



Industrial Health Association of Asia
สมาคมสุขภาพอุตสาหกรรมเอเชีย



PM10 Sampler Calibration

SITE

Project: High Volume Sampler Calibration
Location: Life & Environment Co., Ltd
Date of calibration : February 28, 2026

DETAIL OF SAMPLER

Sampler Model: TE-6070 PM-10
Motor Model: TISCH
Motor Serial No.: 2179

CONDITIONS

Pressure of Ambient Air (Pa)	(mm Hg):	760
Temperature of Ambient Air (Ta)	(K):	300
Average Pressure (Ps)	(mm Hg):	754
Average Temperature (Ts)	(K):	300

CALIBRATION ORIFICE

Make :	Tisch	Slope :	1.26202
Model :	TE-5025A	Intercept:	-0.01176
Serial#:	5		

CALIBRATION				LINEAR REGRESSION
Plate or Test #	H ₂ O (in)	Qa (m ³ /min)	I (chart)	
1	13.00	1.804	58.0	Slope = 20.7296 Intercept = -0.8253 Corr. coeff. = 0.9995 SFR = 1.121 SSP = 37.75
2	10.40	1.615	52.0	
3	8.00	1.417	46.0	
4	5.20	1.145	36.0	
5	3.10	0.886	28.0	

of Observations: 5

Calibrated by:



Approved by :



Industrial Hygiene Specialist



Industrial Health Association of Asia
สมาคมสุขภาพอุตสาหกรรมเอเชีย



PM10 Sampler Calibration

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Project: High Volume Sampler Calibration
Location: Life & Environment Co., Ltd
Date of calibration : February 28, 2026

DETAIL OF SAMPLER

Sampler Model: TE-6070 PM-10
Motor Model: TISCH
Motor Serial No.: 2182

CONDITIONS

Pressure of Ambient Air (Pa) (mm Hg) : 760
Temperature of Ambient Air (Ta) (K) : 300
Average Pressure (Ps) (mm Hg) : 754
Average Temperature (Ts) (K) : 300

CALIBRATION ORIFICE

Make : Tisch
Model : TE-5025A
Serial#: 5
Slope : 1.26202
Intercept: -0.01176

CALIBRATION					LINEAR REGRESSION	
Plate or Test #	H ₂ O (in)	Qa (m ³ /min)	I (chart)	IC (corrected)		
1	12.20	1.748	61.0	38.33	Slope =	20.9927
2	9.70	1.560	54.0	33.93	Intercept =	1.4086
3	7.50	1.373	48.0	30.16	Corr. coeff. =	0.9998
4	4.80	1.100	39.0	24.50	SFR =	1.121
5	2.90	0.857	31.0	19.48	SSP =	37.75

of Observations: 5

Calibrated by:



Approved by :



Industrial Hygiene Specialist



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สมาคมสุขภาพอุตสาหกรรมเอเชีย



PM10 sampler Calibration

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Project: High Volume Sampler Calibration
Location: Life & Environment Co., Ltd
Date of calibration : February 28, 2026

DETAIL OF SAMPLER

Sampler Model: TE-6070 PM-10
Motor Model: TISCH
Motor Serial No.: 2184

CONDITIONS

Pressure of Ambient Air (Pa) (mm Hg) : 760
Temperature of Ambient Air (Ta) (K) : 300
Average Pressure (Ps) (mm Hg) : 754
Average Temperature (Ts) (K) : 300

CALIBRATION ORIFICE

Make : Tisch
Model : TE-5025A
Serial#: 5

Slope : 1.26202
Intercept: -0.01176

CALIBRATION				LINEAR REGRESSION	
Plate or Test #	H ₂ O (in)	Qa (m ³ /min)	I (chart) (corrected)	IC	

1	12.40	1.762	58.0	36.44	Slope = 20.6574
2	9.80	1.568	52.0	32.67	Intercept = 0.0911
3	7.60	1.382	45.0	28.27	Corr. coeff. = 0.9991
4	4.80	1.100	37.0	23.25	SFR = 1.121
5	2.90	0.857	28.0	17.59	SSP = 37.75

of Observations: 5

Calibrated by:



Approved by :



Industrial Hygiene Specialist



Industrial Health Association of Asia
สมาคมสุขภาพอนามัยอุตสาหกรรม



PM10 Sampler Calibration

SITE

Project: High Volume Sampler Calibration
Location: Life & Environment Co., Ltd
Date of calibration : February 28, 2026

DETAIL OF SAMPLER

Sampler Model: TE-6070 PM-10
Motor Model: TISCH
Motor Serial No.: 2185

CONDITIONS

Pressure of Ambient Air (Pa) (mm Hg): 760
Temperature of Ambient Air (Ta) (K): 300
Average Pressure (Ps) (mm Hg): 754
Average Temperature (Ts) (K): 300

CALIBRATION ORIFICE

Make : Tisch Slope : 1.26202
Model : TE-5025A Intercept: -0.01176
Serial#: 5

CALIBRATION				LINEAR	
Plate or	H ₂ O	Qa	I	IC	REGRESSION
Test #	(in)	(m ³ /min)	(chart)	(corrected)	
1	12.30	1.755	61.0	38.33	Slope = 20.3387 Intercept = 2.3000 Corr. coeff. = 0.9993 SFR = 1.121 SSP = 37.75
2	9.90	1.576	54.0	33.93	
3	7.80	1.400	49.0	30.79	
4	5.00	1.123	40.0	25.13	
5	3.00	0.872	32.0	20.10	

of Observations: 5

Calibrated by:



Approved by :



Industrial Hygiene Specialist



Industrial Health Association of Asia
อุตสาหกรรมอนามัยระหว่างประเทศ



CALIBRATION TEST REPORT

Instrument : AIR CHECK SAMPLER (Low Flow) Serial No. 254538 Model : QCD-1500

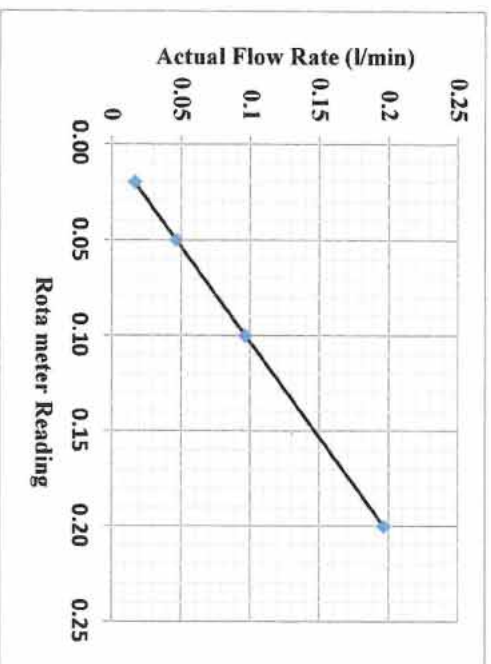
Manufacture : YINHEKEJI

Date of Calibration : JUNE 30, 2025

AM-07

Next Time Calibration : JUNE 30, 2026

Standard Criteria : Primary Flow Meter (Drycal)				Ambient Condition			
Bios Model DLC-M S/N 4669				Temperature = 25.0 °C Pressure = 760 mmHg			
Drycal Reading	Actual Flow Rate (l/min)				Deviation (l/min)	Permissible Deviation (l/min)	Status
	1	2	3	Average			
0.02	0.02	0.02	0.01	0.017	0.0053	±0.05	Pass
0.05	0.04	0.05	0.05	0.047	0.0053	±0.10	Pass
0.10	0.10	0.10	0.09	0.097	0.0053	±0.15	Pass
0.20	0.20	0.20	0.19	0.197	0.0053	±0.20	Pass



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CALIBRATION TEST REPORT

Instrument : AIR CHECK SAMPLER (Low Flow)

Serial No. 254539

Model : QCD-1500

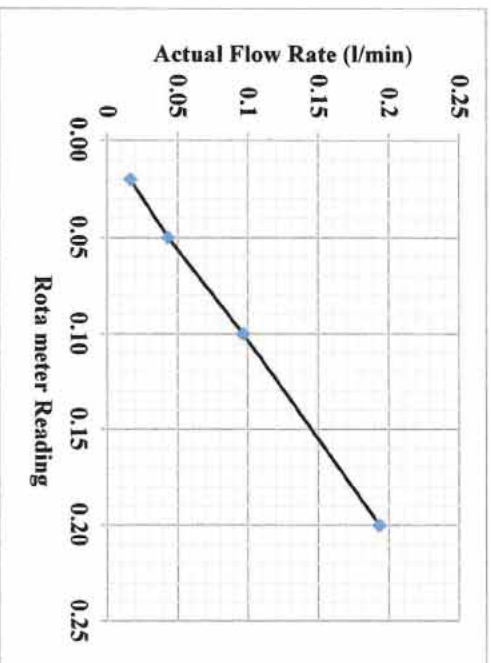
Manufacture : YINHEKEJI

Date of Calibration : JUNE 30, 2025

AM-08

Next Time Calibration : JUNE 30, 2026

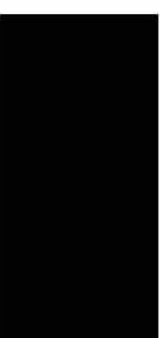
Standard Criteria : Primary Flow Meter (Drycal)				Ambient Condition			
Bios Model DLC-M S/N 4669				Temperature = 25.0 °C			
				Pressure = 760 mmHg			
Drycal Reading	Actual Flow Rate (l/min)			Deviation (l/min)	Permissible Deviation (l/min)	Status	
	1	2	3				Average
0.02	0.02	0.02	0.01	0.017	0.0058	±0.05	Pass
0.05	0.04	0.04	0.05	0.043	0.0058	±0.10	Pass
0.10	0.10	0.10	0.09	0.097	0.0058	±0.15	Pass
0.20	0.19	0.19	0.20	0.193	0.0058	±0.20	Pass



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Industrial Hygiene Specialist



Industrial Hygiene Association of Asia
101 Pracha Uthit Road, 22nd Floor, Pracha Uthit Building, Bangkok 10110, Thailand



CALIBRATION TEST REPORT

Instrument : AIR CHECK SAMPLER (Low Flow)

Serial No. 254541

Model : QCD-1500

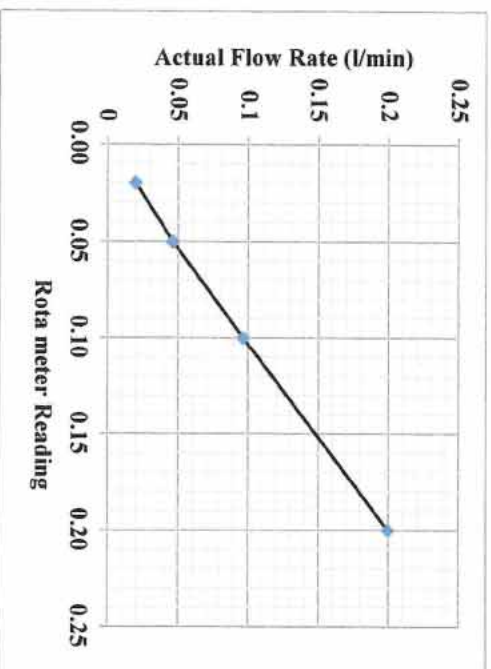
Manufacture : YINHEKEJI

Date of Calibration : JUNE 30, 2025

AM-10

Next Time Calibration : JUNE 30, 2026

Standard Criteria : Primary Flow Meter (Drycal)				Ambient Condition			
Bios Model DLC-M S/N 4669				Temperature = 25.0 °C Pressure = 760 mmHg			
Drycal Reading	Actual Flow Rate (l/min)			Deviation (l/min)	Permissible Deviation (l/min)	Status	
	1	2	3				Average
0.02	0.02	0.02	0.02	0.020	0.0000	±0.05	Pass
0.05	0.05	0.04	0.05	0.047	0.0058	±0.10	Pass
0.10	0.10	0.10	0.09	0.097	0.0058	±0.15	Pass
0.20	0.20	0.19	0.21	0.200	0.0100	±0.20	Pass



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CALIBRATION TEST REPORT

Instrument : AIR CHECK SAMPLER (Low Flow)

Serial No. A122843

Model : 224-PC X R8

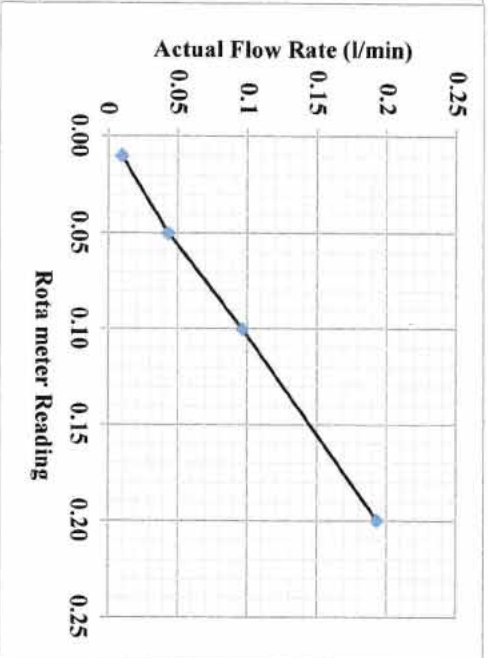
Manufacture : SKC (INC)

Date of Calibration : JANUARY 3, 2026

AM-22

Next Time Calibration : JANUARY 3, 2027

Standard Criteria : Rota Meter				Ambient Condition			
SKC Model1355EZ30 S/N 0107070345011/003				Temperature = 25.0 °C Pressure = 758 mmHg			
Rota Meter Reading	Actual Flow Rate (l/min)				Deviation (l/min)	Permissible Deviation (l/min)	Status
	1	2	3	Average			
0.01	0.01	0.01	0.01	0.010	0.0000	±0.05	Pass
0.05	0.04	0.05	0.04	0.043	0.0058	±0.10	Pass
0.10	0.10	0.10	0.09	0.097	0.0058	±0.15	Pass
0.20	0.20	0.19	0.19	0.193	0.0058	±0.20	Pass



Calibrated by

[Redacted Signature]

Approved by

[Redacted Signature]

Industrial Hygiene Specialist

CALIBRATION TEST REPORT

Instrument : AIR CHECK SAMPLER (Low Flow)

Serial No. 20170104067

Model : BDx-II

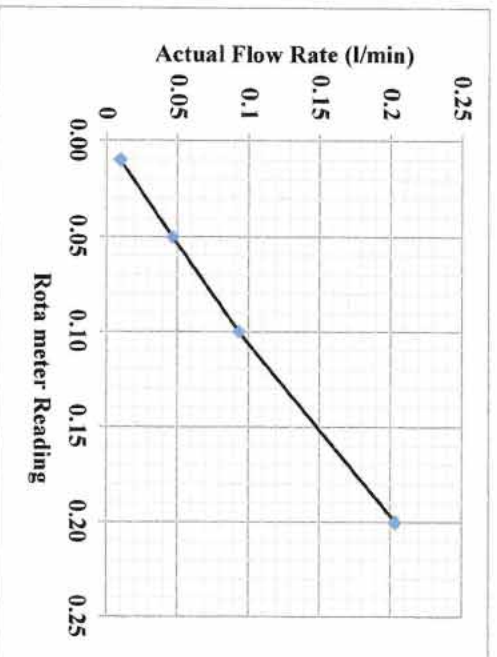
Manufacture : Gilian

Date of Calibration : JANUARY 3, 2026

GN-13

Next Time Calibration : JANUARY 3, 2027

Standard Criteria : Rota Meter				Ambient Condition			
SKC Model1355EZ30 S/N 0107070345011/003				Temperature = 25.0 °C Pressure = 758 mmHg			
Rota Meter Reading	Actual Flow Rate (l/min)				Deviation (l/min)	Permissible Deviation (l/min)	Status
	1	2	3	Average			
0.01	0.01	0.01	0.01	0.010	0.0000	±0.05	Pass
0.05	0.04	0.05	0.05	0.047	0.0058	±0.10	Pass
0.10	0.09	0.09	0.10	0.093	0.0058	±0.15	Pass
0.20	0.21	0.20	0.20	0.203	0.0058	±0.15	Pass



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CALIBRATION TEST REPORT

Instrument : AIR CHECK SAMPLER (Low Flow)

Serial No. 20170104068

Model : BDx-II

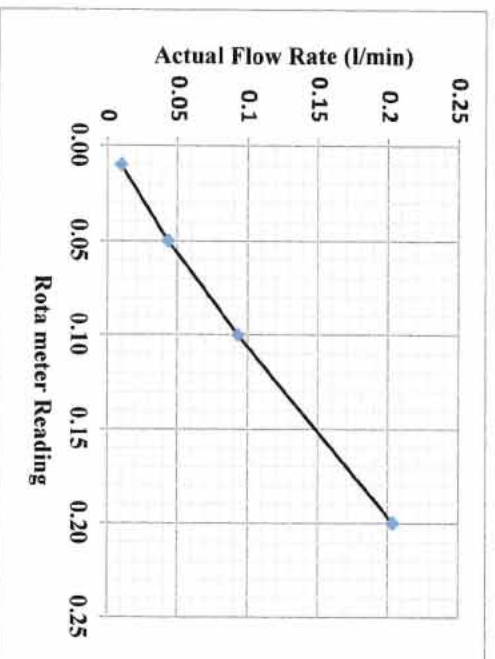
Manufacture : Gilian

Date of Calibration : JANUARY 3, 2026

GN-14

Next Time Calibration : JANUARY 3, 2027

Standard Criteria : Rota Meter				Ambient Condition			
SKC Model1355EZ30 S/N 0107070345011/003				Temperature = 25.0 °C			
				Pressure = 758 mmHg			
Rota Meter Reading	Actual Flow Rate (l/min)				Deviation (l/min)	Permissible Deviation (l/min)	Status
	1	2	3	Average			
0.01	0.01	0.01	0.01	0.010	0.0000	±0.05	Pass
0.05	0.04	0.05	0.04	0.043	0.0058	±0.10	Pass
0.10	0.09	0.09	0.10	0.093	0.0058	±0.15	Pass
0.20	0.21	0.20	0.20	0.203	0.0058	±0.20	Pass



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Industrial Hygiene Specialist

CALIBRATION TEST REPORT

Instrument : AIR CHECK SAMPLER (Low Flow)

