เอกสารแนบที่ 4

เอกสารสอบเทียบความถูกต้องของเครื่องมือตรวจวัด

ตารางสรุปรายการเอกสารการสอบเทียบความถูกต้องของเครื่องมือเก็บตัวอย่าง
และเครื่องมือตรวจวิเคราะห์คุณภาพสิ่งแวดล้อม

รายการตรวจวัด	เครื่องมือเก็บตัวอย่าง	เครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
คุณภาพอากาศในบรรยากาศโดยทั่วไป		
ก๊าซไฮโดรคาร์บอน	THC Analyzer No. B01	THC Analyzer (FID)
ระดับเสียงโดยทั่วไป		
ระดับเสียงเฉลี่ย 24 ชั่วโมง (L_{eq} 24 hr)	Acoustic Calibration	-
ระดับเสียงเฉลี่ย 8 ชั่วโมง (L_{eq} 8 hr)	Sound Level Meter No. C1-B01	
ระดับเสียงสูงสุด (L_{max})		
ระดับเสียงกลางวัน-กลางคืน (L_{dn})		
ระดับเสียงเปอร์เซ็นไทล์ที่ 90 (L_{90})		
คุณภาพน้ำ		
อุณหภูมิ	-	Thermometer
ความเป็นกรด-ด่าง	-	pH Meter
ความขุ่น	-	Turbidity Meter
สารแขวนลอย	-	Digital Balance
น้ำมันและไขมัน	-	Digital Balance
บีโอดี	-	BOD Analyzer
ซีโอดี	-	COD Analyzer
สารอินทรีย์ระเหยง่าย	-	GC/MS
คุณภาพดิน		
สารอินทรีย์ระเหยง่าย	-	GC/MS

เอกสารแนบที่ 4-1

คุณภาพอากาศในบรรยากาศโดยทั่วไป

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

Calibration Report
Total Hydrocarbon Analyzer

Date : 01 May 2025 | Brand : HORIBA | Model : APHA-360CE

No. B01 | Serial No. 4211954001

Calibrator (Dilution System)

Brand	: Teledyne	Model	: 700
Last Cal. Date	: 29 October 2024	Serial No.	: 421

Reference Standard Gas

Standard Gas	: Methane (CH_4)	Cylinder No.	: D612165
Certified Date	: 25 February 2023	Expired Date : 25 February 2031	Cylinder Conc. : 453 ppm

Calibrating Condition

Pressure 1011 mmbar | Temp. 24.6 °C | % RH 50

Start Time : 3:00 PM

Pre-Calibration Checks

Change Particulate Filter : Yes | Station Temp : 25.0 °C

Leak Test : Yes

Calibration Setting

Span Set Point	Initial Reading (Befored Adj)		Final Reading (After Adj)
	Expected Concentration (PPM)	Analyzer Response (PPM)	Analyzer Response (PPM)
Zero	0	-0.10	0
Span	10	10.04	10

Calibration Setting (Final)

Span Instrument Gain: 0.997 | Finish Time: 4:00 PM

APHA-360 Total Hydrocarbon Analyzer

Test Values	Observed Value	Units	Nominal Range
Signal (CH_4)	910.7	mV	800-1,350
Signal (THC)	915.1	mV	800-1,350
Detector	77.8	kPa	((Pressure Air/1013)x100)-20 ± 4 kPa
Purifier	19.2	kPa	8 - 25
NMC	259.3	°C	260 ± 10
Bypath	0.9	L / min	0.9 ± 0.3
Over Flow	0.8	L / Min	0.8

Calibrated by : Adul Dangklom
(Mr.Adul Dangklom)

Approved by :
(Mr. Peera Detudom)

เอกสารแนบที่ 4-2

ระดับเสียงโดยทั่วไป

精密騒音計
Precision Sound Level Meter
TYPE 6238

検査成績書
INSPECTION CERTIFICATE

Serial No. of boy : 223038

Serial No. of Microphone: 80280
Ver:5.0 22-01-08

Date:June 2,2024

承認 Approved	点検 Passed	担当 Inspected
A. nagato	K. Takayama	J. Nagano

株式会社 アコー
ACO CO., LTD.

