
**Reference :** 2209-0537OC-3  
**Submitted by :** SGS (Thailand) Limited-Laboratory (Rayong)  
1/209,1/211 Moo.1, Ban Chang,  
Ban Chang, Rayong 21130  
**Calibration Place :** Spectrophotometry Lab  
**Ambient Temperature :** ( 22.5 - 20.4 ) °C (On-Site)  
**Relative Humidity :** ( 63 - 64 ) % (On-Site)  
**Calibration Procedure :** In - house method :  
CP-OCH4 based on ASTM E 275-01  
**Calibrated by :** Uthen Kankawi

**Approved by :**

Approved Signatory

- (✓) Malee Butkruea  
( ) Saithip Meangmai  
( ) Warakorn Lernagtrakul

**Issue Date :** 28 September 2022

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. : 22CHO553

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### Condition of calibration result

1. Reference Standard Material :

Material	Serial No.	Certificate No.	Due date
1. Absorbance Standard set	32593	100581	30 Mar 2024
2. Wavelength Standard set	29829	94776	02 Sep 2023
3. Wavelength Standard set	29829	94777	02 Sep 2023

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

3. This certificate is traceable to the International System of Unit maintained at :

- National Physical Laboratory (NPL), The United Kingdom of Great Britain and Northern Ireland
- National Institute of Standards and Technology (NIST), The United States of America

4. Spectral BandWidth : 2 nm

Scan Speed : - nm/min

**Calibration Results :** without adjustment

### Wavelength Accuracy

Certified Values of Reference Material ( nm )	UUC Reading ( nm )	Uncertainty of Measurement ( ± nm )	Coverage Factor k
418.61	418.1	0.13	2.00
513.41	513.2	0.13	2.00
536.66	536.5	0.13	2.00
637.98	637.8	0.14	2.00
879.27	878.9	0.13	2.00

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Cert. No. : 22CHO553

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**Calibration Results : without adjustment**

**Photometric Accuracy**

Wavelength (nm)	Certified Values of Reference Material ( Abs )	UUC Reading ( Abs )	Uncertainty of Measurement ( $\pm$ Abs )	Coverage Factor <i>k</i>
440.0	Zero	0.000	0.0028	2.00
	0.5552	0.557	0.0029	2.00
	0.7031	0.704	0.0029	2.00
	0.9867	0.988	0.0029	2.00
546.1	Zero	0.000	0.0028	2.00
	0.5195	0.520	0.0030	2.00
	0.7007	0.701	0.0030	2.00
	0.9833	0.984	0.0029	2.00
635.0	Zero	0.000	0.0028	2.00
	0.5615	0.563	0.0029	2.00
	0.7659	0.767	0.0030	2.00
	1.0763	1.079	0.0029	2.00

**Remark**

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer

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

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