Serial No. 20170104069

Model : BDx-II

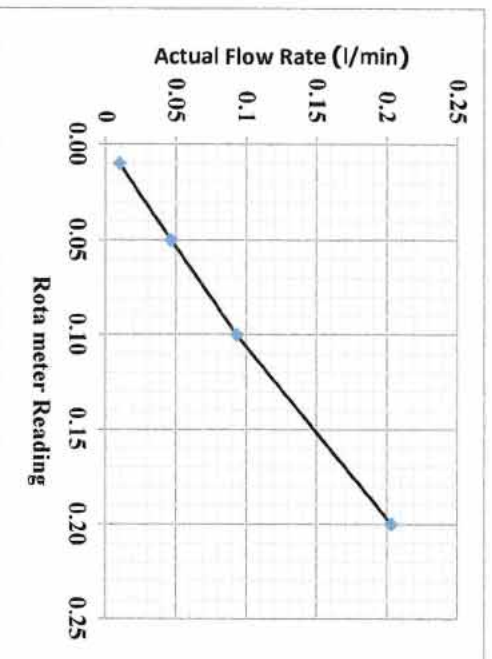
Manufacture : Gillan

Date of Calibration : JANUARY 3, 2026

GN-15

Next Time Calibration : JANUARY 3, 2027

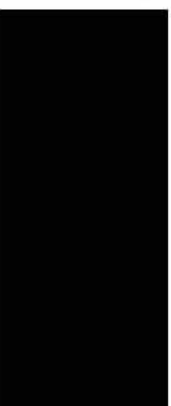
Standard Criteria : Rota Meter				Ambient Condition		
SKC Model 1355EZ30 S/N 0107070345011/003				Temperature = 25.0 °C Pressure = 758 mmHg		
Rota Meter	Actual Flow Rate (l/min)			Deviation (l/min)	Permissible Deviation (l/min)	Status
Reading	1	2	3	Average		
0.01	0.01	0.01	0.01	0.010	0.0000	±0.05 Pass
0.05	0.05	0.05	0.04	0.047	0.0058	±0.10 Pass
0.10	0.09	0.09	0.10	0.093	0.0058	±0.15 Pass
0.20	0.21	0.20	0.20	0.203	0.0058	±0.20 Pass



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CALIBRATION TEST REPORT

Instrument : AIR CHECK SAMPLER (High Flow)

Serial No. 254538

Model : QCD-1500

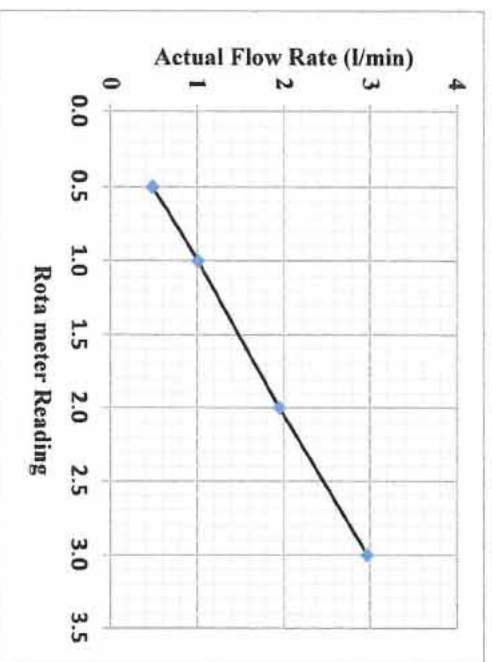
Manufacture : YINHEKEJI

Date of Calibration : JUNE 30, 2025

AM-07

Next Time Calibration : JUNE 30, 2026

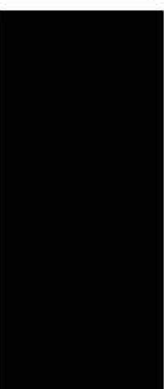
Standard Criteria : Primary Flow Meter (Drycal)				Ambient Condition		
Bios Model DLC-M S/N 4669				Temperature = 25.0 °C Pressure = 760 mmHg		
Drycal Reading	Actual Flow Rate (l/min)			Deviation (l/min)	Permissible Deviation (l/min)	Status
	1	2	3	Average		
0.5	0.49	0.48	0.49	0.487	±0.058	Pass
1.0	1.04	1.00	1.00	1.013	±0.10	Pass
2.0	2.00	1.95	1.90	1.950	±0.15	Pass
3.0	2.90	3.07	3.01	2.966	±0.20	Pass



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CALIBRATION TEST REPORT

Instrument : AIR CHECK SAMPLER (High Flow) Serial No. 254539 Model : QCD-1500

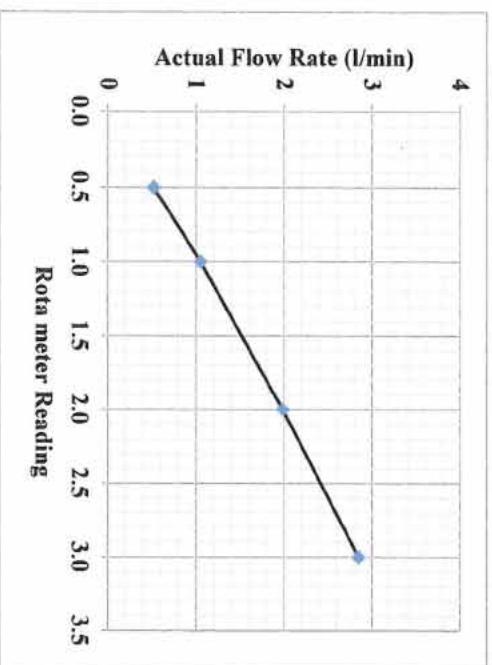
Manufacture : YINHEKEJI

Date of Calibration : JUNE 30, 2025

AM-08

Next Time Calibration : JUNE 30, 2026

Standard Criteria : Primary Flow Meter (Drycal)				Ambient Condition		
Bios Model DLC-M S/N 4669				Temperature = 25.0 °C Pressure = 760 mmHg		
Drycal Reading	Actual Flow Rate (l/min)			Deviation (l/min)	Permissible Deviation (l/min)	Status
	1	2	3	Average		
0.5	0.50	0.50	0.55	0.517	±0.05	Pass
1.0	1.02	1.05	1.10	1.057	±0.10	Pass
2.0	2.02	1.90	2.05	1.990	±0.15	Pass
3.0	2.95	2.80	2.80	2.850	±0.20	Pass



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Industrial Hygiene Specialist



Industrial Health Association of Asia
สำหรับประเทศไทย (ประเทศไทย) 10250 โทรศัทพ์ (662)3200277-8



CALIBRATION TEST REPORT

Instrument : AIR CHECK SAMPLER (High Flow) Serial No. 254541 Model : QCD-1500

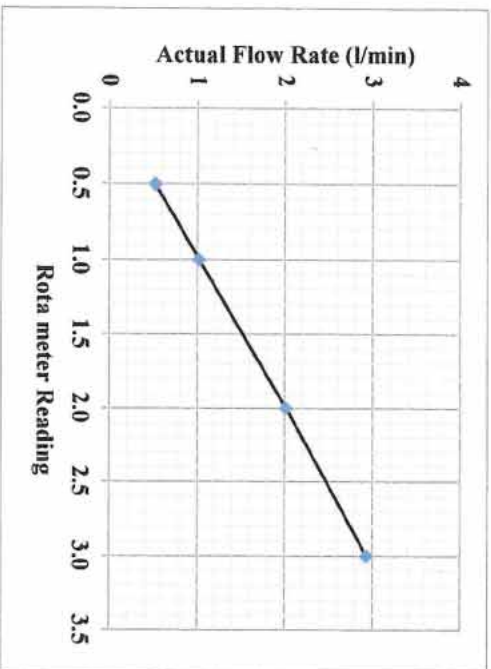
Manufacture : YINHEKEJI

Date of Calibration : JUNE 30, 2025

AM-10

Next Time Calibration : JUNE 30, 2026

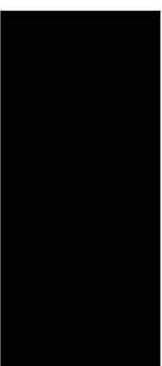
Standard Criteria : Primary Flow Meter (Drycal)				Ambient Condition			
Bios Model DLC-M S/N 4669				Temperature = 25.0 °C			
				Pressure = 760 mmHg			
Drycal Reading	Actual Flow Rate (l/min)				Deviation (l/min)	Permissible Deviation (l/min)	Status
	1	2	3	Average			
0.5	0.53	0.53	0.52	0.527	0.0058	±0.05	Pass
1.0	1.03	1.02	1.02	1.023	0.0058	±0.10	Pass
2.0	2.00	2.05	2.00	2.017	0.0289	±0.15	Pass
3.0	2.91	2.95	2.95	2.937	0.0231	±0.20	Pass



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CALIBRATION TEST REPORT

Instrument : AIR CHECK SAMPLER (High Flow)

Serial No. 20170104067

Model : BDX-II

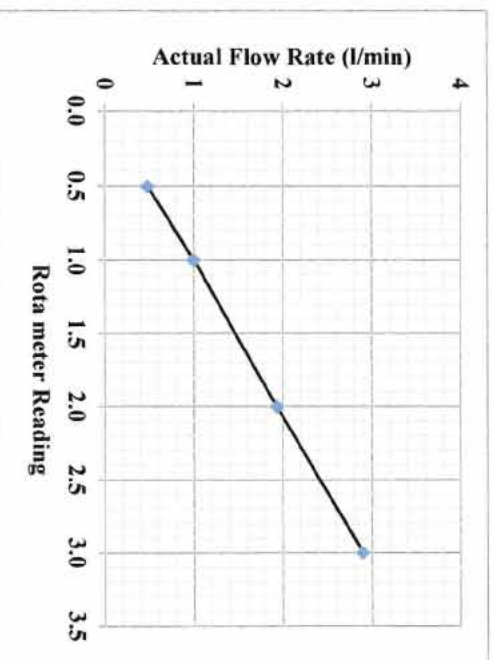
Manufacture : Gillian

Date of Calibration : JANUARY 3, 2026

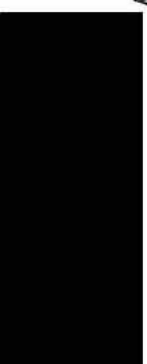
GN-13

Next Time Calibration : JANUARY 3, 2027

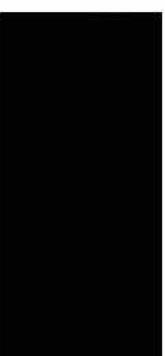
Standard Criteria : Rota Meter				Ambient Condition			
SKC Model1355EZ30 S/N 0107070345011/003				Temperature = 25.0 °C Pressure = 758 mmHg			
Rota Meter Reading	Actual Flow Rate (l/min)			Deviation (l/min)	Permissible Deviation (l/min)	Status	
	1	2	3	Average			
0.5	0.45	0.50	0.50	0.483	0.0289	±0.05	Pass
1.0	1.00	0.95	1.05	1.000	0.0500	±0.10	Pass
2.0	1.95	1.90	1.95	1.933	0.0289	±0.15	Pass
3.0	2.95	2.95	2.80	2.900	0.0866	±0.20	Pass



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Industrial Hygiene Specialist

CALIBRATION TEST REPORT

Instrument : AIR CHECK SAMPLER (High Flow)

Serial No. 20170104068

Model : BDX-II

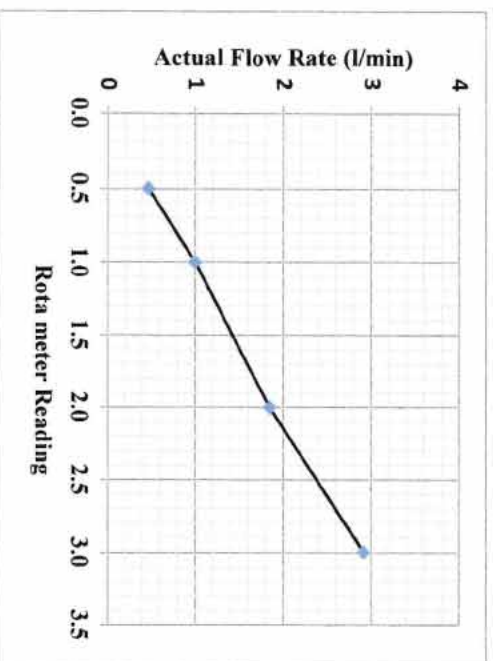
Manufacturer : Gilian

Date of Calibration : JANUARY 3, 2026

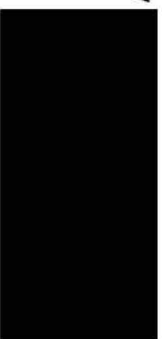
GN-14

Next Time Calibration : JANUARY 3, 2027

Standard Criteria : Rota Meter				Ambient Condition			
SKC Model1355EZ30 S/N 0107070345011/003				Temperature = 25.0 °C			
				Pressure = 758 mmHg			
Rota Meter Reading	Actual Flow Rate (l/min)			Deviation (l/min)	Permissible Deviation (l/min)	Status	
	1	2	3	Average			
0.5	0.45	0.45	0.50	0.467	0.0289	±0.05	Pass
1.0	0.95	1.05	1.00	1.000	0.0500	±0.10	Pass
2.0	1.90	1.85	1.80	1.850	0.0500	±0.15	Pass
3.0	2.80	2.95	3.00	2.917	0.1041	±0.20	Pass



Calibrated by



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Industrial Hygiene Specialist

CALIBRATION TEST REPORT

Instrument : AIR CHECK SAMPLER (High Flow)

Serial No. 20170104069

Model : BDx-II

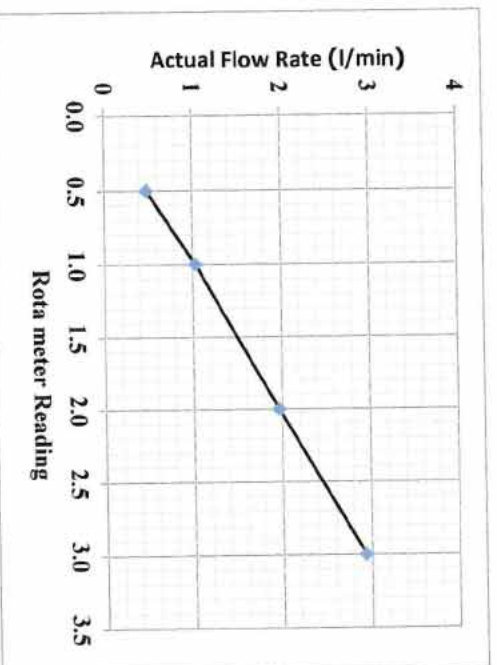
Manufacture : Gilian

Date of Calibration : JANUARY 3, 2026

GN-15

Next Time Calibration : JANUARY 3, 2027

Standard Criteria : Rota Meter				Ambient Condition		
SKC Model1355EZ30 S/N 0107070345011/003				Temperature = 25.0 °C		
				Pressure = 758 mmHg		
Rota Meter Reading	Actual Flow Rate (l/min)			Deviation (l/min)	Permissible Deviation (l/min)	Status
	1	2	3			
0.5	0.50	0.50	0.45	0.483	±0.05	Pass
1.0	1.05	1.00	1.05	1.033	±0.10	Pass
2.0	1.95	2.05	1.90	1.967	±0.15	Pass
3.0	2.95	2.95	2.90	2.933	±0.20	Pass



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CALIBRATION LABORATORY CO., LTD.

21/0-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



ANSI National Accreditation Board
ACCREDITED
CALIBRATION AND
DIMENSIONAL MEASUREMENT
ACDM-2814

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : ROTA FLOW METER
MANUFACTURER : BROOKS INSTRUMENT DIVISION
MODEL / TYPE : 135SEZ30
SERIAL NO. : 0107070345011/002 [ROTA CAL.01]
CLID. NO. : 212501369
JOB CONTROL NO. : 250710080983
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : LIFE & ENVIRONMENT CO., LTD.

90, 92, 94 SOI ON-NUCH 64, SRINAKARIN RD.,
ON-NUCH, SUANLUANG, BANGKOK, THAILAND 10250

DATE OF RECEIVED : 10 July 2025

DATE OF ISSUED : 18 July 2025

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

Calibrated By :

Supphakit Sakuntaharn

Calibration Engineer



Approved By :



Authorized Signatory

18 July 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. Q25080983

F3-011-05/12-23





CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY CO., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE	:	ROTA FLOW METER
MANUFACTURER	:	BROOKS INSTRUMENT DIVISION
MODEL / TYPE	:	135SEZ30
SERIAL NO.	:	0107070345011/002 [ROTA CAL.01]
DATE OF CALIBRATION	:	15 July 2025

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$ Relative Humidity : $(55 \pm 10) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. **CLC-CPPF-03**. The calibration was performed by comparison with Gas Flow Meter which refers to the standard condition of 101.325 kPa and 0 °C.

REFERENCE STANDARD USED :

Gas Flow Meter, Alicat Scientific Model M-5SLPM-D-DB15 S/N. 261330.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Chell Instrument Ltd.

Certificate No. N039747, Due Date 02 April 2026.

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)"

Certificate No. Q25080983

F3-011-05/12-23





CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY CO., LTD.

27/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cah-laboratory.com E-mail: sale@cah-laboratory.com



ANAB National Accreditation Board
ACCREDITED
CALIBRATION AND
DIAGNOSTICAL MEASUREMENT
ACDM-2814

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 rota flow meter.

CALIBRATION DATA

1. ROTA FLOW METER RESULT (SILVER BALL RIGHT)

DUC Setting		STD Reading		Correction		Uncertainty	
(SCCM)	(L/min)	(SCCM)	(L/min)	(SCCM)	(L/min)	± (SCCM)	± (L/min)
1000.0	1.000	1006.3	1.006	+6.3	+0.006	5.8	0.006
2000.0	2.000	2009.1	2.009	+9.1	+0.009	11.7	0.012
3000.0	3.000	3015.2	3.015	+15.2	+0.015	17.7	0.018
4000.0	4.000	4018.9	4.019	+18.9	+0.019	23.6	0.024

2. ROTA FLOW METER RESULT (SILVER BALL LEFT)

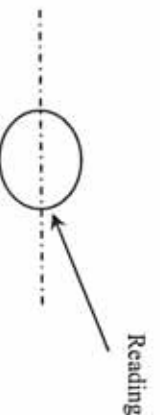
DUC Setting		STD Reading		Correction		Uncertainty	
(SCCM)	(L/min)	(SCCM)	(L/min)	(SCCM)	(L/min)	± (SCCM)	± (L/min)
30	0.030	26.60	0.027	-3.40	-0.003	1.20	0.001
100	0.100	97.26	0.097	-2.74	-0.003	1.30	0.001

Technical Note. Media of Gas : Air

Setting Temperature 21.10 ° C ; Pressure 101.3 kPa

Conversion factor 1 SCCM ≈ 0.001 L/min

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 49 of 68



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

End of Certificate

Certificate No. Q25080983

F3-011-05/12-23





Certificate of Calibration

Equipment:	Electronic Balance	Certificate No.:	C01260924
Manufacturer:	Sartorius	Job No.:	WO-00111081
Model:	LA130S-F	Issued Date:	20 March 2026
Serial No.:	16908811	Page:	1 of 2
ID No.:	EP-AB-01/47		
Condition of the item:	Normal		

Customer: LIFE & ENVIRONMENT CO., LTD.
90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Environment Condition:

Temperature	26 °C	±	0.5 °C
Relative Humidity	47 %	±	1.8 %

Calibration Place: LIFE & ENVIRONMENT CO., LTD. (Air (TSP/PM10) Testing Laboratory)
90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Calibration By: Mr. Chananyu Kongtraiphop

Calibration Date: 20 March 2026

The Method Used: In-house method, CAL-WI-47, based on UKAS Lab 14

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Co., Ltd. Certificate No. C02251333

Person in charge

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 Evaluation of measurement data - Guide to the expression of uncertainty in measurement (JCGM 100).