宮崎県西諸県郡高原町大字蒲牟田1-8
株式会社アコー
代表取締役　寺薗信一
1-8 Kamamuta Takaharucho
Nishimorokatagun Miyazaki Japan
President : Shinichi Terazono
ACO CO., LTD.

1. Inspection Date : June 2,2024

2. Inspection Condition

Temperature : 26 °C

Humidity: 44%

Barometric pressure : 995 hPa

3. Inspection Results

1) RANGE The RANGE Shifting Error

RANGE : 20-100dB 70dB ±0.5dB

Within ±0.5dB of the value at 70dB input, Range 20-100dB.

RANGE (dB)	Input level (dB)	Frequency (Hz)		
		31.5	1000	12500
20-80	70	0.0	-0.1	-0.1
20-90	70	0.1	0.0	0.0
20-100	70	0.0	0.0	0.0
20-110	70	0.1	0.0	0.1
30-120	70	0.0	-0.1	0.1
40-130	70	-0.1	-0.1	0.0
Passed		Pass		

2)Stability Caracteristic

RANGE : 20-100dB ±0.5dB

Within ±0.5dB of the value one minute later, Range 20-100dB.

	ten minutes later
Error (dB)	0.0
Passed	Pass

3) The Scale Error

RANGE : 30-120dB 31.5Hz 75.0dB 1kHz, 12.5kHz 95dB

31.5Hz is 75.0dB input standard 1kHz, 12.5kHz is 95dB input standard

A weighting

Input (dB)	Standard (dB)	Frequency (Hz) 31.5
120		
118		
115		
110		
105		
100		
95		
90		
85		
80	±0.3	0.0
75	0.0	0.0
70	±0.3	-0.1
65	±0.3	-0.2
60	±0.3	-0.1
55	±0.3	0.0
50	±0.3	-0.1
45	±0.3	-0.1
40	±0.3	-0.1
35	±0.3	0.1
Passed		Pass

A weighting

Input (dB)	Standard (dB)	Frequency (Hz) 1000	12500
120	±0.3	0.0	
118	±0.3		0.0
115	±0.3	0.0	0.0
110	±0.3	-0.1	-0.1
105	±0.3	-0.1	0.0
100	±0.3	-0.2	0.0
95	0.0	0.0	0.0
90	±0.3	-0.1	-0.1
85	±0.3	-0.1	0.0
80	±0.3	0.0	0.1
75	±0.3	0.0	0.0
70	±0.3	-0.3	0.0
65	±0.3	-0.2	-0.1
60	±0.3	-0.2	-0.1
55	±0.3	-0.1	0.0
50	±0.3	-0.1	0.0
45	±0.3	0.0	-0.1
40	±0.3	-0.2	-0.1
35	±0.3	-0.1	0.0
Passed		Pass	

4) Dynamic Characteristic

RANGE 20-100dB 100dB, 1kHz

When 100dB input, Range 20-100dB at 1kHz.

	Standard	Measured Value
FAST	-1.0 $^{+0.5}_{-1.0}$ (dB)	-1.5
SLOW	-4.0±1.0 (dB)	-4.5
Passed		Pass