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 อีเซีย จำกัด
DKSH Technology Limited
2533 สุขุมวิท ถนนสุขุมวิท กรุงเทพฯ 10260
2533 Sukhumvit Road, Bangkok, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Authorized signatory

Calibration Results:

Without Adjustment

Eccentric Error: Weight to be 1/3 or 1/2 of Maximum capacity, taken from the center of the pan as a zero reference.

	Nominal Test Value 5 (g)				
	Reference Points (g)				
	A	B	C	D	E
	-	-0.0001	0.0001	0.0001	-0.0001

Repeatability: Determination of the standard deviation of weighing balance., Readability 0.0001 (g)

Nominal test value (g)	Standard Deviation
1	0.00005
10	0.00008

Error of indication from nominal or conventional mass value., Readability 0.0001 (g)

Nominal Value (g)	Conventional Mass (g)	Displayed Value (g)	Error of indication (g)	Uncertainty (± g)	k
1	1.00001	1.0000	0.0000	0.00013	2.09
2	2.00001	2.0000	0.0000	0.00013	2.09
3	3.00002	3.0000	0.0000	0.00013	2.08
4	4.00003	3.9999	-0.0001	0.00014	2.08
5	5.00002	5.0000	0.0000	0.00013	2.09
6	6.00003	6.0000	0.0000	0.00014	2.08
7	7.00003	7.0000	0.0000	0.00014	2.08
8	8.00004	7.9999	-0.0001	0.00014	2.06
9	9.00005	9.0001	0.0000	0.00014	2.06
10	10.00001	10.0000	0.0000	0.00013	2.08

The End of Certificate



บริษัท บาราสายันติฟิค จำกัด
BARA SCIENTIFIC CO., LTD.

PREVENTIVE MAINTENANCE/ CALIBRATION

GC SYSTEM

GC-14B/C-R5A

ID NO.

: -

REPORT NO.

: C-A3-TK-6811-0211

DATE OF REPORT

: 12 November 2025

COMPLETION DATE

: 12 November 2025

NEXT DUE DATE

: ON November 2026

GAS CHROMATOGRAPHY

SERIAL NUMBER

C10733000756SA

CUSTOMER

LIFE AND ENVIRONMENT CO., LTD.

ADDRESS

90, 92, 94 SOI ON-NUCH 64,
SRINAKARIN ROAD, ON-NUCH
SUANLUANG, BANGKOK 10250.

ATTENTION

KHUN TUNYALUCK KREEPANICH

PHONE

02-320-0277-8 EXT. 304, 308

FAX

023200293

DONE BY

Mr. Nattapon Ngamsang

SERVICE REPORT NO.

C-A3-TK-6811-0211

SIGNED FOR AND ON BEHALF OF
BARA SCIENTIFIC CO., LTD.



บริษัท บาราสายันติฟิด จำกัด
BARA SCIENTIFIC CO., LTD.

CERTIFICATE

THIS CERTIFIES THE PERFORMANCE OF SHIMADZU GAS CHROMATOGRAPHY AT

LIFE AND ENVIRONMENT CO., LTD.ADDRESS : 90, 92, 94 SOI ON-NUCH 64,
SRINAKARIN ROAD, SUANLUANG, BANGKOK 10250.

SYSTEM CONFIGURATION : GC-14B, C-R5A

DETECTOR TYPE : FLAME IONIZATION DETECTOR (FID)

METHOD : SENSITIVITY TEST OF FID BY SHIMADZU CORPORATION, JAPAN.

CHEMICAL : N-HEXADECANE(C₁₆) 100ng/ul (HEPTANE SOVENT)

SPECIFICATION OF FID :S(C/g)OF C16 IS MORE THAN 0.01(C/g)

RESULT : SENSITIVITY OF FID CH1 = **0.0138** C/g

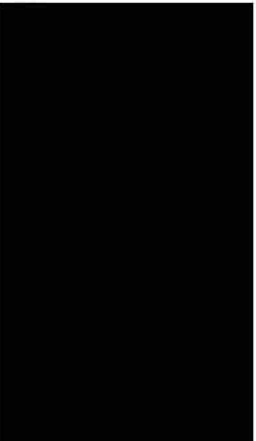
REPRODUCIBILITY : Area Value CH1 CV $\leq$ 10.00 % = **0.822** %

Retention Time CH1 CV $\leq$ 2.00 % = **0.135** %

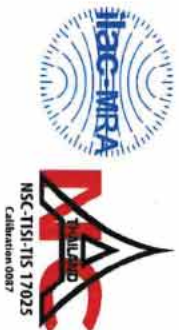
ISSUED ON : 12 November 2025

ISSUED AT : SERVICE SECTION, BARASCIENTIFIC CO.,LTD.

APPROVED BY :

(


SERVICE ENGINEER



Certificate of Calibration

Equipment:

SPECTROPHOTOMETER

Certificate No.: C06250507

Manufacturer:

CECIL

Job No.: WO-00097669

Model:

CE 1011

Issued Date: 10 December 2025

Serial No.:

920-252

Page: 1 of 2

ID No.:

-

Condition of the item: Normal**Customer:**

LIFE & ENVIRONMENT CO., LTD.

90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Environment Condition:

Temperature	25.2	°C	±	0.4	°C
Relative Humidity	54.2	%	±	2.6	%

Calibration Place:

LIFE & ENVIRONMENT CO., LTD. (Air Testing Laboratory)
90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Calibration By:

Mr.Atachai Ngamchanat

Calibration Date:

10 December 2025

The Method Used:

In house method, CAL-WI-24, base on ASTM E 275-08 and ASTM E 387-04

Traceability:

This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Starna Scientific Limited.

The standard for Wavelength Certificate No. 134632 and 134634

The standard for Photometric Certificate No. 134665

Person in charge**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 Evaluation of measurement data - Guide to the expression of uncertainty in measurement (JCGM 100).

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 อีเซีย จำกัด
DKSH Technology Limited
2533 สุขุมวิท 90 ถนนสุขุมวิท กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangkok, Prathunong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Calibration Results:
Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 5 nm and UUC at 8 nm

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.40	420.5	-2.10	0.13
447.20	450.2	-3.00	0.13
459.30	459.6	-0.30	0.13
537.00	539.2	-2.20	0.13
638.00	640.3	-2.30	0.13
585.56	589.5	-3.94	0.13

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.5783	0.577	0.0013	0.0045
	0.7109	0.713	-0.0021	0.0045
440 nm	1.0114	1.014	-0.0026	0.0045
	0.0000	0.000	0.0000	0.0045
	0.5620	0.559	0.0030	0.0045
465 nm	0.6993	0.697	0.0023	0.0045
	0.9948	0.991	0.0038	0.0045
	0.0000	0.000	0.0000	0.0045
546.1 nm	0.5226	0.523	-0.0004	0.0045
	0.6607	0.661	-0.0003	0.0045
	0.9389	0.940	-0.0011	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.5204	0.519	0.0014	0.0045
	0.6972	0.697	0.0002	0.0045
635 nm	0.9921	0.992	0.0001	0.0045
	0.0000	0.000	0.0000	0.0045
	0.5541	0.553	0.0011	0.0045
	0.7726	0.765	0.0076	0.0045
	1.1014	1.090	0.0114	0.0045
	0.0000	0.000	0.0000	0.0045
	0.5615	0.560	0.0015	0.0045
	0.7622	0.758	0.0042	0.0045
	1.0864	1.079	0.0074	0.0045

The End of Certificate



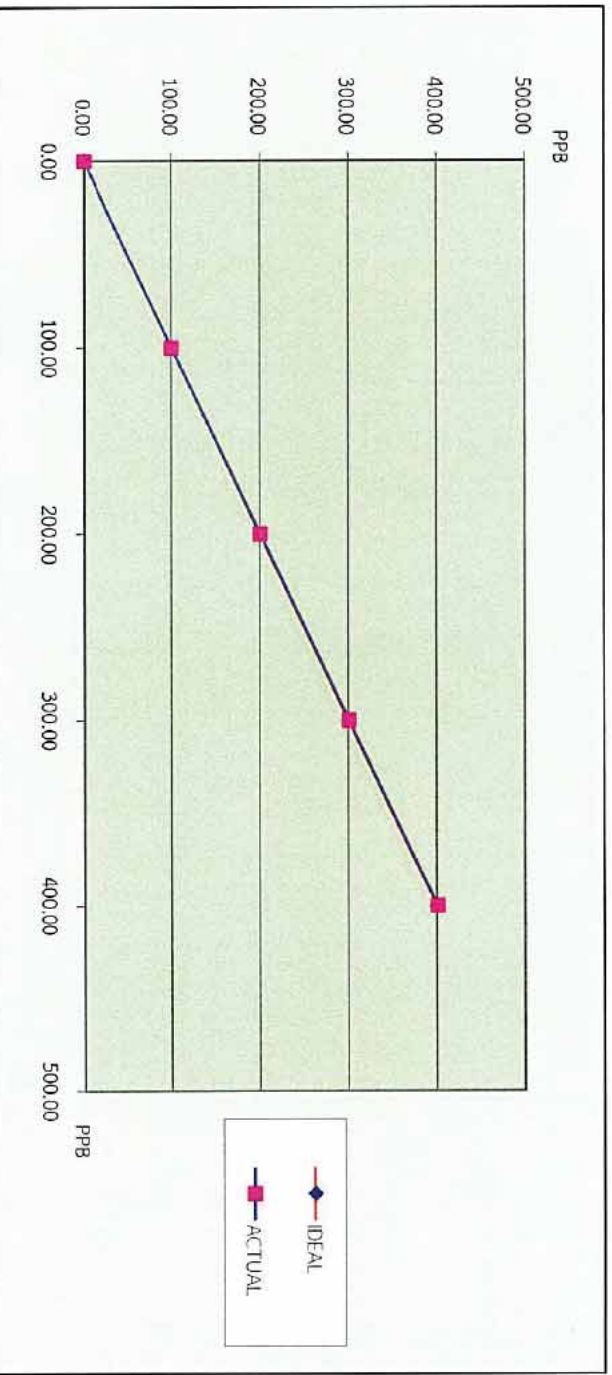
TEST REPORT

JIRANATEE ASSOCIATES CO.,LTD

CUSTOMER NAME	: All-Quip Co., Ltd. [บริษัท ออล คิวลิป จำกัด (สำนักงานใหญ่)]		
EQUIPMENT NAME	: SO ₂ Analyzer		
MANUFACTURER	: HORIBA	MODEL :	APSA-370
STANDARD GAS CONCENTRATION (PPM)	: 53.29 PPM		
CYLINDER PRESSURE (PSI)	: 1,400 PSI		
CERTIFIED BY : AIRGAS			SERIAL NO : 4AXYPEVX
			CYLINDER NO : CC734373
			CERTIFIED DATE : 12/05/2020
			EXPIRED DATE : 12/05/2028

TEST RESULTS

POINT NO	TEST RESULTS			
	IDEAL	ACTUAL	ERROR	%ERROR
ZERO	0.00	0.10	0.10	-
1	100.00	99.90	-0.1	-0.10
2	200.00	200.30	0.3	0.15
3	300.00	300.70	0.7	0.23
4	400.00	400.90	0.9	0.22
AVERAGE (%)				0.13



CALIBRATED BY : [REDACTED] DATE : 26/2/89

CHECKED BY : [REDACTED] DATE : 26/2/89



ต้องการซื้ออุปกรณ์เพิ่มเติม : กรุณาติดต่อฝ่ายขาย , โทร 02-868-0812 # 15-16 , E-Mail : Engineer@jiranatee.com

สาขาที่ 63/14-15,67/35-36 ถนน ซอยเพชรเกษม 7/7/1 เพชรเกษม แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพมหานคร 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889



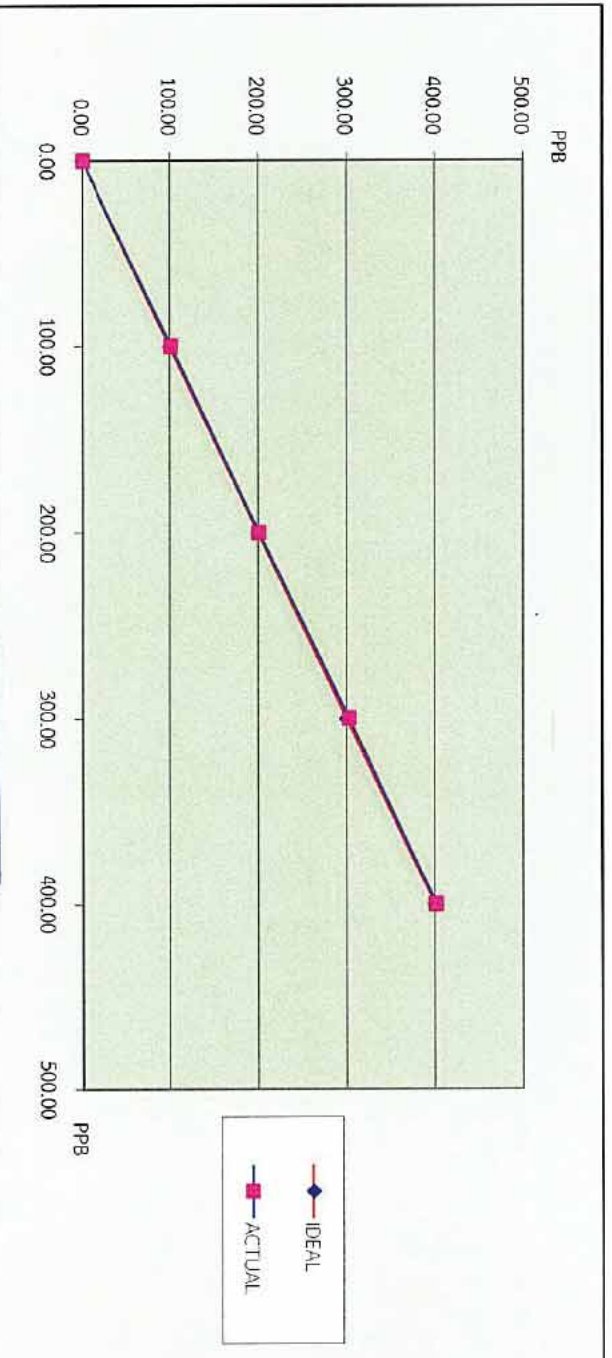
TEST REPORT

IRANATEE ASSOCIATES CO., LTD.

CUSTOMER NAME	: All-Quip Co., Ltd. [บริษัท ออล คิวลิป จำกัด (สำนักงานใหญ่)]		
EQUIPMENT NAME	: SO ₂ Analyzer		
MANUFACTURER	: HORIBA	MODEL :	APSA-370
STANDARD GAS CONCENTRATION (PPM)	: 53.29 PPM		
CYLINDER PRESSURE (PSI)	: 1,400 PSI		
CERTIFIED BY : AIRGAS			SERIAL NO : P333UH11
			CYLINDER NO : CC734373
			CERTIFIED DATE : 12/05/2020
			EXPIRED DATE : 12/05/2028

TEST RESULTS

POINT NO	TEST RESULTS			
	IDEAL	ACTUAL	ERROR	%ERROR
ZERO	0.00	0.20	0.20	-
1	100.00	101.30	1.3	1.30
2	200.00	200.50	0.5	0.25
3	300.00	302.90	2.9	0.97
4	400.00	401.10	1.1	0.28
AVERAGE (%)				0.70



CALIBRATED BY : [REDACTED] DATE : 26/2/69

CHECKED BY : [REDACTED] DATE : 26/2/69



ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการลูกค้าทางขาย , โทร 02-868-0812 # 15-16 , E-Mail : Engineer@iranatee.com

เลขที่ 63/14-15.67/35-36 ถนน ซอยเพชรเกษม 7/7/1 เพชรเกษม แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพมหานคร 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889

Ecotech EC9850 Sulphur Dioxide Analyzer

Model : EC9850

Serial Number : 02-0314

Brand	Airgas
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96	96
97	97
98	98
99	99
100	100

Components

Carbon Monoxide (CO)

Nitric Oxide (NO)

Sulfur Dioxide (SO_2)

Nitrogen (N_2)

Concentration

5510 PPM

57.60 PPM

56.23 PPM

Balance

Calibration Setting

Span Instrument Gain	34.613	Start Time	10:00
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Span Instrument Gain	5.919
Finish Time	10:35

Signature

Approved

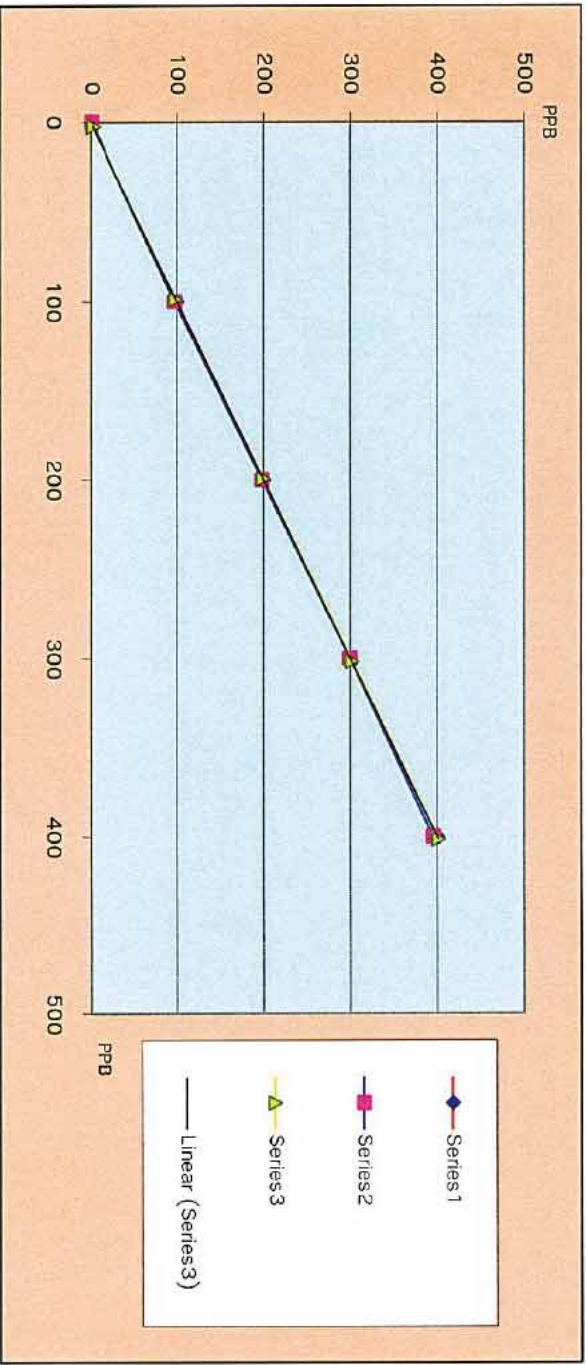
บริษัท สุทธิพรเมอส์ จำกัด
SITHIPORN ASSOCIATES COMPANY LIMITED

TEST REPORT

CUSTOMER NAME	: All-Quip Co., Ltd. [บริษัท ออล คิวลิป จำกัด (สำนักงานใหญ่)]				
EQUIPMENT NAME	: NO _x Analyzer				
MANUFACTURER	: HORIBA	MODEL :	APNA-370	SERIAL NO	: XFJ1IE36
STANDARD GAS CONCENTRATION (PPM)	: 53.15 PPM			CYLINDER NO	: CC734373
CYLINDER PRESSURE (PSI)	: 1,400 PSI			CERTIFIED DATE	: 12/05/2020
CERTIFIED BY : AIRGAS				EXPIRED DATE	: 12/05/2028

TEST RESULTS

POINT NO	TEST RESULTS					
	IDEAL	ACTUAL NO	ERROR NO	%ERROR NO	ACTUAL NO _x	ERROR NO _x %ERROR NO _x
ZERO	0.00	0.20	0.20	-	0.10	0.10 -
1	100.00	101.90	1.90	1.90	100.20	0.20 0.20
2	200.00	201.70	1.70	0.85	201.80	1.80 0.90
3	300.00	301.50	1.50	0.50	301.50	1.50 0.50
4	400.00	400.60	0.60	0.15	400.20	0.20 0.05
AVERAGE (%)				0.85		0.41



CALIBRATED BY : [REDACTED] DATE : 26/12/169

CHECKED BY : [REDACTED] DATE : 26/12/169

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : กรุณาส่งอีเมลขอใบบริการหลังการขาย , โทร 02-868-0812 # 15,16 , E-Mail : Engineer@iranatee.com

เลขที่ 63/14-15,67/35-36 สอบถามราคากลาง 7,7/1 แผนบริหารงาน แสงสว่างสำหรับ เตาเผาถลุงใหญ่ กรุงเทพมหานคร โทร 02-868-0812-13 โทรสาร 02-868-1889



บริษัท เอ็นไวร์ เซอร์วิส จำกัด (สำนักงานใหญ่)

Envir Service Co., Ltd. (Head Office)

Report on the repair and calibration of air quality monitoring equipment.

Customer / Agency : LIFE & ENVIRONMENT CO., LTD

Date : 09 February 2026

List of devices/ machinery : NOx Analyze

Manufacturing company :  TELEDYNE INSTRUMENTS

Model of equipment : 200E

Serial Number : 2288

PARAMETER	RECORDED VALUE	ACCEPTAB VALLE UE
RANGE	500.0 PPB/PPM	50 PPB TO 20 PPM
NOx STAB	0.3 PPB/PPM	≤ 1 PPB WITH ZERO AIR
SAMPLE FLOW	454 CM ³	500 ± 50
OZONE FLOW	71 CM ³	80 ± 15
PMT	102.6 MV	0-5000MV
NORM PMT	59.9 MV	0-5000MV
AZERO	37.9 MV	-20 TO 150
HVPS	730 V	400 – 900
RCELL TEMP	50.0 °C	50 ± 1
BOX TEMP	28.2 °C	AMBIENT ± 5°C
PMT TEMP	7.0 °C	7 ± 2°C
MOLY TEMP	314.4 °C	315 ± 5°C
RCEL PRESS	8.8 IN-HG-A	<10
SAMP PRESS	28.8 IN-HG-A	AMBIENT ± 1
NOx SLOPE	1.030	1.0 ± 0.3
NOx OFFSET	1.5 MV	50 TO 150
NO SLOPE	0.972	1.0 ± 0.3
NO OFFSET	-7.5 MV	50 TO 15 0



Calibration Date 17-Feb-2025

Product Brand Ecotech

Type Systematic Analyzer Ambient Monitoring

Serial Number : 02-0409

May-2025

Airgas

Concentration

4504 PPM

45.73 PPM

45.67 PPM

Balance

Calibration Setting

10.764

10:35

Reading (After Adj.)			
Span	Expected	Analyzer Response	Error
Set Point	Concentration (PPB)	(PPB)	%
Zero NO	0	0	-
Zero NO _x	0	0	-
Span NO	400	399	-0.25
Span NO _x	400	400	0.00

17.566

11:10

1003



ประมุขสิทธิมนุษยชนเพื่อชีวิตและเสรีภาพ

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer: AIR LIQUIDE (THAILAND) LTD
Part Number: E04N199E15A0292 Reference Number: 160-402702977-1
Cylinder Number: CC757566 Cylinder Volume: 144.0 CF
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2015 PSIG
PGVP Number: A12023 Valve Outlet: 660
Gas Code: CO,NO,NOX,SO2,BALN Certification Date: Apr 18, 2023
Expiration Date: Apr 18, 2031

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

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	55.00 PPM	55.88 PPM	G1	+/- 1.4% NIST Traceable	04/11/2023, 04/18/2023
NITRIC OXIDE	55.00 PPM	55.87 PPM	G1	+/- 1.3% NIST Traceable	04/11/2023, 04/18/2023
SULFUR DIOXIDE	55.00 PPM	55.91 PPM	G1	+/- 1.0% NIST Traceable	04/11/2023, 04/18/2023
CARBON MONOXIDE	4500 PPM	4518 PPM	G1	+/- 0.7% NIST Traceable	04/11/2023
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	210607-22	CG708067	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
GMS	DCK1201202230	CG750372	49.20 PPM NITRIC OXIDE/NITROGEN	+/- 0.9%	Jan 19, 2026
PRM	12404	APEX 1324257 - NOX	50.06 PPM NOX/NITROGEN	+/- 0.4%	Dec 22, 2023
GMS	124206889104	CC322509	4.326 PPM NITROGEN DIOXIDE/AIR	+/- 2.0%	Feb 21, 2025
NTRM	160610-01	CC473196	49.02 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Mar 22, 2028
GMS	07212022B109	EB0141209	50.08 PPM SULFUR DIOXIDE/NITROGEN	+/- 1.0%	Dec 21, 2026
CARBON MONOXIDE	051608	KAL004632	4857 PPM CARBON MONOXIDE/NITROGEN	0.60%	Jun 07, 2024

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

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 NIKD579	NDIR	Apr 05, 2023
Nicolet iS60 FTIR AUP2010245 NO	FTIR	Apr 06, 2023
Nicolet iS60 FTIR AUP2010245 NO2	FTIR	Mar 23, 2023
Nicolet iS60 FTIR AUP2010245 SO2	FTIR	Apr 13, 2023

Maintenance and Calibration Report

Wind Direction Sensor

Met One Instrument	Model: 034B	S/N. : Y1846
Date 24/02/2026		Start Time 14:00
Data Logger : Metone	Model: 466A	S/N.: Y1191

Customer : Life & Environment Co.,Ltd.

90,92,94 ซอยอ่อนนุช 64 แขวงอ่อนนุช เขตสวนหลวง กรุงเทพมหานคร 10250

Maintenance

Replace Front Bearing	☐ Yes	☒ No
Replace Back Bearing	☐ Yes	☒ No
Replace Potentiometer	☐ Yes	☒ No

Calibration Result

Reading			Analog Output (Volt)	
Expected	Logger	% Error	Expected	Measured
360,0	0	0.0	2.500	2.500
90	90	0.0	0.625	0.625
180	180	0.0	1.250	1.250
270	270	0.0	1.875	1.875

Finish Time 17:30

Comment :

Performed rotate the WD increase 90 degree per 1 step from 0,360 , 90, 180 and 270 degree.

Data Logger Metone Model 466A, S/N. Y1191

Engineer Name :
.....

Maintenance and Calibration Report

Wind Speed Sensor

Met One Instrument	Model: 034B	S/N. : Y1846
Date 24/02/2026		Start Time 14:00
Data Logger : Metone	Model: 466A	S/N.: Y1191
Calibrator : RM Young	Model: 18811	S/N.: 4176

Customer : Life & Environment Co.,Ltd.

90,92,94 ซอยอ่อนนุช 64 แขวงอ่อนนุช เขตสวนหลวง กรุงเทพมหานคร 10250

Maintenance

Replace Front Bearing	☐ Yes	☒ No
Replace Back Bearing	☐ Yes	☒ No
Replace Shaft Coupler	☐ Yes	☒ No
Replace Hub	☐ Yes	☒ No

Testing Result

Generate Speed	Reading		Error (Diff) m/s
	Expect (m/s)	Logger	
0	0.30	0.30	0.00
100	2.94	3.10	0.16
200	5.61	5.50	-0.11
300	8.27	8.30	0.03
400	10.93	11.10	0.17
500	13.60	13.50	-0.10

Finish Time 17:30

Comment : Set the offset reading of WS is 0.3 m/s.

Test by force to rotate the WS sensor from 0 - 500 round per second.

Data Logger Metone Model 466A, S/N. Y1191

Engineer Name :



.....



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Tel. +662-114-3148 Email : stcal.mtd@gmail.com Website : stc-cal.com



Certificate of Calibration

Certificate No. STCR-2602079-7

Work Order No. STCR-2602079

Page 1 of 3

Customer Name : LIFE & ENVIRONMENT CO., LTD. (HEAD OFFICE)
90, 92, 94 Soi On-Nuch 64 Shinakarin Rd., On-Nuch,
Suanluang, Bangkok 10250

Equipment Name : Sound Level Meter
Manufacturer : Pulsar
Model : 45
Serial Number : PN2449
Control Number : N/A
Received Date : Feb 10, 2026
Calibration Date : Feb 12, 2026
Recommended Due Date : Feb 12, 2027
Calibration Method : Calibration Procedure No. CPE-04-01

Environmental Conditions
Ambient Temperature : $(25 \pm 2) ^\circ\text{C}$
Ambient Relative Humidity : $(50 \pm 15) \% \text{RH}$
Calibration Place : Permanent Calibration Laboratory
Condition as received : Normal
Calibration Result : See data attached

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated

Date of Issue : Mar 16, 2026
Calibrated by : P. Wasit Pintong

Approved by :



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2602079-7

Page 2 of 3

Standards Equipment Used

<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Sound Calibrator	N975185	5523631032296324	Oct 31, 2026	MP-TH

Traceability

This calibration is traceable to the International System of Unit via :

- MP-TH : Micro Precision Calibration Laboratory (Thailand) Co., Ltd.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2602079-7

Page 3 of 3

UUC Range : (30 to 130) dB

Resolution : 0.1 dB

Results of Calibration: [] Without adjustment [☒] With adjustment

Appearance and Function of Use Inspection : GOOD

Sound Level Calibration @ Frequency 1 KHz

Select : A

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.07 dB	93.3 dB	94.0 dB	0.07 dB	0.40 dB
	114.06 dB	113.2 dB	113.9 dB	0.16 dB	0.40 dB

Sound Level Calibration @ Frequency 1 KHz

Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.07 dB	93.2 dB	93.9 dB	0.17 dB	0.40 dB
	114.06 dB	113.3 dB	113.9 dB	0.16 dB	0.40 dB

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -





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Certificate of Calibration

Certificate No. STCR-2602079-8

Work Order No. STCR-2602079

Page 1 of 3

Customer Name : LIFE & ENVIRONMENT CO., LTD. (HEAD OFFICE)
90, 92, 94 Soi On-Nuch 64 Srinakarin Rd., On-Nuch,
Suanluang, Bangkok 10250

Equipment Name : Sound Level Meier
Manufacturer : Pulsar
Model : 45
Serial Number : PN2450
Control Number : N/A
Received Date : Feb 10, 2026
Calibration Date : Feb 12, 2026
Recommended Due Date : Feb 12, 2027
Calibration Method : Calibration Procedure No. CPE-04-01

Environmental Conditions

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

Condition as received : Normal

Calibration Result : See data attached

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated.

Date of Issue : Feb 16, 2026

Approved by :

Calibrated by : P. Wasit Pintong

Laboratory Manager



@smarttechcal

Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2602079-8

Page 2 of 3

Standards Equipment Used

<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability To</u>
Sound Calibrator	N975185	5523631032296324	Oct 31, 2026	MP-TH

Traceability

This calibration is traceable to the International System of Unit via :

- MP-TH : Micro Precision Calibration Laboratory (Thailand) Co., Ltd.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2602079-8

Page 3 of 3

UUC Range : (30 to 130) dB

Resolution : 0.1 dB

Results of Calibration: [] Without adjustment [☒] With adjustment

Appearance and Function of Use Inspection : GOOD

Sound Level Calibration @ Frequency 1 KHz

Select : A

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.07 dB 114.06 dB	93.1 dB 113.1 dB	94.0 dB 113.9 dB	0.07 dB 0.16 dB	0.40 dB 0.40 dB

Sound Level Calibration @ Frequency 1 KHz

Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.07 dB 114.06 dB	93.0 dB 113.0 dB	93.9 dB 113.8 dB	0.19 dB 0.26 dB	0.40 dB 0.40 dB

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -



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Certificate of Calibration

Certificate No. STCR-2602079-9

Work Order No. STCR-2602079

Page 1 of 3

Customer Name : LIFE & ENVIRONMENT CO., LTD. (HEAD OFFICE)
90, 92, 94 Soi On-Nuch 64 Sinakarin Rd., On-Nuch,
Suanluang, Bangkok 10250

Equipment Name : Sound Level Meter
Manufacturer : Pulsar
Model : 45
Serial Number : PN2451
Control Number : N/A
Received Date : Feb 10, 2026
Calibration Date : Feb 12, 2026
Recommended Due Date : Feb 12, 2027
Calibration Method : Calibration Procedure No. CPE-04-01

Environmental Conditions

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

Condition as received : Normal

- Calibration Result** : See data attached
1. 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%.
 2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
 3. The working standard is indicated in page 2 of this certificate.
 4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
 5. This results of this report only to the items calibrated.

Date of Issue : Feb 16, 2026

Approved by :

Calibrated by : P. Wasit Pintong



@smartechnical



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2602079-9

Page 2 of 3

Standards Equipment Used

<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Sound Calibrator	N975185	5523631032296324	Oct 31, 2026	MP-TH

Traceability

This calibration is traceable to the International System of Unit via :

- MP-TH : Micro Precision Calibration Laboratory (Thailand) Co., Ltd.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2602079-9

Page 3 of 3

UUC Range : (30 to 130) dB

Resolution : 0.1 dB

Results of Calibration: [] Without adjustment [☒] With adjustment

Appearance and Function of Use Inspection : GOOD

Sound Level Calibration @ Frequency 1 KHz

Select : A

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.07 dB	93.3 dB	94.0 dB	0.07 dB	0.40 dB
	114.06 dB	113.3 dB	114.0 dB	0.06 dB	0.40 dB

Sound Level Calibration @ Frequency 1 KHz

Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.07 dB	93.2 dB	93.9 dB	0.17 dB	0.40 dB
	114.06 dB	113.3 dB	114.0 dB	0.06 dB	0.40 dB

STD = Standard

UUC = Unit Under Calibration

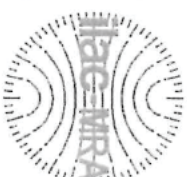
- End of Certificate -





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ANAB
ANSI National Accreditation Board
ACCREDITED
CALIBRATION LABORATORY
AC-3093

Certificate of Calibration

Certificate No. STCR-2509094-3

Work Order No. STCR-2509094

Page 1 of 3

Customer Name : LIFE & ENVIRONMENT CO., LTD. (HEAD OFFICE)
90, 92, 94 Soi On-Nuch 64 Srinakarin Rd., On-Nuch,
Suanluang, Bangkok 10250

Equipment Name : Sound Level Meter
Manufacturer : ACO
Model : TYPE 6236
Serial Number : 222241
Control Number : SLM-NO.12
Received Date : Sep 2, 2025
Calibration Date : Sep 2, 2025
Recommended Due Date : Sep 2, 2026
Calibration Method : Calibration Procedure No. CPE-04-01

Environmental Conditions

Ambient Temperature : (25 ± 2) °C
Ambient Relative Humidity : (50 ± 15) %RH
Calibration Place : Permanent Calibration Laboratory

Condition as received : Normal

Calibration Result : See data attached

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated.

Date of Issue : Sep 18, 2025
Calibrated by : C. Jirayu

Approved by :



@smarttechnical

Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2509094-3

Page 2 of 3

Standards Equipment Used

<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Sound Calibrator	N975185	5523631031354566	Nov 6, 2025	MP-TH

Traceability

This calibration is traceable to the International System of Unit via :

- MP-TH : Micro Precision Calibration Laboratory (Thailand) Co., Ltd.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2509094-3

Page 3 of 3

UUC Range : (30 to 130) dB

Resolution : 0.1 dB

Results of Calibration: [] Without adjustment [☒] With adjustment

Appearance and Function of Use Inspection : GOOD

Sound Level Calibration @ Frequency 1 KHz

Select : A

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	86.7 dB 106.7 dB	92.2 dB 111.9 dB	1.89 dB 2.17 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	86.7 dB 106.6 dB	92.2 dB 111.9 dB	1.89 dB 2.17 dB	0.40 dB 0.40 dB

Sound Level Calibration @ Frequency 1 KHz

Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	86.4 dB 106.3 dB	92.1 dB 111.8 dB	1.99 dB 2.27 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	86.4 dB 106.3 dB	92.1 dB 111.8 dB	1.99 dB 2.27 dB	0.40 dB 0.40 dB

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -



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Certificate of Calibration

Certificate No. STCR-2602079-10

Work Order No. STCR-2602079

Page 1 of 3

Customer Name : LIFE & ENVIRONMENT CO., LTD. (HEAD OFFICE)
90, 92, 94 Soi On-Nuch 64 Srinakarin Rd., On-Nuch,
Suanluang, Bangkok 10250

Equipment Name : Sound Level Meter
Manufacturer : ACO
Model : 6236
Serial Number : 142013
Control Number : SLM-NO.7
Received Date : Feb 10, 2026
Calibration Date : Feb 12, 2026
Recommended Due Date : Feb 12, 2027
Calibration Method : Calibration Procedure No. CPE-04-01

Environmental Conditions

Ambient Temperature : (25 ± 2) °C
Ambient Relative Humidity : (50 ± 15) %RH
Calibration Place : Permanent Calibration Laboratory

Condition as received : Normal

Calibration Result : See data attached

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated.