5) Frequency Response

RANGE : 20-100dB 95dB

When 95dB input, including Microphone value, Range 20-100dB

Frequency (Hz)	A			C			Z	Tolerance (dB)
	Standard (dB)	Response (dB)	Deviation (dB)	Standard (dB)	Response (dB)	Deviation (dB)	Response (dB)	
10	-70.4	-69.0	1.4	-14.3	-12.5	1.8	-0.4	+3.0, -cxJ
20	-50.5	-50.6	-0.1	-6.2	-5.7	0.5	-0.2	±2.0
40	-34.6	-34.9	-0.3	-2.0	-2.1	-0.1	-0.1	±1.0
100	-19.1	-19.3	-0.2	-0.3	-0.3	0.0	0.0	±1.0
250	-8.6	-8.8	-0.2	0.0	-0.1	-0.1	-0.1	±1.0
500	-3.2	-3.3	-0.1	0.0	0.0	0.0	-0.1	±1.0
1000	**0 0**	0 0	0 0	0.0	-0.1	-0.1	-0.1	±0.7
2k	1.2	1.2	0.0	-0.2	-0.3	-0.1	-0.1	±1.0
4k	1.0	0.5	-0.5	-0.8	-1.5	-0.7	-0.4	±1.0
5k	0.5	0.2	-0.3	-1.3	-1.8	-0.5	-0.2	±1.5
6.3k	-0.1	-0.5	-0.4	-2.0	-2.6	-0.6	-0.2	+1.5, -2.0
8k	-1.1	-1.9	-0.8	-3.0	-3.9	-0.9	-0.5	+1.5, -2.5
10k	-2.5	-3.2	-0.7	-4.4	-5.3	-0.9	-0.9	+2.0, -3.6
12.5k	-4.3	-4.6	-0.3	-6.2	-6.5	-0.3	-0.9	+2.0, -5.0
16k	-6.6	-6.8	-0.2	-8.5	-8.9	-0.4	-1.5	+2.5, -16.0
20k	-9.3	-10.4	-1.1	- 11.2	-12.1	-0.9	-2.6	+3.0, -cxJ
Passed		Pass						

6) l.OdB

Within l.OdB on the Burst signal of the peak factor 3, Ragne 20-100dB.

Frequency 2kHz, Repeat frequency 40Hz

Effective value Error (dB)	Passed
0.3	Pass

7) Self-noise

RANGE : 20-80dB

RANGE : 20-80dB (Including Microphone value)	A	C	Z
Standard (dB)	Below 20	Below 29	Below 31
Self-noise (dB)	17.7	28.5	30.5
Passed	Pass		

เอกสารแนบที่ 4-3
คุณภาพน้ำและดิน

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

NSC-TISI-TIS17025
CALIBRATION 0049

CERTIFICATE No : 25M2256
REFERENCE No : 76365-3

Certificate of Calibration

EQUIPMENT	:	DIGITAL BALANCE
MANUFACTURER	:	SARTORIUS
MODEL	:	BSA224S-CW
SERIAL No	:	36591843
ID No	:	BA09/61
CONDITION AS RECEIVED	:	USED ITEM
SUBMITTED BY	:	S.P.S. CONSULTING SERVICE CO., LTD. 7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD., JOMPOL, CHATUCHAK, BANGKOK 10900
CALIBRATED BY	:	ATSAWIN Y.
CALIBRATION DATE	:	07-Mar-25
APPROVED BY	:	PONGSAK J.
ISSUED DATE	:	13-Mar-25
RECEIVED DATE	:	07-Mar-25

Certificate

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF QUALITY CALIBRATION CO., LTD.

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

CERTIFICATE No : 25M2256

Calibration Report

EQUIPMENT	:	DIGITAL BALANCE	**MODEL**	:	BSA224S-CW
MANUFACTURER	:	SARTORIUS	**S/N**	:	36591843
ID No	:	BA09/61	**RECEIVED DATE**	:	07-Mar-25
AIR PRESSURE	:	1009mbar ± 1mbar	**CALIBRATION DATE**	:	07-Mar-25
AMBIENT TEMPERATURE	:	24° C ± 1° C	**RELATIVE HUMIDITY**	:	52 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS NOT ADJUSTED BEFORE CALIBRATION. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARLITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.
2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) STANDARD WEIGHT SET	E2	QK-I-151	C02250116	28-Jan-27
2) STANDARD WEIGHT	E2	15843	C02250117	29-Jan-27

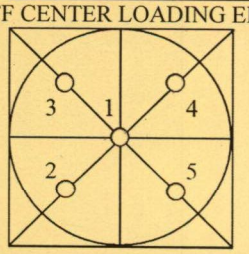
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
   - NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL
2. TARE FUNCTION : NORMAL
3. REPEATABILITY OF READING AT 200 g WAS 0.000071 g
4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (± g)
0.00	0.0000	0.0000	0.00012
0.10	0.1000	0.0000	0.00012
0.20	0.2000	0.0000	0.00012
0.50	0.5000	0.0000	0.00012
1.00	1.0000	0.0000	0.00012
2.00	2.0000	0.0000	0.00012
5.00	5.0000	0.0000	0.00012
10.00	10.0000	0.0000	0.00012
20.00	20.0001	-0.0001	0.00012
50.00	50.0000	0.0000	0.00014
100.00	100.0001	-0.0001	0.00019
200.00	200.0001	-0.0001	0.00032