Date of Issue : Feb 16, 2026

Approved by :

Calibrated by : P. Wasit Pintong



@smarttechcal



Laboratory Manager

Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2602079-10

Page 2 of 3

Standards Equipment Used

<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Sound Calibrator	N975185	5523631032296324	Oct 31, 2026	MP-TH

Traceability

This calibration is traceable to the International System of Unit via :

- MP-TH : Micro Precision Calibration Laboratory (Thailand) Co., Ltd.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2602079-10

Page 3 of 3

UUC Range : (30 to 130) dB

Resolution : 0.1 dB

Results of Calibration: [] Without adjustment [☒] With adjustment

Appearance and Function of Use Inspection : GOOD

Sound Level Calibration @ Frequency 1 kHz

Select : A

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.07 dB 114.06 dB	93.0 dB 112.8 dB	94.1 dB 114.0 dB	-0.03 dB 0.06 dB	0.40 dB 0.40 dB
SLOW	94.07 dB 114.06 dB	93.1 dB 113.0 dB	94.1 dB 114.0 dB	-0.03 dB 0.06 dB	0.40 dB 0.40 dB

Sound Level Calibration @ Frequency 1 kHz

Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.07 dB 114.06 dB	93.1 dB 113.1 dB	94.1 dB 113.9 dB	-0.03 dB 0.16 dB	0.40 dB 0.40 dB
SLOW	94.07 dB 114.06 dB	93.0 dB 113.0 dB	94.1 dB 114.0 dB	-0.03 dB 0.06 dB	0.40 dB 0.40 dB

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -





SMART TECH CALIBRATION & SERVICES CO., LTD.

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Certificate of Calibration

Certificate No. STCR-2506111-7

Work Order No. STCR-2506111

Page 1 of 3

Customer Name : LIFE & ENVIRONMENT CO., LTD. (HEAD OFFICE)
90, 92, 94 Soi On-Nuch 64 Srinakarin Rd., On-Nuch,
Suanluang, Bangkok 10250

Equipment Name : Sound Level Meter
Manufacturer : ACO
Model : TYPE 6236
Serial Number : 222222
Control Number : SLM-NO.11
Received Date : Jun 3, 2025
Calibration Date : Jun 4, 2025
Recommended Due Date : Jun 4, 2026
Calibration Method : Calibration Procedure No. CPE-04-01

Environmental Conditions

Ambient Temperature : (25 ± 2) °C
Ambient Relative Humidity : (50 ± 15) %RH
Calibration Place : Permanent Calibration Laboratory

Condition as received : Normal

Calibration Result : See data attached

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated.

Date of Issue : Jun 27, 2025
Calibrated by : C. Jirayu

Approved by :



@emarttechnical



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506111-7

Page 2 of 3

Standards Equipment Used

<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Sound Calibrator	N975185	5523631031354566	Nov 6, 2025	MP-TH

Traceability

This calibration is traceable to the International System of Unit via :

- MP-TH : Micro Precision Calibration Laboratory (Thailand) Co., Ltd.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506111-7

Page 3 of 3

UUC Range : (30 to 130) dB

Resolution : 0.1 dB

Results of Calibration: [] Without adjustment [☒] With adjustment

Appearance and Function of Use Inspection : GOOD

Sound Level Calibration @ Frequency 1 kHz

Select : A

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	93.4 dB 113.4 dB	94.0 dB 114.0 dB	0.09 dB 0.07 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	93.4 dB 113.4 dB	94.0 dB 114.0 dB	0.09 dB 0.07 dB	0.40 dB 0.40 dB

Sound Level Calibration @ Frequency 1 kHz

Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	93.3 dB 113.5 dB	94.1 dB 114.0 dB	-0.01 dB 0.07 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	93.3 dB 113.5 dB	94.1 dB 114.0 dB	-0.01 dB 0.07 dB	0.40 dB 0.40 dB

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -





SMART TECH CALIBRATION & SERVICES CO., LTD.

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THANYABURI, PATHUM THANI 12110, THAILAND
Tel. +662-114-3148 Email : stcal.md@gmail.com Website : stc-cal.com



Certificate of Calibration

Certificate No. STCR-2506111-6

Work Order No. STCR-2506111

Page 1 of 3

Customer Name : LIFE & ENVIRONMENT CO., LTD. (HEAD OFFICE)
90, 92, 94 Soi On-Nuch 64 Srinakarin Rd., On-Nuch,
Suanluang, Bangkok 10250

Equipment Name : Sound Level Meter
Manufacturer : ACO
Model : TYPE 6236
Serial Number : 2222220
Control Number : SLM-NO.9
Received Date : Jun 3, 2025
Calibration Date : Jun 4, 2025
Recommended Due Date : Jun 4, 2026
Calibration Method : Calibration Procedure No. CPE-04-01

Environmental Conditions

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

Condition as received : Normal

Calibration Result : See data attached

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated.

Date of Issue : Jun 10, 2025
Calibrated by : C. Jirayu

Approved by :



@smarttechcal



Laboratory Manager

Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506111-6

Page 2 of 3

Standards Equipment Used

<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Sound Calibrator	N975185	5523631031354566	Nov 6, 2025	MP-TH

Traceability

This calibration is traceable to the International System of Unit via :

- MP-TH : Micro Precision Calibration Laboratory (Thailand) Co., Ltd.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506111-6

Page 3 of 3

UUC Range : (30 to 130) dB

Resolution : 0.1 dB

Results of Calibration: [] Without adjustment [☒] With adjustment

Appearance and Function of Use Inspection : GOOD

Sound Level Calibration @ Frequency 1 kHz

Select : A

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	93.5 dB 113.4 dB	94.0 dB 114.0 dB	0.09 dB 0.07 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	93.5 dB 113.4 dB	94.0 dB 114.0 dB	0.09 dB 0.07 dB	0.40 dB 0.40 dB

Sound Level Calibration @ Frequency 1 kHz

Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	93.5 dB 113.5 dB	94.0 dB 114.1 dB	0.09 dB -0.03 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	93.5 dB 113.5 dB	94.0 dB 114.1 dB	0.09 dB -0.03 dB	0.40 dB 0.40 dB

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -





Professional Calibration & Services Co., Ltd.

50/888, 50/889 Moo 2, Rungsi-Nakornmayok Rd., Bungyeetho, Thunyaburi,
Pathumthani 12130 Thailand
Tel : (+66)2150-6641 (Autoline)
Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : EL01227/26

Page 1 of 3

Control Number : PCAL203633

Customer Control : -

Description : Acoustic Calibrator

Manufacturer : Quest Technologies

Model : QC-20

Serial Number : QOF110014

Customer : Life and Environment Co., Ltd

90, 92, 94 Soi On-Nuch 64, Srinakarin Rd., On-Nuch, Suanluang, Bangkok 10250



Date of Receipt : 13-Jan-26

Date of Calibration : 13-Jan-26 Due Date : 13-Jan-27

Calibration Location : Electrical Laboratory

Environment : Temperature 23.0 °C ± 2 °C

: Relative Humidity 50.0 % ± 20 %

Calibration Method : Calibration Procedure Number CP-EL35

Calibration Results : See data attached

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

This certificate is issued in accordance with ISO/IEC17025 and the conditions of accreditation granted by the Accreditation Body which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. The results relate only to the item calibrated.

This certificate shall not be reproduced other than in full except without the prior written approval of the Head of Calibration Laboratory of Professional Calibration & Services Co., Ltd.

Calibrated By

Authorized Signature

Mr. Watcharapol Horasit

13-Jan-26
Issued Date



Professional Calibration & Services Co., Ltd.

50/888, 50/889 Moo 2, Rungsi-Nokornmyok Rd., Bungyeeho, Thunyaburi,

Pathumthani 12130 Thailand

Tel : (+66)2150-6641 (Autoline)

Email : info@p-cal.com www.p-cal.com



Calibration Report

Certificate Number : **EL01227/26**

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Sound Level Meter	030606101	ANAB : AC-2590	EL11791/25	11-Mar-26
Sound Calibrator	125626778	NSC : Calibration 0037	EEL.BP. 99/0168	23-Jan-26

Condition as received : **Normal**

Definitions :-

* ANAB - The ANSI National Accreditation Board

* NSC - National Standardization Council of Thailand



Professional Calibration & Services Co., Ltd.

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Email : info@p-cal.com www.p-cal.com



Calibration Report

Certificate No.: EL01227/26

Page : 3 of 3

Calibration Results

Sound Pressure Level Accuracy

Nominal Value	Measured Value	UUC Error	Uncertainty (±)	Tolerance Limit Value
94 dB	93.93 dB	0.07 dB	0.17 dB	93.70 ~ 94.30 dB
114 dB	113.97 dB	0.03 dB	0.17 dB	113.70 ~ 114.30 dB

Notes:

- 1). Tolerances or specifications report in table above are based on QC-10 and QC-20 Acoustical Calibrator, User Manual, document no. 056-144, Rev. J 7/11, Quest Technologies.

...End...



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Certificate of Calibration

Certificate No. STCR-2506111-1

Work Order No. STCR-2506111

Page 1 of 3

Customer Name

: LIFE & ENVIRONMENT CO., LTD. (HEAD OFFICE)
90, 92, 94 Soi On-Nuch 64 Srinakarin Rd., On-Nuch,
Suanluang, Bangkok 10250

Equipment Name

: Noise Dosimeters

Manufacturer

: SOUNDTEK

Model

: ST-130

Serial Number

: 220100103

Control Number

: NT-06

Received Date

: Jun 3, 2025

Calibration Date

: Jun 4, 2025

Recommended Due Date

: Jun 4, 2026

Calibration Method

: Calibration Procedure No. CPE-04-01

Environmental Conditions

Ambient Temperature

: (25 ± 2) °C

Ambient Relative Humidity

: (50 ± 15) %RH

Calibration Place

: Permanent Calibration Laboratory

Condition as received

: Normal

Calibration Result

: See data attached

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated.

Date of Issue

: Jun 27, 2025

Calibrated by

: C. Utrayu

Approved by :

()
Laboratory Manager



@smarttechcal

Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506111-1

Page 2 of 3

Standards Equipment Used

<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Sound Calibrator	N975185	5523631031354566	Nov 6, 2025	MP-TH

Traceability

This calibration is traceable to the International System of Unit via :

- MP-TH : Micro Precision Calibration Laboratory (Thailand) Co., Ltd.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506111-1

Page 3 of 3

UUC Range : (30 to 130) dB

Resolution : 0.1 dB

Results of Calibration: [] Without adjustment [☒] With adjustment

Appearance and Function of Use Inspection : GOOD

Sound Level Calibration @ Frequency 1 kHz

Select : A

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	93.8 dB 113.8 dB	94.0 dB 114.0 dB	0.09 dB 0.07 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	93.8 dB 113.8 dB	94.0 dB 114.0 dB	0.09 dB 0.07 dB	0.40 dB 0.40 dB

Sound Level Calibration @ Frequency 1 kHz

Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	92.9 dB 112.7 dB	94.1 dB 114.1 dB	-0.01 dB -0.03 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	92.9 dB 112.7 dB	94.1 dB 114.1 dB	-0.01 dB -0.03 dB	0.40 dB 0.40 dB

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -





SMART TECH CALIBRATION & SERVICES CO., LTD.

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Certificate of Calibration

Certificate No. STCR-2506111-4

Work Order No. STCR-2506111

Page 1 of 3

Customer Name : LIFE & ENVIRONMENT CO., LTD. (HEAD OFFICE)
90, 92, 94 Soi On-Nuch 64 Srinakarin Rd., On-Nuch,
Suanluang, Bangkok 10250

Equipment Name : Noise Dosimeters
Manufacturer : SOUNDTEK
Model : ST-130
Serial Number : 220100105
Control Number : N/A
Received Date : Jun 3, 2025
Calibration Date : Jun 4, 2025
Recommended Due Date : Jun 4, 2026
Calibration Method : Calibration Procedure No. CPE-04-01

Environmental Conditions

Ambient Temperature : (25 ± 2) °C
Ambient Relative Humidity : (50 ± 15) %RH
Calibration Place : Permanent Calibration Laboratory

Condition as received : Normal

Calibration Result : See data attached

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated.

Date of Issue : Jun 27, 2025
Calibrated by : C. Jirayu

Approved by :



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Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506111-4

Page 2 of 3

Standards Equipment Used

<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Sound Calibrator	N975185	5523631031354566	Nov 6, 2025	MP-TH

Traceability

This calibration is traceable to the International System of Unit via :

- MP-TH : Micro Precision Calibration Laboratory (Thailand) Co., Ltd.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506111-4

Page 3 of 3

UUC Range : (30 to 130) dB

Resolution : 0.1 dB

Results of Calibration: [] Without adjustment [☒] With adjustment

Appearance and Function of Use Inspection : GOOD

Sound Level Calibration @ Frequency 1 kHz

Select : A

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	92.6 dB 112.3 dB	94.0 dB 114.1 dB	0.09 dB -0.03 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	92.8 dB 112.3 dB	94.1 dB 114.1 dB	-0.01 dB -0.03 dB	0.40 dB 0.40 dB

Sound Level Calibration @ Frequency 1 kHz

Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	92.6 dB 112.2 dB	94.1 dB 114.1 dB	-0.01 dB -0.03 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	92.6 dB 112.2 dB	94.1 dB 114.1 dB	-0.01 dB -0.03 dB	0.40 dB 0.40 dB

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -





SMART TECH CALIBRATION & SERVICES CO., LTD.

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THANYABURI, PATHUM THANI 12110, THAILAND
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Certificate of Calibration

Certificate No. STCR-2506111-3

Work Order No. STCR-2506111

Page 1 of 3

Customer Name : LIFE & ENVIRONMENT CO., LTD. (HEAD OFFICE)
90, 92, 94 Soi On-Nuch 64 Srinakarin Rd., On-Nuch,
Suanluang, Bangkok 10250

Equipment Name : Noise Dosimeters
Manufacturer : SOUNDTEK
Model : ST-130
Serial Number : 220300020
Control Number : N/A
Received Date : Jun 3, 2025
Calibration Date : Jun 4, 2025
Recommended Due Date : Jun 4, 2026
Calibration Method : Calibration Procedure No. CPE-04-01

Environmental Conditions

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

Condition as received : Normal

Calibration Result : See data attached

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated.

Date of Issue : Jun 27, 2025
Calibrated by : C. Jirayu

Approved by :



@smarttechcal



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506111-3

Page 2 of 3

Standards Equipment Used

<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Sound Calibrator	N975185	5523631031354566	Nov 6, 2025	MP-TH

Traceability

This calibration is traceable to the International System of Unit via :

- MP-TH : Micro Precision Calibration Laboratory (Thailand) Co., Ltd.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506111-3

Page 3 of 3

UUC Range : (30 to 130) dB

Resolution : 0.1 dB

Results of Calibration: [✓] Without adjustment [] With adjustment

Appearance and Function of Use Inspection : GOOD

Sound Level Calibration @ Frequency 1 kHz

Select : A

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	94.1 dB 114.0 dB	- -	-0.01 dB 0.07 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	94.1 dB 114.0 dB	- -	-0.01 dB 0.07 dB	0.40 dB 0.40 dB

Sound Level Calibration @ Frequency 1 kHz

Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	94.0 dB 114.0 dB	- -	0.09 dB 0.07 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	94.0 dB 114.0 dB	- -	0.09 dB 0.07 dB	0.40 dB 0.40 dB

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -





SMART TECH CALIBRATION & SERVICES CO., LTD.

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THANYABURI, PATHUM THANI 12110, THAILAND
Tel. +662-114-3148 Email : stcal.md@gmail.com Website : stc-cal.com



Certificate of Calibration

Certificate No. STCR-2506111-2

Work Order No. STCR-2506111

Page 1 of 3

Customer Name

: LIFE & ENVIRONMENT CO., LTD. (HEAD OFFICE)
90, 92, 94 Soi Or-Nuch 64 Srinakarin Rd., Or-Nuch,
Suanluang, Bangkok 10250

Equipment Name

: Noise Dosimeters

Manufacturer

: SOUNDTEK

Model

: ST-130

Serial Number

: 190500073

Control Number

: N/A

Received Date

: Jun 3, 2025

Calibration Date

: Jun 4, 2025

Recommended Due Date

: Jun 4, 2026

Calibration Method

: Calibration Procedure No. CPE-04-01

Environmental Conditions

Ambient Temperature : (25 ± 2) °C

Ambient Relative Humidity : (50 ± 15) %RH

Calibration Place : Permanent Calibration Laboratory

Condition as received : Normal

Calibration Result : See data attached

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated.

Date of Issue

: Jun 27, 2025

Calibrated by

: C. Jirayu

Approved by :

([REDACTED])

Laboratory Manager



@smarttechnical

Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506111-2

Page 2 of 3

Standards Equipment Used

<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Sound Calibrator	N975185	5523631031354566	Nov 6, 2025	MP-TH

Traceability

This calibration is traceable to the International System of Unit via :

- MP-TH : Micro Precision Calibration Laboratory (Thailand) Co., Ltd.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506111-2

Page 3 of 3

UUC Range : (30 to 130) dB

Resolution : 0.1 dB

Results of Calibration: [] Without adjustment [☒] With adjustment

Appearance and Function of Use Inspection : GOOD

Sound Level Calibration @ Frequency 1 kHz

Select : A

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	93.5 dB 113.4 dB	94.1 dB 114.0 dB	-0.01 dB 0.07 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	93.4 dB 113.4 dB	94.1 dB 114.0 dB	-0.01 dB 0.07 dB	0.40 dB 0.40 dB

Sound Level Calibration @ Frequency 1 kHz

Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	93.8 dB 113.4 dB	94.1 dB 114.1 dB	-0.01 dB -0.03 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	93.8 dB 113.4 dB	94.1 dB 114.1 dB	-0.01 dB -0.03 dB	0.40 dB 0.40 dB

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -





www.accl-calibration.com
www.accl-cal.com
www.asiainstruments.com

ADVANTAGE CENTER CO., LTD.
59/494 M.6, Frakham Road, T.Kukhot, Lumlookkar, Pathumthani 12130 Thailand.
Tel: (66-2) 9873248-50 Fax: (66-2) 9873252 E-mail: info.accl2662@gmail.com
pomsak2008@yahoo.co.th



CALIBRATION LABORATORY

Certificate No. RA-2510010-2

Job No. RA-2510010

Certificate of Calibration

FOR

Equipment Name : Noise Dose Meter

Manufacturer : SOUNDTEK

Model : ST-130

Serial Number : 230600111

Customer Code : N/A

Location of Calibration : In Lab

Customer Name : Life & Environment Co.,Ltd.

90,92,94 Soi On Nut 64, Srinakarin Road, Suan Luang Subdistrict, Suan Luang District, Bangkok 10250

Calibration Procedure : CPE-04-01

Received Date : Oct 2, 2025

Calibration Date : Oct 7, 2025

Recommended Due Date : Oct 7, 2026

CONDITION AS RECEIVED : Normal

Environmental Conditions

Ambient Temperature : (25 ± 2) °C

Relative Humidity : (50 ± 15) %RH

Result

: No Adjustment (See data attached in page 3 to the end of certificate)

1. 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%.

2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to

SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017

3. The working standard is indicated in page 2 of this certificate.

4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by

Calibration Laboratory, Advantage Center Co., Ltd.

Calibrated by : J. Sutep

Approved by :



Date of Issue : Oct 9, 2025

Laboratory Management

Certificate No.: RA-2510010-2

Reference Standards

Equipment Name	Serial No.	Certificate No.	Due Date	Traceability to
Sound Calibrator	I70603302	EEL.BP. 32/1167	Nov 14, 2025	TISTR

Traceability

This calibration is traceable to the International System of Unit via :

- TISTR : Thailand Institute of Scientific and Technological Research

Certificate No. : RA-2510010-2

Result of Calibration

Calibration Range : 94 dB, 114 dB

Function : Measurement @ 1 kHz

Select A Fast response

STD	UUC Reading	Correction	Uncertainty of Measurement (± dB)
Setting	(dB)	(dB)	
94.42 dB	94.4	0.02	0.88
114.32 dB	114.5	-0.18	0.88

Select A Slow response

STD	UUC Reading	Correction	Uncertainty of Measurement (± dB)
Setting	(dB)	(dB)	
94.42 dB	94.4	0.02	0.88
114.32 dB	114.5	-0.18	0.88

Select C Fast response

STD	UUC Reading	Correction	Uncertainty of Measurement (± dB)
Setting	(dB)	(dB)	
94.42 dB	94.4	0.02	0.88
114.32 dB	114.5	-0.18	0.88

Select C Slow response

STD	UUC Reading	Correction	Uncertainty of Measurement (± dB)
Setting	(dB)	(dB)	
94.42 dB	94.4	0.02	0.88
114.32 dB	114.5	-0.18	0.88

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -



CALIBRATION LABORATORY

Certificate No. RA-2510010-5

Job No. RA-2510010

Certificate of Calibration

FOR

Equipment Name : Noise Dose Meter

Manufacturer : SOUNDTEK

Model : ST-130

Serial Number : 230600100

Customer Code : N/A

Location of Calibration : In Lab

Customer Name : Life & Environment Co.,Ltd.

90,92,94 Soi On Nut 64, Srinakarin Road, Suan Luang Subdistrict, Suan Luang District, Bangkok 10250

Calibration Procedure : CPE-04-01

Received Date : Oct 2, 2025

Calibration Date : Oct 7, 2025

Recommended Due Date : Oct 7, 2026

CONDITION AS RECEIVED : Normal

Environmental Conditions

Ambient Temperature : $(25 \pm 2) ^\circ\text{C}$

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

Result

: No Adjustment (See data attached in page 3 to the end of certificate)

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Advantage Center Co., Ltd.

Calibrated by : J. Sutep

Approved by :

()

Date of Issue : Oct 9, 2025

Laboratory Management





ADVANTAGE CENTER CO., LTD.

59/494 M.6, Frakham Road, T.Kukhot, Lumlookkar, Pathumthani 12130 Thailand.
Tel. (66-2) 9873248-50 Fax: (66-2) 9873252 E-mail: info.accl2662@gmail.com
pomsak2008@yahoo.co.th

Certificate No.: RA-2510010-5

Reference Standards

Equipment Name	Serial No.	Certificate No.	Due Date	Traceability to
Sound Calibrator	170603302	EEL.BP. 32/1167	Nov 14, 2025	TISTR

Traceability

This calibration is traceable to the International System of Unit via :

- TISTR : Thailand Institute of Scientific and Technological Research



Certificate No. : RA-2510010-5

Result of Calibration

Calibration Range : 94 dB, 114 dB

Function : Measurement @ 1 KHz

Select A Fast response

STD	UUC Reading	Correction	Uncertainty of
Setting	(dB)	(dB)	Measurement (± dB)
94.42 dB	94.4	0.02	0.88
114.32 dB	114.5	-0.18	0.88

Select A Slow response

STD	UUC Reading	Correction	Uncertainty of
Setting	(dB)	(dB)	Measurement (± dB)
94.42 dB	94.4	0.02	0.88
114.32 dB	114.5	-0.18	0.88

Select C Fast response

STD	UUC Reading	Correction	Uncertainty of
Setting	(dB)	(dB)	Measurement (± dB)
94.42 dB	94.4	0.02	0.88
114.32 dB	114.5	-0.18	0.88

Select C Slow response

STD	UUC Reading	Correction	Uncertainty of
Setting	(dB)	(dB)	Measurement (± dB)
94.42 dB	94.4	0.02	0.88
114.32 dB	114.5	-0.18	0.88

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -





Professional Calibration & Services Co., Ltd.

50/888, 50/889 Moo 2, Rungsi-Nakornmayok Rd., Bungyeetho, Thunayaburi,
Pathumthani 12130 Thailand
Tel : (+66)2150-6641 (Autoline)
Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : EL34668/25

Page 1 of 3

Control Number : PCAL190749

Customer Control : CB-01

Description : Acoustic Calibrator

Manufacturer : Quest Technologies

Model : QC-10

Serial Number : QE6090186

Customer : Life and Environment Co., Ltd

90, 92, 94 Soi On-Nuch 64, Srinakarin Rd., On-Nuch, Suanluang, Bangkok 10250



Date of Receipt : 20-Jun-25

Date of Calibration : 21-Jun-25

Calibration Location : Electrical Laboratory
Environment : Temperature 23 °C ± 2 °C
: Relative Humidity 50 % ± 20 %

Calibration Method : Calibration Procedure Number CP-EL07,CP-EL35

Calibration Results : See data attached

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

This certificate is issued in accordance with ISO/IEC17025 and the conditions of accreditation granted by the Accreditation Body which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. The results relate only to the item calibrated.

This certificate shall not be reproduced other than in full except without the prior written approval of the Head of Calibration Laboratory of Professional Calibration & Services Co., Ltd.

Calibrated By

Authorized Signature

Mr.Nattaya Iammarm

23-Jun-25

Issued Date



Professional Calibration & Services Co., Ltd.

50/888, 50/889 Moo 2, Rungsi-Nakornmayok Rd., Buriyetho, Thunayaburi.

Pothumthani 12130 Thailand

Tel : (+66)2150-6641 (Autoline)

Email : info@p-cal.com www.p-cal.com



Calibration Report

Certificate Number : EL34668/25

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Sound Level Meter	030606101	ANAB : AC-2590	EL11791/25	11-Mar-26
Sound Calibrator	125626778	NSC : Calibration 0037	EEL.BP. 99/0168	23-Jan-26

Condition as received : Normal

Definitions :-

- * ANAB - The ANSI National Accreditation Board
- * NSC - National Standardization Council of Thailand



Professional Calibration & Services Co., Ltd.

50/888, 50/889 Moo 2, Rungsi-Nakornmayok Rd., Bungyeetho, Thunayaburi,

Pathumthani 12130 Thailand

Tel : (+66)2150-6641 (Autoline)

Email : info@p-cdl.com www.p-cdl.com



Calibration Report

Certificate No.: EI.34668/25

Page : 3 of 3

Calibration Results

Sound Pressure Level Accuracy

Nominal Value	Measured Value	UUC Error	Uncertainty (±)	Tolerance Limit Value
114 dB	114.10 dB	-0.10 dB	0.17 dB	113.70 ~ 114.30 dB

Notes:

- 1) Tolerances or specifications report in table above are based on Acoustic Calibrator, User Manual, Model QC-10 and QC-20, Quest Technologies.

...End...



A Trescal company

Certificate of Services for Sub-contracting for Calibration

Reference Number : SPR25060323-2
Certificate Number : PL34668/25
Sub-contract Name : PROFESSIONAL CALIBRATION & SERVICES CO., LTD.

CUSTOMER DETAILS

Customer Name : Life and Environment Co., Ltd.
: 90, 92, 94 Soi On-Nuch 64, Srinakarin Rd., On-Nuch,
Suanluang, Bangkok 10250

INSTRUMENT DETAILS

Equipment Name : Sound Calibrator
Manufacturer : 3M
Model : QC-10
Serial Number : QE6090186
ID Number : CB-01

Receive Date : 20 June 2025
Calibration Date : 21 June 2025
Recalibration Date : N/A
(Specified by customer)

Before Calibration : Good Physical Condition
After Calibration : Calibrated and Serviceable

SP METROLOGY SYSTEM (THAILAND) CO.,LTD. has coordinated the above item to our
Approved Supplier, PROFESSIONAL CALIBRATION & SERVICES CO., LTD. The instrument is
calibrated according to International Standard. Please refer to the attached certificate of
calibration for condition of use.

SP METROLOGY SYSTEM (THAILAND) CO., LTD.

69/29 Moo 1 Klongsi, Klongluang, Pathumthani, Thailand (12120)

Tel.: (662) 193-2220 (4 Lines) Fax.: (662) 193-2221

Website: www.spmetrology.co.th

Certificate of Calibration

Method 5 Pre-Test Calibration - Liters (L)

UUT Meter Console Information

Model #: XC-572
Serial #: 605186
DGM Model #: SK25EX
DGM Serial #: 00009102

Calibration Conditions

Bar. Pressure (mm Hg): 760.0
Ambient Temperature (°C): 25.7
Relative Humidity (%): 65
Altitude (m): 7.00
Bar. Pressure Corr. (mm Hg): 759.4

Calibration Reference

Work No.: **SV051125** Calibration No.: **SA2026009**

Judgment: **Pass** According to note:

Reference Equipment

WTM Model: W-NK-5B Serial No.: 546321
Gamma: 0.9906 Cal. Due: 13-Mar-26
Thermometer: FLUKE714 Serial No.: 9038005
Cal. Due Date: 19-Nov-26

Factors/Conversions

Std. Temp. (K): 298.15
Std. Press. (mm Hg): 760
K₁ (K/mm Hg): 0.3923

UUT Meter (DGM)

Run Time (seconds)	Orifice, ΔH (mm H ₂ O)	Volume			Meter Temperature (°C)		Meter Pressure (mm H ₂ O)	Volume (L)			Outlet Temperature (°C)	
		Initial (L)	Final (L)	Total (L)	Initial	Final		Initial	Final	Total	Initial	Final
Θ	P _{m(g)}	V _{mi}	V _{mf}	V _m	t _{mi}	t _{mf}	P _w	V _{wi}	V _{wf}	V _w	t _{wi}	t _{wf}
900	13.00	101999.7	102155.8	156.1	24.0	24.0	1.5	526652.52	526811.49	159.0	26.7	26.0
600	25.00	102173.4	102325.8	152.4	25.0	25.0	2.0	526836.21	526987.44	151.2	26.1	26.0
480	50.00	102337.6	102511.9	174.3	25.0	24.0	3.0	526999.10	527172.57	173.5	26.0	26.0
420	80.00	102522.7	102711.8	189.1	24.0	24.0	4.5	527183.34	527371.44	188.1	25.9	25.9
300	120.00	102725.2	102898.2	173.0	24.0	24.0	5.5	527384.95	527559.01	174.1	25.9	25.9

Reference Meter (WTM)

Standardized Data

Reference Meter (L)		UUT Meter (L)		Correction Factor		ΔH @ (mm H ₂ O)	
Std. Vol.	Std. Flow	Std. Vol.	Std. Flow	Value	Variance	0.0212 SCMM	Variance
V _{w(std)}	Q _{w(std)}	V _{m(std)}	V _{w(std)}	Y	ΔY	ΔH@	ΔΔH@
157.22	10.48	156.70	10.5	1.0033	0.0147	53.9	3.436
149.90	14.99	152.65	15.0	0.9820	-0.0067	50.7	0.228
172.40	21.55	175.30	21.5	0.9834	-0.0052	49.5	-0.963
187.68	26.81	191.06	26.8	0.9823	-0.0063	51.8	1.310
174.10	34.82	175.46	34.8	0.9922	0.0036	46.4	-4.011
				0.9887	= Y Avg.	50.4	= ΔH@ Avg. (Metric)

Note1 : For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.

Note2 : For ΔH_g, orifice pressure differential that equates to 0.0212m³/min at standard temperature and pressure, acceptable tolerance of individual values from the average is ±0.2inches (5.1mm) H₂O.

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SITHIPORN ASSOCIATES COMPANY LIMITED

Calibrator :

Signature :

Date : 28/Nov/25

The instruments listed and described on this certificate have been calibrated against standards traceable to the National Institute of Standards and Technology (N.I.S.T.) and in reference to EPA Method 5, Section 10.3.1.

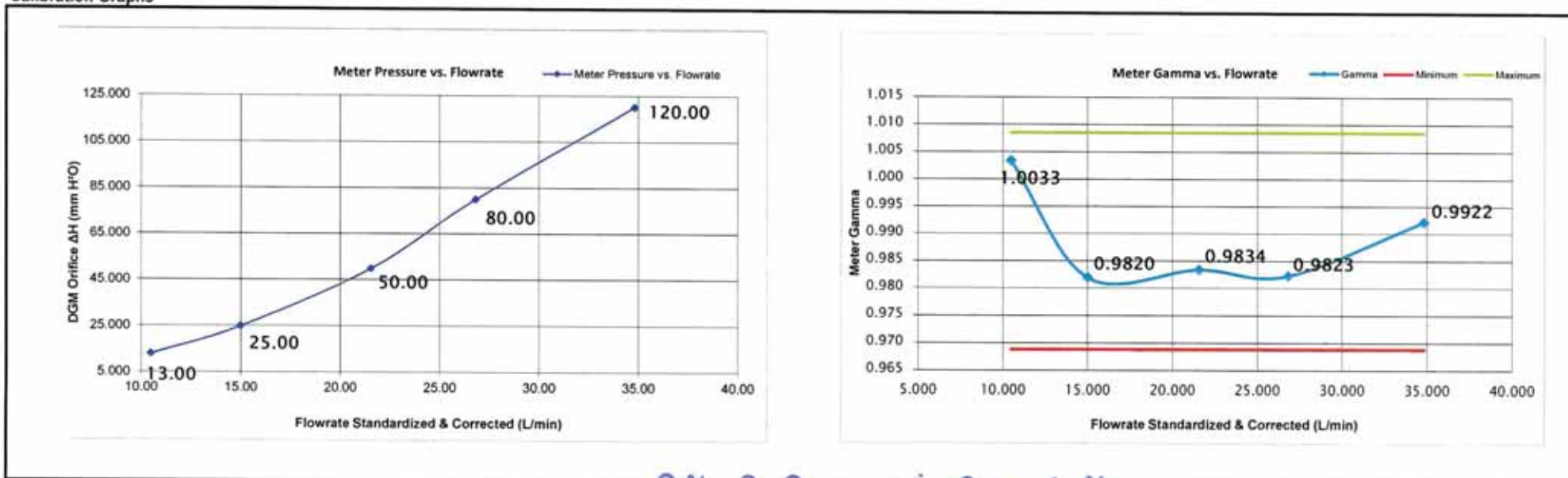
Calibration Certificate Appendix

METHOD 5 PRE-TEST CONSOLE CALIBRATION

Calibration No.: **SA2026009**

UUT Meter / Console Information Model #: <u>XC 572-V</u> Serial number: <u>605186</u> DGM Model #: <u>SK25EX</u> Serial number: <u>00009102</u>		Nomenclature Pb - Barometric Pressure DGM - Dry Gas Meter K ₁ - Constant based on standard temp and press Θ - Run time, in minutes P _m - ΔH (Meter Pressure, gauge) V _m - Volume collected by test meter, corrected for STP Q _{m(std)} - Calculated flow rate of test meter K' - Critical orifice coefficient P _w - Measured pressure of reference meter t _w - Temperature measured in reference meter t _m - Temperature measured in test meter Y - Ratio of volume collected from test meter and orifice		Equations $K_1 = \frac{T_{std}}{P_{std}}$ $V_{w(std)} = Y * K_1 \frac{V_m * (P_{bar} + \frac{P_m(g)}{13.6})}{\frac{K_1 V_m (P_{bar} + \frac{P_m(g)}{13.6})}{T_m}}$ $Y = \frac{V_{std}}{V_{m(std)}} \quad Q_{w(std)} = \frac{V_{w(std)}}{\Theta}$ $Metric \Delta H_a = \frac{P_m(g) * 0.0011696 * (P_{bar} + \frac{P_m(g)}{13.6})}{T_m} * \left(\frac{T_w * \Theta}{V_w * P_{bar}} \right)^2$																									
Check the Diagnosis Check the system before calibrating.																													
		<table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Not Passed</th> <th style="text-align: center;">Passed</th> </tr> </thead> <tbody> <tr> <td>-Visual instrument normalcy</td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☒</td> </tr> <tr> <td>-Electrical and Temperature Systems</td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☒</td> </tr> <tr> <td>-Inclined Manometer with Systems</td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☒</td> </tr> <tr> <td>-Pressure Gauge</td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☒</td> </tr> <tr> <td>-Leak Check</td> <td style="text-align: center;">☒</td> <td style="text-align: center;">☒</td> </tr> <tr> <td>☒ PM and Calibration</td> <td style="text-align: center;">☐ Vacuum : Pass</td> <td style="text-align: center;">☒ Pressure : Pass</td> </tr> <tr> <td></td> <td style="text-align: center;">☐ Repairing before Calibration</td> <td></td> </tr> </tbody> </table>					Not Passed	Passed	-Visual instrument normalcy	☐	☒	-Electrical and Temperature Systems	☐	☒	-Inclined Manometer with Systems	☐	☒	-Pressure Gauge	☐	☒	-Leak Check	☒	☒	☒ PM and Calibration	☐ Vacuum : Pass	☒ Pressure : Pass		☐ Repairing before Calibration	
	Not Passed	Passed																											
-Visual instrument normalcy	☐	☒																											
-Electrical and Temperature Systems	☐	☒																											
-Inclined Manometer with Systems	☐	☒																											
-Pressure Gauge	☐	☒																											
-Leak Check	☒	☒																											
☒ PM and Calibration	☐ Vacuum : Pass	☒ Pressure : Pass																											
	☐ Repairing before Calibration																												

Calibration Graphs



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SITHIPORN ASSOCIATES COMPANY LIMITED

Certificate of Calibration

Method 5 Console Sensor Calibration - Metric Units

page: 1/1

Console Information

Model #: XC-572
Serial #: 605186
Units: Metric

Calibration Conditions

Pbar (mm. Hg): 760.00
Humidity (%): 65
Tamb (°C): 25.7
Elevation (m): 7.0
Corr. Pbar (mm. Hg): 759.40

Calibration Reference

Calibration No.: SA2026009
Work No.: SVO51125
Reference Devices
TC Calibrator Model: FLUKE 714
Serial No.: 9038005

Temperature Sensors Calibration Data

Reference Temp.		Test Thermocouple Calibrations						Reference Point Status ¹
		Aux	Stack	Probe	Oven	Filler	Exit	
Point	°C	°C	°C	°C	°C	°C	°C	Pass/Fail
1	-18	-17	-17	-17		-17	-17	PASS
2	38	37	37	37		37	37	PASS
3	93	92	92	92		92	92	PASS
4	149	149	149	149		149	149	PASS
5	260	258	258	258		258		PASS
6	371		370					PASS
7	482		481					PASS
8	593		592					PASS
9	816		815					PASS
10	1038		1051					PASS
±3.0°C, 5.4°F 1.50% ±3.0°C, 5.4°F ±3.0°C, 5.4°F ±3.0°C, 5.4°F ±1.0°C, 2.0°F								
Overall Audit Status								
PASS								

DGM Temperature Sensor

Ref Point	Reference Temp.	DGM Thermocouple Sensor Reading	ΔT _{abs}	Maximum	Reference Status ² (±1%)
#	°C	°C	°C	%	Pass/Fail
Ice Water	0.2	0	0.07%	0.07%	PASS
Ambient	25.7	26	0.06%	0.07%	PASS

Temperature Controller

Heater Controller Set point	Reference Measure (μ)	XC-572 Thermometer	Deviated to set point	ΔT _{abs} ±3%	Temp. Controller Status ³
120 °C	°C	°C	°C	°C	Pass/Fail
Probe	123.6	126	-2	0.60%	PASS
Heat box	122.7	123	0	0.08%	PASS

Notes

- ¹ Suggested, minimum reference points are 10, 100, 200, 300, 500, 700, 900, 1100, 1500, 1900 °F), can test for more.
- ² For valid test results, the maximum difference between test and reference readings should be temperature from the reference reading and the exit thermocouple which should be less than 2°F (1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1.1-7.6.1.1-8)
- ³ Heater control acceptance limit: Temperature can be maintained at 120 °C ±14 °C, ±57 °F within ±1.5% (°) at a flow rate of 20 lpm.