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	100.0000
2	100.0000
3	100.0000
4	100.0000
5	100.0000
OFF-CENTER LOADING	0.0000

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA
THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k =2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT

Harikul Science Co.,Ltd.
694 Soi Ratchadanivet 24, Pracharatbamphen,
Samsaennok, Huaikhwang, Bangkok 10310
Tel: 0-2274-2456 Fax: 0-2274-2443
Email: info@harikul.com www.harikul.com

CERT.No.: HS-W015C

Certificate of Calibration

Calibration Date :	18 Mar 25	Model	: YSI 5000
Submitted by :	S.P.S CONSULTING SERVICE CO.,LTD	S/N	: 15B100751
	7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol,	Probe	: YSI 5010
	Chatuchak, Bangkok, Thailand 10900	S/N	: 22D100097
		ID NO.	: -
Avg Room Temp :	20 °C	Air Temp ref	: S/N. F8065C26
Avg Water Temp :	20 °C	Barometric ref	: S/N. F8065C26
Air Pressure :	760.00 mmHg	Water Temp ref	: -
Salinity :	0 ppt	ID NO.	HS001
		Technician	: Kittipong M.

Calibration Details

Calibration Point	100% air sat. (@20 °C, DO = 9.09 mg/l)	(status)		(status)
Measurement 1 (mg/l)	9.08	(PASS)	-	-
Measurement 2 (mg/l)	9.08	(PASS)	-	-
Measurement 3 (mg/l)	9.08	(PASS)	-	-
Measurement 4 (mg/l)	9.07	(PASS)	-	-
Measurement 5 (mg/l)	9.07	(PASS)	-	-
Measurement 6 (mg/l)	9.07	(PASS)	-	-
Measurement 7 (mg/l)	9.07	(PASS)	-	-
Measurement 8 (mg/l)	9.07	(PASS)	-	-
Measurement 9 (mg/l)	9.07	(PASS)		-
Measurement 10 (mg/l)	9.07	(PASS)	-	-
Mean Measurement	9.07	mg/l	-	-
Inaccuracy	0.02	mg/l	-	-

Overall Status (PASS)

Manufacturer Specification

Accuracy = +/- 0.02 mg/l

1) This certificate is issued based on the result that are found as shown on date and place of test only.
2) The calibration procedure followed in accordance with Harikul Science Co., Ltd.
3) This result shall not be used for advertising purpose.

Technician Signature

(Kittipong Maekwong)

Laboratory Manager

(Natenapha Pisatkunchon)

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

CERTIFICATE No : 25T0520
REFERENCE No : 75853-1

Certificate of Calibration

EQUIPMENT	:	COD REACTOR
MANUFACTURER	:	HACH
MODEL	:	DRB 200
SERIAL No	:	15110C0497
ID No	:	DRB 05/59
CONDITION AS RECEIVED	:	USED ITEM
SUBMITTED BY	:	S.P.S. CONSULTING SERVICE CO., LTD. 7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD., JOMPOL, CHATUCHAK, BANGKOK 10900
CALIBRATED BY	:	CHAICHARN CH.
CALIBRATION DATE	:	27-Jan-25
APPROVED BY	:	PONGSAK J.
ISSUED DATE	:	27-Jan-25
RECEIVED DATE	:	15-Jan-25

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF QUALITY CALIBRATION CO., LTD.

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

CERTIFICATE No : 25T0520

Calibration Report

EQUIPMENT	:	COD REACTOR			
MANUFACTURER	:	HACH	**MODEL**	:	DRB 200
ID NUMBER	:	DRB 05/59	**SERIAL NUMBER**	:	15110C0497
RECEIVED DATE	:	15-Jan-25	**CALIBRATION DATE**	:	27-Jan-25
AMBIENT TEMPERATURE	:	23° C ± 1° C	**RELATIVE HUMIDITY**	:	53 %RH ± 10 % RH

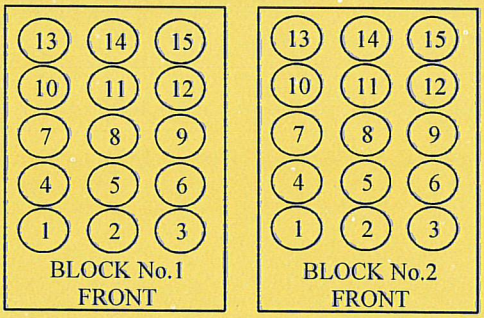
CONDITION OF THIS RESULTS OF CALIBRATION

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

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH TC TYPE K	HYDRA 2635A	6635300	24T6468	26-Jun-25

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

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



Block No.		1	2
Calibration Point (°C)		150	150
Controller temperature (°C)		144	144
Indicating Temperature		144	144
Measured Temperature (° C) at Spread Locations	1	150.01	149.57
	2	150.69	150.44
	3	150.40	149.46
	4	150.22	149.89
	5	150.27	149.75
	6	150.51	150.45
	7	150.24	150.03
	8	150.20	150.08
	9	150.14	150.14
	10	149.70	149.83
	11	149.58	149.89
	12	149.46	149.79
	13	148.77	149.03
	14	148.99	149.14
	15	149.02	149.62
Uncertainty of Measurement(± °C)		0.87	0.87

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.
NOTE 2 : LOCATION 10 WAS REFERENCE LOCATION.
NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.
THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k =2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT

GC Clarus 600/680 Preventive Maintenance (PM)

Company Name:	**S.P.S. Consulting Service Co.,Ltd**		
Address (Instrument Location):	7 Soi Phaholyothin24 Phaholyothin Road, Jompol, Chatuchak, Bangkok, 10900.		
Serial Number:	680S14042502	**Service Tag:**	N68APSSFXMP
Customer Name (if applicable):	Ms.Naruecha	**PM number:**	1 of 2
Service Engineer Name:	Monchai Kitcharoenkeat	**Service Order Number:**	WO-
Date PM Performed: (DD-MMM-YYYY)	22-Feb-2025	**Next PM Due Date:** (DD-MMM-YYYY)	22-Aug-2025

Part Number	Release	Publication Date
TH09370070	C	August 2016

Scope

The purpose of this PM is to ensure the continued functionality of the Clarus 600 and Clarus 680 GC by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. The customer should save their method before the PM begins.

General Instructions:

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

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Component List

Component / Specific Model	Serial #	Software Version	Configuration Notes
Clarus680	680S14042502	Totalchrom6.3.2	PSS, PSS, FID,
Clarus SQ8T	648N4050804	Turbomass 6.4	
AtomX	US14113002	Tekma AtomX	

Parts Lists

Additional Tools Required for PM				
Part Number (if applicable)	**Description**	**Quantity**	**Serial #**	**Calibration Due Date (MM/YY)**
N/A				
Additional Reagents and Standards Required for PM				
Part Number (if applicable)	**Description**	**Quantity**	**Batch/Lot #**	**Expiration Date (MM/YY)**
N/A				

Procedure Checklist

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

1. General:

☑ Review the instrument performance with the customer and document any recent problems.

☑ Check incoming AC line voltage for proper levels and grounding.
L-N 220 Volt
L-G 220 Volt
N-G 0.33 Volt

**Neutral to ground not more than 0.5 volts peak to peak*

☑ Inspect all gas line filters and traps; Replace if necessary with customer supplied spares.
Carrier gas ☑ Helium ☐ Nitrogen ☐ Hydrogen
Moisture level ☑ Good ☐ Need to replace ☐ Other _____

Detector gas ☑ Air Zero ☑ Hydrogen ☐ Nitrogen ☐ Helium
Moisture level ☑ Good ☐ Need to replace ☐ Other _____

☑ Inspect the customer log book and make any appropriate PM entries.

☑ Leak check all fittings from the gas source to instrument.
Gas leakage ☑ Pass ☐ Fail Comment _____

☑ Perform general inspection of system for cleanliness.