Signature: _____ Date: 28/Nov/25
I certify that the above Thermocouple Sensors were calibrated in accordance with US EPA Methods 2 and 5, CFR 40 Part 60.

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SITHIPORN ASSOCIATES COMPANY LIMITED

Console Sensor Audit QA Sheet

Meter Console Information (UUT)

Model #: XC-572
Serial #: 605186
Units: Metric

Calibration Conditions

Pbar (mm. Hg): 760.00
Humidity (%): 65%
Amb. Temp. (°C): 25.7
Altitude (m): 7.0
Corrected Pbar (mm. Hg): 759.4

Calibration No. : SA2026009

Work No. : SVO51125

Reference Devices
TC Calibrator Model: FLUKE 714

Serial No.: 9038005

Digital Manometer Model: Dwyer DPGA-00

Serial No.: 721

Audit Data

Reference Point	Reference Temp.	Console Thermocouple Audit					Reference Point Status ¹
		Aux	Stack	Probe	Oven	Filter	Exit
#	°C	°C	°C	°C	°C	°C	°C
1	24	23	23	23	23	23	23
Acceptance criteria		3.0°C, 5.4°F	1.50%		3.0°C, 5.4°F		1.0°C, 2.0°F
							PASS

Reference Thermocouple ID: 90728323

Ref Point	Reference Temp.	DGM Thermocouple Sensor Reading	ΔT abs4	Maximum	Reference Status (±1%)
#	°C	°C	°C	%	
Ice Water	0.2	0	0.07%	0.31%	Pass/Fail
Ambient	25.5	24	0.31%		PASS

Internal temperature thermocouple is not audited to EPA standards, and should not be used as an official reference for ambient temperature.

Notes

¹For valid test results, the maximum difference between test and reference readings should be temperature from the reference reading and the exit thermocouple which should be less than 2°F (1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1.1, 7.6.1.1, 8)

³For valid test results, the maximum difference between console and reference vacuum readings should be less than 0.5 in. Hg (12.5 mm Hg)

บริษัท สิทธีพรหมเอสซีแอล จำกัด
SITHIPHORN ASSOCIATES COMPANY LIMITED

Signature: _____

Date: 28/Nov/25 _____

I certify that the above Thermocouple, Barometric, and Vacuum Sensors were calibrated and audited in accordance with US EPA Methods, CFR 40 Part 60

Nozzle Calibration

Nozzle Information

Manufacturer Apex
Type Stainless Steel
Identification _____

Calibration Conditions

Bar. Pressure (mm Hg): 760.0
Ambient Temperature (°C): 25.7
Relative Humidity (%): 65

Calibration Reference

Calibration No.: SA2026NZ004
Work No.: SVO51125
Units: _____ Metric

Reference Equipment

Vernier, 0-250mm 0.01 mm increments model Mitutoyo

Serial No 3038570

Cal No.: L202310355-0001

Cal.due: 25/Mar/26

Calibration Method

Follow the USEPA Method 5 nozzle size calibration procedure. (ref. 40 CFR PART 60).

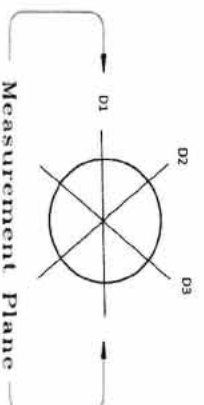
Calibration Result

ID No.	Sizes	measured every 60° nozzle			(D ₁ + D ₂ + D ₃) / 3	Different ≤ 0.100 mm.	
	mm.	D ₁	D ₂	D ₃	Davg	1	Judgment
4	3.1	3.14	3.14	3.15	3.143	0.010	PASS
6	4.6	4.38	4.35	4.40	4.377	0.050	PASS
8	6.2	6.19	6.21	6.20	6.200	0.020	PASS
10	7.8	7.74	7.78	7.76	7.760	0.040	PASS
12	9.4	9.38	9.38	9.40	9.387	0.020	PASS
14	10.9	10.89	10.87	10.86	10.873	0.030	PASS
16	12.6	12.69	12.70	12.71	12.700	0.020	PASS

Where :

D₁, D₂, D₃ = There difference nozzle diameters at 60 degrees to each other,
each measured to the nearest 0.025 mm or 0.001 inch

Δ D = Maximum difference between any two diameters, must be ≤ 0.100 mm or 0.004 inch
D avg = (D₁ + D₂ + D₃) / 3



Signature _____

Date : _____

28/Nov/25

บริษัท สิทธีพรหมเอเซีย จำกัด
SITHIPORN ASSOCIATES COMPANY LIMITED

Sampling Probe and Pitot validation

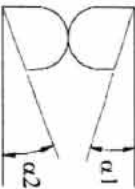
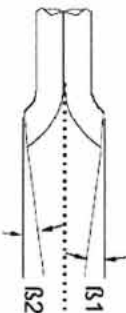
Sampling Probe Information		Calibration Conditions		Calibration Reference	
Manufacturer:	Apex	Bar. Pressure (mm Hg):	760.0	Calibration No.:	SA2026PR004
Probe Type:	SS, 6ft	Ambient Temperature (°C):	25.7	Work No.:	SVO51125
Probe No.:	-	Relative Humidity (%):	65	Reference Devices - Vernier, 0-250mm 0.01 mm increments Model: Mitutoyo, ID No.:EPD1-VER-57-1-CEN-01	
Pitot tube Type:	S Type 3/8 Inc.				
Pitot tube No.:	-				
		Units:	Metric		

Validation method : Follow the USEPA Method 5 pitot tubes (S type) calibration procedure. (ref. 40 CFR PART 60).

Sampling Probe Validation with Tune up			□. Measuring and aligning with 1/2" sample nozzle(12.7 mm)		
	Measured	Acceptance Standard			
L_1 =	18.78 mm	(19.05 mm, or 0.75 in.)			
L_2 =	48.73 mm	(50.8 mm, or 2.0 in.)			
D_T =	9.53 mm	(9.525 mm., 0.375 in.)			
A =	22.88 mm	(2.1 $D_T \leq A \leq 3 D_T$)			
$A/2 D_T$ =	1.200 mm	(1.05 $P_A / D_T \leq A \leq 1.5$)			

Pitot Tube Validations and Engles measurement Result

☑ : Measure results after maintenance and adjustments.

	α_1 =	0.00 °	$\leq 10^\circ$
	β_1 =	2.00 °	$\leq 5^\circ$
	β_1 =	1.00 °	$\leq 10^\circ$
	β_2 =	1.00 °	$\leq 5^\circ$
	γ =	0.00 °	
	Z =	0.000 mm	$Z < 3.175 \text{ mm. (0.125 in.)}$
	W =	0.000 mm	$W < 0.0794 \text{ mm. (0.03125 in.)}$

Can be use 0.84 for Cp(s) if the type of face-opening misalignment show above with not affect the base line value of Cp(s)
Solong as standard range.

Signature:

[Redacted Signature]

Date: 28/Nov/25

บริษัท สิทธีพรหมเอสเอช จำกัด
SITHIPHORN ASSOCIATES COMPANY LIMITED

Certificate of Calibration
DGM with Totallizer Calibration - Liters (L)

UUT Meter Console Information

Model :	XC-572
Serial :	605186
Totalizer display:	N/A
DGM model :	SK25EX
DGM Serial #:	00009102

Calibration Conditions

Bar. Pressure (mm Hg):	756.0
Ambient Temperature (°C):	25.7
Relative Humidity (%):	65
Altitude (m):	7.00

Factors/Conversions

Std. Temp. (K):	298.15
Std. Press. (mm Hg):	760
K ₁ (K/mm Hg):	0.3923

Work No.: SVO51125

Calibration No. : SA2026009

Reference Equipment

WTM Model:	W-NK-5B	WTM Serial:	546321
WTM Cal. Due Date:	13-Mar-26	Gamma:	0.9906
Thermometer:	Fluke 714	Serial #:	9038005

UUT Meter (DGM)

Run Time (seconds)	Flow Rate (Rotameter)	Volume(L)			Meter Temperature (°C)	
		Initial	Final	Total	Initial	Final
Θ	(L/Min)	V _{wi}	V _{wf}	V _w	t _{mi}	t _{mf}
900	1.00	103622.60	103635.40	12.80	25.0	25.0
600	2.00	103636.20	103654.60	18.40	25.0	25.0
480	2.50	103659.80	103678.50	18.70	25.0	26.0
420	3.00	103688.30	103705.80	17.50	24.0	24.0
300	3.50	103712.20	103729.40	17.20	26.0	26.0

Reference Meter (WTM)

Meter Pressure (mm H ₂ O)	Volume (L)			Outlet Temperature (°C)	
	Initial	Final	Total	Initial	Final
P _w	V _{wi}	V _{wf}	V _w	t _{wi}	t _{wf}
-1.0	528425.50	528438.99	13.49	26.0	26.0
-1.0	528439.65	528459.00	19.35	26.0	26.0
-1.0	528464.34	528483.65	19.31	26.0	26.0
-1.0	528493.62	528511.50	17.88	26.0	26.0
-1.0	528517.97	528535.47	17.50	26.0	26.0

Standardized Data

Scaling Factor				Calibration Results	
Test meter		Reference Meter		Gamma	
Std. Vol.	Std. Flow Rate	Std. Volume	Std. Flow Rate	Value	Variation
V _{mstd} (L)	Q _{wstd} (L/min)	V _{wstd} (L)	Q _{wstd} (L/min)	Y	ΔY
12.734	0.883	13.247	0.883	1.0403	0.018
18.307	1.900	19.002	1.900	1.0380	0.016
18.575	2.370	18.962	2.370	1.0209	-0.001
17.472	2.508	17.558	2.508	1.0050	-0.017
17.058	3.437	17.185	3.437	1.0074	-0.015
				1.0223	DGM Y Avg. ⁽¹⁾

Rotameter Calibration		
Rotameter	Std. Flow.	Variation
(L/Min)	(L/min)	(L/min)
1.00	0.88	0.12
2.00	1.90	0.10
2.50	2.37	0.13
3.00	2.51	0.49
3.50	3.44	0.06

Note:1. For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.

Note:2. For the Scaling Calibration Factor.(SC), it is the ratio of the display to adjust the Y value to be close to 1.000, equal to the reference standard.

Technical: MR.Phattipong V.

Signature:

[Signature]

บริษัท สิทธีพรแอสโซซิเอต จำกัด
SITHIPORN ASSOCIATES COMPANY LIMITED

Date: 28/Nov/2025

The instruments listed and described on this certificate have been calibrated against standards traceable to the National Institute of Standards and Technology (N.I.S.T.) and in reference to EPA Method 5, Section 10.3.1. and EPA Method 6, Section 10.1.3.

Sithiporn Associate Co.,Ltd Environmental / Hygiene Department (ENV) Web site : www.sithiporn.com # E-mail: service2-env@sithiporn.com

Calibration Certificate Appendix

DGM with Totallizer Calibration

Nomenclature

P_b - Barometric Pressure
 DGM - Dry Gas Meter
 K_1 - Constant based on standard temp and press
 Θ - Run time, in minutes
 P_m - ΔH (Meter Pressure, gauge)
 V_m - Volume collected by test meter, corrected for STP
 $Q_{m(std)}$ - Calculated flow rate of test meter
 K' - Critical orifice coefficient
 P_w - Measured pressure of reference meter
 t_w - Temperature measured in reference meter
 t_m - Temperature measured in test meter
 Y - Ratio of volume collected from test meter and orifice
 sc - Scaling Factor
 $Counts_{std}$ - Number of pulse counts, standardized
 C_{total} - Number of raw pulse counts of a calibration run

Equations

$$V_{w(std)} = Y * K_1 \frac{V_w * (P_{bar} + \frac{P_m(g)}{13.6})}{T_w}$$

$$K_1 = \frac{T_{std}}{P_{std}}$$

$$V_{m(std)} = Counts_{std} * Y_{sc(avg)}$$

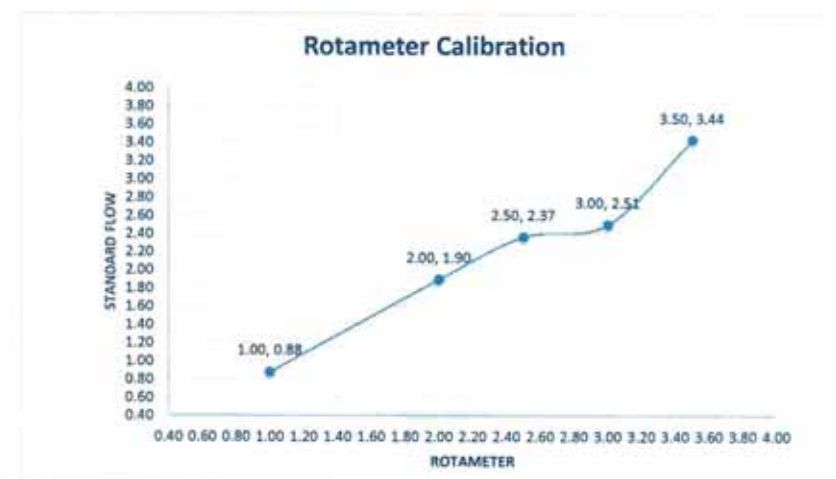
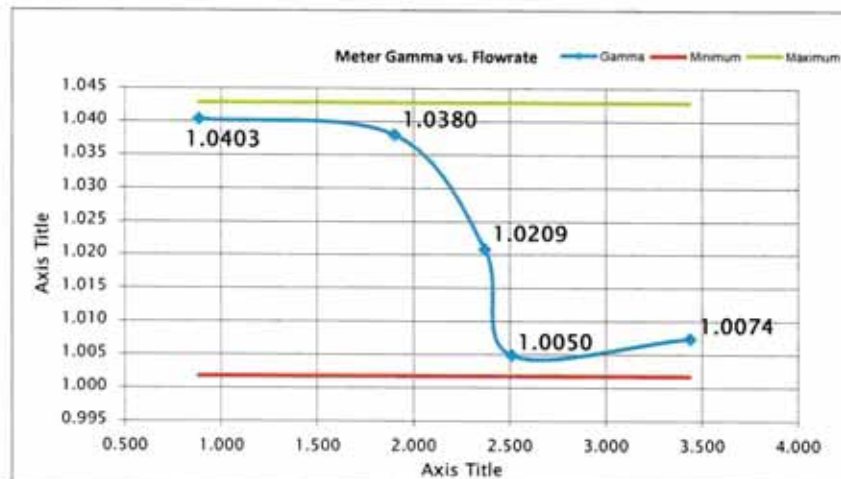
$$Q_{w(std)} = \frac{V_{w(std)}}{\Theta}$$

$$Counts_{std} = K_1 \frac{C_{total} * (P_{bar} + \frac{P_m(g)}{13.6})}{T_m}$$

$$Y_{sc} = \frac{V_{w(std)}}{Counts_{std}}$$

$$Y = \frac{V_{cr(std)}}{V_{m(std)}}$$

Calibration Graphs



Accredited by

NSC-TISI-TIS 17025

Calibration 0426



Calibration certificate

Calibration Certificate No. 25BNA0178

Object	Electronic non-automatic weighing instrument	This calibration certificate documents the traceability to national standards.
Manufacturer	Sartorius	Uncertainties of measurements are taken into account when only statements of compliance are made.
Type	MSE125P-100-DU	This certificate was prepared by Sartorius Corporation in accordance to the current ISO/IEC 17025:2017 standard and Sartorius Work Instruction (Method) SOP WI 08.
Serial QM Ident. no.	0028606077 N/A	This certificate relate and apply this equipment only.

Customer Life and Environment Co., Ltd.

90, 92, 94 Soi On-Nuch 64,Srinakarin Road,
On-Nuch, Suanluang, Bangkok 10250. Thailand.

Order no. 268985

Number of pages 4

Date of calibration 12 Sep 2025

This calibration certificate may not be reproduced other than in full except with the permission of NSC-TISI-TIS-17025 and the issuing laboratory. Calibration certificates without signature are not valid.
The user is obliged to have the object recalibrated at appropriate intervals.

Date of issue	12 Sep 2025	Approval of the Calibration Certificate	Person in charge
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N [Redacted Signature]

[Redacted Signature]

Calibration Certificate

Calibration object

Multi interval instrument

Model	MSE125P-100-DU	
Serial Number	0028606077	
QM Ident. no Inventory no.	N/A ---	
Range	1	2
Maximum capacity (Max. load)	60.00000 g	120.0000 g
Measured up to	60.00000 g	120.0000 g
Scale interval	0.00001 g	0.0001 g

Place of calibration

Address	According to page 1
Department Cost center	Laboratory Testing. ---
Building Floor	--- 1st Floor.
Room	Air(TSP/PM10) Testing Laboratory.
Maximum temperature variation at place of calibration	5 K

Calibration procedure

EURAMET Calibration Guide No. 18, Version 4.0 (1/12015) - Guidelines on the Calibration of Non-Automatic Weighing Instruments

Test equipment

Test equipment type	Test equipment ID	Valid until
Thermometer	Testo 174H(Traceable to SI unit through ENTECH) SN: 84391651	10 Nov 2025
Test weight set OIML R111 E2	Certificate No.C02241568, E2(Traceable to SI unit through DKSH)	29 Aug 2026

Adjustment Status

The measuring device was internally adjusted before the calibration.

Environmental and measuring conditions

Date of calibration12 Sep 2025

Temperature at place of calibration | Temp. diff.25.6 °C | 0.1 K

Twights - T_{place}

Measuring conditions

The installation site is suitable. The device is level. Balance was loaded up to Max before test.

CommentsHumidity 48.8 %RH.