☑ Inspect for functional and clean electronic cooling and oven vent fans
Electronic cooling fan ☑ Yes ☐ No
Oven cooling fan ☑ Yes ☐ No

2. Electronic :

☑ Check oven temperature. Calibrate if necessary.
Oven temperature set point 150 ^{0}C ☑ Pass ☐ Fail

☐ Check sub-ambient option. (If installed).
Oven temperature set point 5 ^{0}C ☐ Pass ☐ Fail

☑ Perform routine maintenance on detector/injector. Replace parts as necessary with customer supplied spares.

☑ Check flows, including split flows if applicable. Calibrate if necessary.
Carrier flow Pass
Split flow Pass

☑ Check detector gas flows and adjust if necessary.
Detector flow Pass

☑ Autosampler installed ☑ Yes ☐ No
Check autosampler sensor for wear and replace if necessary.
Vial sensor Pass
Door sensor Pass
Tower sensor Pass
Plunger sensor Pass
Elevator sensor Pass

☑ Remove syringe, manually flush. Replace with customer supplied spare if necessary.

☑ Check firmware version. Upgrade to current levels if necessary.
Firmware version 6.5

☑ Measure all accessible power supply voltages.
5 Volt Pass
+15 Volt Pass
-15 Volt Pass
24 Volt Pass

☑ Record all detector voltage signal.
Detector Channel A 1.12 mV.
Detector Channel B NA mV.

3. Diagnostics Tests:

☑ Run instrument diagnostics.
☑ BRAM Pass
☑ EPROM Pass

☑ Run Autosampler diagnostics.
☑ BRAM Pass
☑ EPROM Pass

4. Review:

☑ Review with the customer PM work performed.
☑ Review with the customer routine maintenance procedures.
☑ Discuss recommended customer-supplied materials to have on hand
☑ Attach PM sticker.
☑ Update Logbook.

Additional Comments

Additional Comments Regarding the PM

Review

The preventive maintenance checks and if applicable performance tests for Clarus600/680 GC have been completed. ***This Clarus600/680 GC*** **Pass** ***the preventive maintenance.***		
Review of Preventive Maintenance:		
Authorized PerkinElmer Representative: Monchai Kitcharoenkeat	Monchai	Date: 22-Feb-2025 (DD-MMM-YYYY)
Authorized Customer Representative: Ms.Naruecha	Naruecha	Date: 22-Feb-2025 (DD-MMM-YYYY)

CALIBRATION LABORATORY CO., LTD.
2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
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CALIBRATION AND DIMENSIONAL MEASUREMENT
ACDM-2814

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE	:	pH METER
MANUFACTURER	:	HANNA
MODEL / TYPE	:	HI3512/HI1332/HI7662-T
SERIAL NO.	:	08685754/11250B7M/092806BN[PH04/56]
CLID. NO.	:	272501562
JOB CONTROL NO.	:	250617070523
CALIBRATION SERVICE	:	☑ IN-LABORATORY ☐ ON-SITE

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

DATE OF RECEIVED : 17 June 2025 DATE OF ISSUED : 20 June 2025

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

Calibrated By : Sukgasem Seehanart
Wenick Inchaisri
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory
20 June 2025

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q25070523

@clccalibration

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CALIBRATION AND DIMENSIONAL MEASUREMENT
ACDM-2814

REPORT OF CALIBRATION

FOR

NOMENCLATURE	:	**pH METER**
MANUFACTURER	:	**HANNA**
MODEL / TYPE	:	**HI3512/HI1332/HI7662-T**
SERIAL NO.	:	**08685754/11250B7M/092806BN[PH04/56]**
DATE OF CALIBRATION	:	**18 June 2025**

ENVIRONMENT CONDITIONS :

Temperature : (25 ± 2.5) °C **Relative Humidity :** (50 ± 15) % RH

PROCEDURE USED :

This instrument was calibrated under procedure No. **CLC-CPCH-01** [pH Meter]. The calibration was performed by direct measurement with Certified Reference Material (CRM).

This instrument was calibrated under procedure No. **CLC-CPTH-04** [Temperature] based on **ASTM E 644-04** as calibration guidelines. The calibration was performed by using Calibration Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. pH Standard Solution, NIMT TRM CODE TRM-S-2003, TRM CODE TRM-S-2007.
2. pH Standard Solution, Control Company Catalog Number 06664260,11754256, Lot Number CC787362.
3. Calibration Bath, Kambic Model OB-22/2 ULT S/N. 17115653.
4. Precision Thermometer, ASL Model F250 S/N. 1334023800.
5. IPRT, Wika Model CTP5000-250-D S/N. PO00043543-1-10-1.

@clccalibration

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI) , through National Institute of Metrology (Thailand). Lot Number. 080124 , 120124. Due Date 23 January 2026.

2. The measurements are traceable to International System of Units (SI) , through Control Company. Certificate No. 4281-14495731 , Due Date 27 September 2025.

3. The measurements are traceable to International System of Units (SI) , through Calibration Laboratory Co., Ltd. Certificate No. Q24120999, Due Date 26 November 2025.

4. The measurements are traceable to International System of Units (SI) , through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 1042/67, Due Date 16 October 2025.

5. The measurements are traceable to International System of Units (SI) , through National Institute of Metrology (Thailand). Certificate No. TT-0146-24, Due Date 28 October 2025.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment ( ) adjustment

The table in the following gives the calibration results and associated measurement uncertainties of pH meter.

CALIBRATION DATA

1. pH METER RESULT @ 25 °C

Standard pH Buffer Solution (pH)	pH Meter Reading (pH)	pH Meter Reading (mV)	Correction (pH)	Uncertainty of pH Measurement (± pH)	*k* Factor
4.003	4.005	168.2	-0.002	0.010	2,00
7.005	7.010	-8.1	-0.005	0.013	2,00
10.015	10.010	-177.7	+0.005	0.014	2,00

Technical Note. Setting function CAL 3 point (4,7,10).

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 4 of 68

2. TEMPERATURE RESULT

Immersion depth (mm)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty ± (°C)
100	25.00	25.0	0.00	0.07

Technical Note. Type of sensor : Thermistor

Probe ∅ 3 mm

Materials : Metal Sheath.

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of $k = 2,00$.

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 56 of 68

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

End of Certificate

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

Certificate of Calibration

Equipment :	Turbidity Meter
Manufacturer :	Eutech
Model :	CyberScan WLTB1000
Serial No. :	201802206
ID. No. :	TB 02/50
Condition As-Received:	Used Item
Received Date :	17 February 2025
Calibration Date :	18 February 2025
Reference :	2502-0500WN-1
Submitted by :	S.P.S. Consulting Service Co.,Ltd. 7 Phaholyothin 24, Phaholyothin Road., Jompol, Chatuchak, Bangkok 10900
Ambient Temperature :	(25 ± 2.5) ºC
Relative Humidity :	(50 ± 20) %
Calibration Procedure :	In - house method : CP-CH11 Direct measurement by using Formazin standard solution
Calibrated by :	Walalak Sirithean

Approved by :

Approved Signatory

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

Issue Date : 21 February 2025

The Uncertainties are for a confidence probability of approximately 95%

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Condition of this calibration result

1. Reference Standard Instruments :

Instruments	Serial No.	ID No.	Certificate No.	Due date
1) Thermo-Hygrograph	1103328	130EC010	24H1372	12 July 2025
2) Electronic Balance	14233821	110RC001	24MM131	04 July 2025

- This Certification is traceable to SI Throught Technology Promotion Association (Thailand - Japan)

2. Standard Material : The Formazin suspension has been prepared gravimetric from

Material	Manufacturer	Lot No.	Assay
1) Hexamethylenetetramine	HIMEDIA	0000493947	99.65%
2) Hydrazinium Sulfate	HIMEDIA	0000522014	99.40%

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

Calibration result

Performing three - Formazin suspension standard curve by using 0,10,1000 NTU Turbidity Meter Serial Number : 201802206

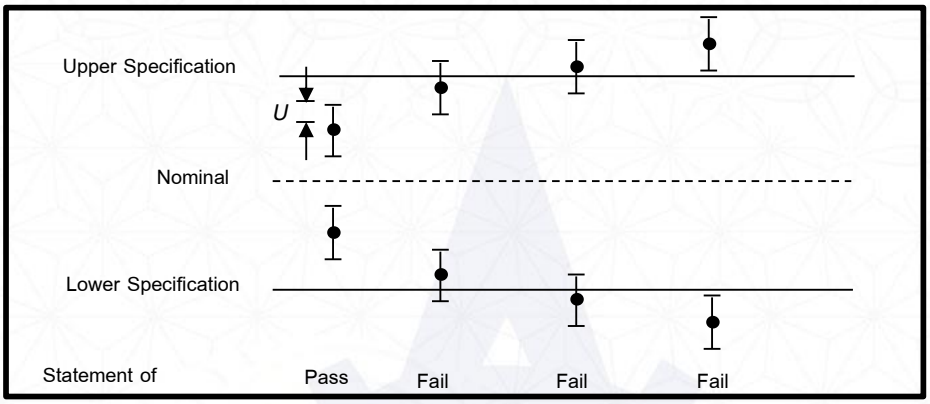
Standard Formazine suspension (NTU)	UUC* Reading (NTU)	Error (NTU)	Uncertainty of Measurement (± NTU)	Coverage Factor *k*	Tolerance Limit (± NTU)	Judgement
20	19.4	-0.6	0.38	2.00	2.0	Pass
40	39.9	-0.1	0.40	2.00	2.0	Pass
100	98.9	-1.1	0.70	2.00	2.0	Pass
400	391	-9	1.5	2.05	20.0	Pass

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

Decision Rule : The decision rule is prescribed by customer (Error ± Uncertainty < Specification)

Statement of conformity are reported as :

- Pass - the measured value included the measurement uncertainty is below the acceptance limit.
- Fail - the measured value included the measurement uncertainty is above the acceptance limit.



U=95% expanded measurement uncertainty

Tolerance Limit (Specification Limit) provided by customer

Tolerance Limit (TL) (Specification Limit) : specified upper or lower bound of permissible values of property.

Acceptance Limit (AL) : specified upper or lower bound of permissible measured quantity values.

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

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CALIBRATION 0059
CLC

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE	:	DIGITAL THERMOHYGRO METER
MANUFACTURER	:	ISOLAB
MODEL / TYPE	:	N/A
SERIAL NO.	:	N/A[TH 14/61]
CLID. NO.	:	232100142
JOB CONTROL NO.	:	250114004264
CALIBRATION SERVICE	:	☑ IN-LABORATORY ☐ ON-SITE

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

DATE OF RECEIVED : 14 January 2025 DATE OF ISSUED : 16 January 2025

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

Calibrated By : Oranut Kamchatphai
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory
16 January 2025

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q25004264

@clccalibration

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CALIBRATION 0059
CLC

REPORT OF CALIBRATION

FOR

NOMENCLATURE	:	**DIGITAL THERMOHYGRO METER**
MANUFACTURER	:	**ISOLAB**
MODEL / TYPE	:	**N/A**
SERIAL NO.	:	**N/A[TH 14/61]**
DATE OF CALIBRATION	:	**15 January 2025**

ENVIRONMENT CONDITIONS :

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

PROCEDURE USED :

This instrument was calibrated under procedure No. **WI-305-74**. The calibration was performed by using Chilled Mirror Hygrometer which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Chilled Mirror Hygrometer, Edgetech Model Dew Master S/N. 36151.

Temperature & Humidity Chamber, PGC Model 9141-5114 S/N.0802282.

TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Thunder Scientific Corporation.

Certificate No. 22212, Due Date 23 February 2025.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2{,}00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment ( ) adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring digital thermohygro meter.

CALIBRATION DATA

1. CORRECTION OF TEMPERATURE

Test point (°C)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty ±(°C)
25.0	25.00	25.0	0.00	0.40

2. CORRECTION OF HUMIDITY

STD Temperature (°C)	STD Reading (%RH)	DUC Reading (%RH)	Correction (%RH)	Uncertainty ± (%RH)
25	50.0	49	+1.0	1.3

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 48 of 138

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

End of Certificate