Measurement results | Measurement uncertainties

Repeatability			Eccentricity		
Test load (nominal): 50 g 100 g			Test load (nominal):		
50 g			50 g		
1	49.99999 g	100.0000 g	Center		49.99999 g
2	50.00000 g	100.0000 g	Front left		49.99998 g
3	49.99999 g	100.0000 g	Back left		50.00001 g
4	49.99999 g	100.0000 g	Back right		50.00007 g
5	49.99999 g	100.0000 g	Front right		50.00000 g
6	50.00000 g	100.0000 g	Maximum deviation from centric loading indication		
7	50.00000 g	100.0000 g	Δ _{lecc} max = 0.00008 g		
8	49.99999 g	100.0000 g			
9	49.99999 g	100.0000 g			
10	50.00000 g	100.0000 g			
s = 0.000005 g s = 0.00000 g					

Error of indication

Testload	Indication	Error	Expansion factor	Uncertainty	Uncertainty relative
L	I	E	k	U(E)	U _{rel} (E)
0.01000 g	0.01001 g	0.00001 g	2.00	0.000024 g	0.24 %
0.10000 g	0.10001 g	0.00001 g	2.00	0.000037 g	0.037 %
1.00001 g	1.00002 g	0.00001 g	2.00	0.000026 g	0.0026 %
9.99999 g	9.99999 g	0.00000 g	2.00	0.000069 g	0.00069 %
19.99995 g	19.99997 g	0.00002 g	2.00	0.000069 g	0.00035 %
54.99995 g	54.99995 g	0.00000 g	2.00	0.00017 g	0.00031 %
69.9999 g	69.9999 g	0.0000 g	2.00	0.00017 g	0.00024 %
79.9999 g	80.0000 g	0.0001 g	2.00	0.00019 g	0.00023 %
99.9999 g	100.0000 g	0.0001 g	2.00	0.00017 g	0.00017 %
109.9999 g	110.0000 g	0.0001 g	2.00	0.00028 g	0.00025 %
119.9999 g	119.9999 g	0.0000 g	2.00	0.00028 g	0.00023 %
Maximum error of indication			E _{max} = 0.00010 g		

U_{rel}(E) is the quotient of U(E) and test load L. The uncertainty of measurement U(E) is valid only if error E is considered. You will find reference notes on the uncertainty of measurement in use under: Appendix to the calibration certificate | Interpretation of measurement results.
Reference note: The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the documented expansion factor, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

End of calibration certificate

Uncertainty of measurement in use

Device adjusted before measurement

Temperature deviation considered

Temperature coefficient considered

Yes

1.5 K (isoCAL active)

$1 \cdot 10^{-9}/\text{K}$

Uncertainty of the weighing result $U_{gI}(W)$

Partial weighing range 1 | 0.00000 g...60.00000 g

$U_{gI}(W) = 0.000013 \text{ g} + 7.28 \cdot 10^{-6} \cdot R$

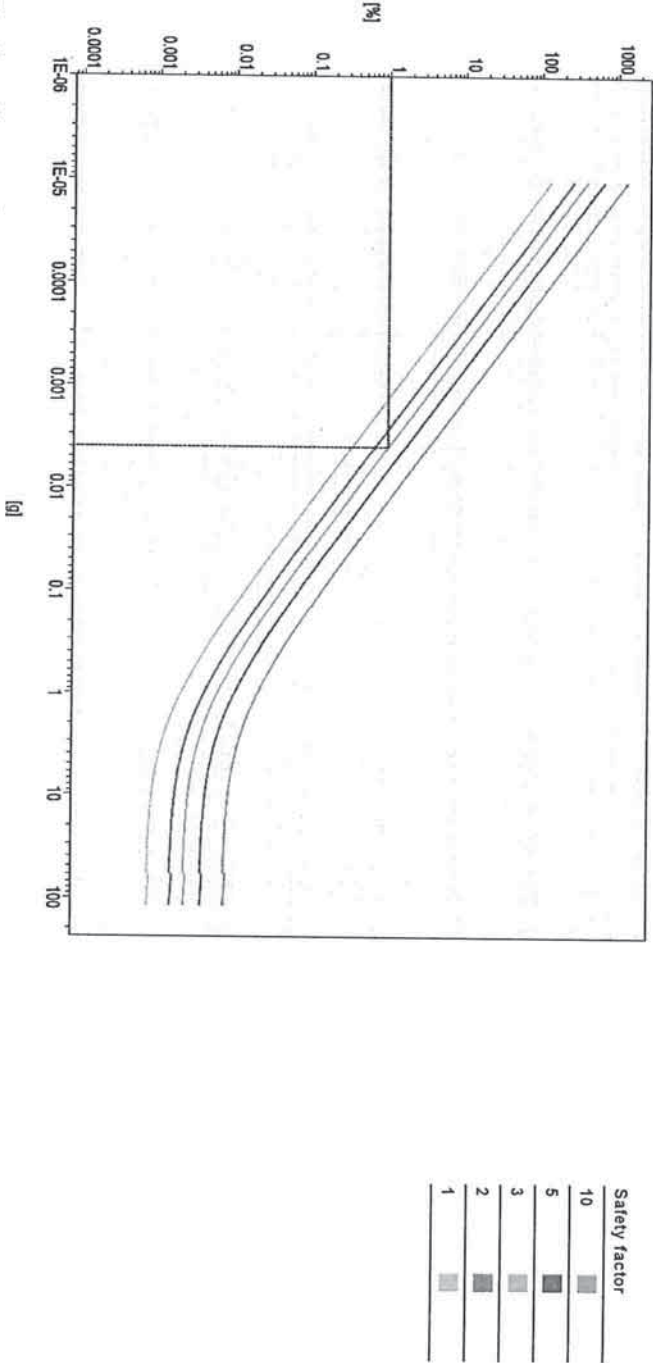
Partial weighing range 2 | 60.00000 g...120.0000 g

$U_{gI}(W) = 0.000058 \text{ g} + 7.03 \cdot 10^{-6} \cdot R$

Reference note: The current uncertainty of measurement is calculated by entering of the reading R into this formula. In relation to this, there is no need for a correction of the indication error. The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied with an Expansion factor of 2, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

Indication in % from Max1	Net indication R	Uncertainty $U_{gI}(W)$	Uncertainty relative $U_{gI}(W)_{rel}$
1 %	0.60000 g	0.000017 g	0.0029 %
25 %	15.00000 g	0.00012 g	0.00081 %
50 %	30.00000 g	0.00023 g	0.00077 %
75 %	45.00000 g	0.00034 g	0.00076 %
100 %	60.00000 g	0.00045 g	0.00075 %

Graphic realization of the relative uncertainty of measurement | process accuracy



Displayed example

Process accuracy

Safety factor

Minimum sample weight

1.00 %

3

0.00396 g



Cert.No.: 25P4585

Page: 2 of 2

Result of calibration:- Without adjustment

Range: 0 mmHg to 1034 mmHg

Function:- Pressure Measurement

Resolution: 1 mmHg

Increasing Pressure

Applied Pressure (mmHg)	0.0	99.9	199.9	299.9	399.8	499.8	599.7	699.7	799.6	899.6	1033.5
UUC* Indication (mmHg)	0	100	200	300	399	499	599	699	799	898	1032
Error (mmHg)	0.0	0.1	0.1	0.1	-0.8	-0.8	-0.7	-0.7	-0.6	-1.6	-1.5

Decreasing Pressure

Applied Pressure (mmHg)	1033.5	899.6	799.6	699.7	599.7	499.8	399.8	299.9	199.9	99.9	0.0
UUC* Indication (mmHg)	1032	898	799	699	599	499	399	300	200	100	0
Error (mmHg)	-1.5	-1.6	-0.6	-0.7	-0.7	-0.8	-0.8	0.1	0.1	0.1	0.0

The uncertainty of measurement was ± 1.0 mmHg

* UUC = Unit Under Calibration

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

-000-



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

Cert.No.: 25CH29
Page.: 1 of 2

Equipment :	pH Meter
Manufacturer :	Hanna
Model :	HI 3222
Serial No. :	08645111
ID No. :	-
Condition As-Received:	Used Item
Received Date :	03 January 2025
Calibration Date :	10 January 2025
Reference :	2501-0065WN-1
Submitted by :	LIFE & ENVIRONMENT CO., LTD. 90, 92, 94 Soi On-Nuch 64, Srinakarin Road, On-Nuch, Suanluang, Bangkok 10250
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(50 ± 15) %
Calibration Procedure :	In - house method : - CP-CH5 by direct measurement with DC voltage standard and direct measurement with certified reference material (CRM)
Calibrated by :	
Approved by :	Approved Signatory () Ponthippa Tameyakul () Ponpan Paipim (✓) Saithip Meangmai
Issue Date :	10 January 2025

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.: 25CH29
Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	54030049	130RC116	24E2759	25 Aug 2025

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

2. Certified Reference Materials

:The measurement results are traceable to SI through Hach Lange GmbH Ltd.,
Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00
:The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.008	CPA chem	1034203	27 Sep 2026
pH 7.000	Hach Lange GmbH	C03185	09 July 2026
pH 10.010	CPA chem	1034205	27 Sep 2025

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

Calibration Results

Function : mV Measurement

Performing standard curve by Document Process Calibrator at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement ($\pm$ mV)	Coverage factor <i>k</i>
	pH	mV	mV	pH		
pH Meter S/N.: 08645111	4.000	177.48	177.3	4.000	0.058	2.00
	7.000	0.00	-0.1	7.000	0.058	2.00
	10.000	-177.48	-177.5	10.000	0.058	2.00

Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement ($\pm$)	Coverage factor <i>k</i>
pH Electrode S/N.: 092818FN	4.008	4.008	174.1	0.0045	2.00
	7.000	7.001	-0.3	0.0084	2.00
	10.010	10.008	-174.5	0.0068	2.00

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 %.



A Trespical company

METROLOGY SYSTEM (THAILAND) CO., LTD.



Certificate of Calibration

Certificate Number : SPR26010030-1

Page : 1 of 3

Customer : Life and Environment Co., Ltd.

90, 92, 94 Soi On-Nuch 64, Srinakarin Rd., On-Nuch, Suanluang,
Bangkok 10250

Equipment Name	: Barometer
Manufacturer	: Barigo
Model	: N/A
Serial Number	: N/A
ID. Number	: BM-06
Environmental Conditions	
Ambient Temperature	: 23 °C ± 2 °C Received Date : 07 Jan 2026
Relative Humidity	: 50 % ± 15 % Calibration Date : 07 Jan 2026
Location of Calibration	: In-Lab Recommend Due Date : 07 Jan 2027
Calibration Procedure	: SP-CPM-04-05 Date of Issue : 08 Jan 2026

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr. Witthawat Jansuwan

Approved by

Calibration Officer



Authorized Signatory

SP-FM-04-15 rev.0



Calibration Report

Certificate Number : SPR26010030-1

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Pressure calibrator	718 30G	2314118	25P1309	10 Apr 2026

Traceability

This certification is traceable to the International System of Unit maintained at :

TPA - Technology Promotion Association (Thailand-Japan)



Result of Calibration

Certificate Number : SPR26010030-1

Page : 3 of 3

Range : 710 to 810 mmHg(abs)

Scale Division : 1 mmHg(abs)

Measurement Function : Absolute Pressure Measurement UUC* Accuracy $\pm$: 1.6 %F.S.

Unit : mmHg(abs)

Direction	UUC Reading	STD Reading		Error	Uncertainty ($\pm$)
		As Found	As Left		
Increasing	730	730.4	N/A	-0.4	2.4
	740	740.5		-0.5	2.4
	750	750.6		-0.6	2.4
	760	760.7		-0.7	2.4
	770	770.6		-0.6	2.4
Decreasing	770	770.6	N/A	-0.6	2.4
	760	760.7		-0.7	2.4
	750	750.6		-0.6	2.4
	740	740.5		-0.5	2.4
	730	730.4		-0.4	2.4

Calibrated condition :

UUC* Unit Under Calibration

Conversion factor : 1 mmHg(abs) = 133.32 Pa

Mounting Position : Vertical

Reference level was center of the dial is above that of the standard and $\Delta h = 0$ m.

Note :

The result of calibration was found accurate as show on date and place of calibration only.

This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The 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 No: G 260026

Date of issue : 14-Jan-26

Instrument description	:	Gas Analyzer
Instrument model	:	EC 9832 Series CO
Instrument serial no.	:	13-1210
Control unit serial no.	:	-
ID no. or control no.	:	-
Manufacturer	:	Ecotech
Probe description	:	-
Probe model	:	-
Probe serial no.	:	-
Customer name	:	Life & Environment Co., Ltd. (Head Office)
Customer address	:	90, 92, 94 Soi On-Nuch 64, Srinakarin Road, Suanluang, Bangkok 10250

Total pages of certificate	:	2 Pages
Receiving no.	:	L-260099
Receiving date.	:	13-Jan-26
Parameter of calibration	:	Gas Calibration (Carbon monoxide)

Condition of UUC.	:	Used
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Ambient condition	:	All of the Measurement were carried out the stabilized labotary
-------------------	---	---

Temperature	:	23 ±5 °C
Humidity	:	55 ± 15 %RH

Calibration place	:	17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210
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Calibration procedure no :	:	This instrument was calibrated by comparison with Standard gas mixture according to calibration Work Instruction no. WI-CL-19-C
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The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurent multiplied by coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

This certificate is applied only to item under test Environmental condition.

This Calibration Certificate may not be reporduced other than in full except with the permission of the issuing laboratory.

Calibration certificates without signature and seal not valid and The results relate only to the items tested/calibrated.

This calibration certificate documents are tracebility to national standards, which realize measurement according to the

International System of Units (SI).

Date of calibration	:	14-Jan-26
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Calibration Technician

Technical Manager

Certificate No.: G 260026

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Carbon monoxide (CO) 1000 ppm	3131/25	Linde	27-Oct-29

Measured room conditions

Temperature : 23.1 °C Humidity : 61.4 %RH Pressure : 1012.5 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 1,500 ml/min Gas pressure : 1020.3 mbar

Calibration Results (before adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
CO (ppm)	1000	1012.30	12.30	17

Calibration Results (after adjustment) (Table 3)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
CO (ppm)	1000	1001.13	1.13	12

Remark : 1 µmol/mol = 1 ppm.

End of Certificate of Calibration

Certificate No: G 260072

Date of issue : 04-Feb-26

Instrument description : Flue Gas Analyzer
Instrument model : Testo 310II
Instrument serial no. : 64471811
Control unit serial no. : -
ID no. or control no. : -
Manufacturer : Testo SE & Co. KGaA
Probe description : -
Probe model : -
Probe serial no. : -
Customer name : Life & Environment Co., Ltd. (Head Office)
Customer address : 90,92,94 Soi On-Nuch 64, Srinakarin Road, Suanluang, Bangkok 10250

Total pages of certificate : 2 Pages
Receiving no. : L-260265
Receiving date. : 29-Jan-26
Parameter of calibration : Gas Calibration (Oxygen, Carbon Monoxide)

Condition of UUC. : Used

Ambient condition : All of the Measurement were carried out the stabilized laboratory

Temperature : 23 ± 5 °C
 Humidity : 55 ± 15 %RH

Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210

Calibration procedure no. : This instrument was calibrated by comparison with Standard gas mixture according to calibration Work Instruction no. WI-CL-28-C

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

This certificate is applied only to item under test Environmental condition.

This Calibration Certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature and seal not valid and The results relate only to the items tested/calibrated.

This calibration certificate documents are traceability to national standards, which realize measurement according to the International System of Units (SI).

Date of calibration : 03-Feb-26

Calibration Technician

Technical Manager

Certificate No.: G 260072

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.506 % Vol	1287/25	Linde	08-May-29
Oxygen (O ₂) 9.984 % Vol	CG-0090-25	Nimt	24-Jun-30
Oxygen (O ₂) 21.01 % Vol	CG-0112-24	Nimt	01-Aug-29
Carbon monoxide (CO) 80.47 ppm	3276/25	Linde	09-Nov-27
Carbon monoxide (CO) 300.9 ppm	1422/25	Linde	21-May-29
Carbon monoxide (CO) 1000 ppm	3131/25	Linde	27-Oct-29

Measured room conditions

Temperature : 23.3 °C Humidity : 59.8 %RH Pressure : 1013.2 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 700 ml/min Gas pressure : 1016.1 mbar

Calibration Results (Without adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.506	2.5	-0.006	0.15
O ₂ (%Vol)	9.984	10.1	0.116	0.20
O ₂ (%Vol)	21.01	21.1	0.09	0.30
CO (ppm)	80.47	83	2.53	3.5
CO (ppm)	300.9	309	8.1	9.6
CO (ppm)	1000	1028	28	33

Remark : 1 cmol/mol = 1 %vol., 1 µmol/mol = 1 ppm.

End of Certificate of Calibration



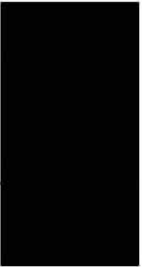
TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484



MSC-TIS-11517025
CALIBRATION 0008

Certificate of Calibration

Cert.No.: 26CH31
Page.: 1 of 2

Equipment :	pH Meter
Manufacturer :	Hanna
Model :	HI 3222
Serial No. :	08645111
ID No. :	-
Condition As-Received:	Used Item
Received Date :	26 December 2025
Calibration Date :	09 January 2026
Reference :	2512-0706WN-1
Submitted by :	LIFE & ENVIRONMENT CO., LTD. 90, 92, 94 Soi On-Nuch 64, Srinakarin Road, On-Nuch, Suanluang, Bangkok 10250
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(50 ± 15) %
Calibration Procedure :	In - house method : - CP-CH5 by direct measurement with DC voltage standard and direct measurement with certified reference material (CRM)
Calibrated by :	
Approved by :	Approved Signatory
() Chakrit Waewwanjua () Ponpan Paipim (✓) Saithip Meangmai	
Issue Date :	12 January 2026

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.: 26CH31
Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	54030049	130RC116	25E2743	25 Aug 2026

- This measurement result is traceable to SI through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials

:The measurement results are traceable to SI through Hach Lange GmbH Ltd.,
Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00
:The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.007	CPA chem	1135353	16 Aug 2027
pH 7.000	Hach Lange GmbH	CO3319	17 Oct 2027
pH 10.010	CPA chem	1150493	30 Oct 2026

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

Calibration Results

Function : mV Measurement

Performing standard curve by Document Process Calibrator at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement ($\pm$ mV)	Coverage factor k
	pH	mV	mV	pH		
pH Meter S/N.: 08645111	4.000	177.48	177.3	4.000	* 0.058	2.00
	7.000	0.00	-0.1	7.000	0.058	2.00
	10.000	-177.48	-177.5	10.000	0.058	2.00

Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement ($\pm$)	Coverage factor k
pH Electrode S/N.: 092818FN	4.007	4.009	170.0	0.0044	2.00
	7.000	7.007	-4.3	0.0084	2.00
	10.010	10.012	-175.2	0.0065	2.00

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 %.



Certificate of Calibration

NSC-TIS-TIS 17023
Calibration only

Equipment:	Cooled Incubator	Certificate No.:	C31252398
Manufacturer:	Accuplus	Issued Date:	05 November 2025
Model:	i250	Job No.:	WO-00092325
Serial No.:	0812-0416	Ventilation Valve:	None
ID No.:	W-BOD-01/55	Page:	1 of 3
Shelves(pc.):	2		
Condition of the item:	Normal		

Customer: LIFE & ENVIRONMENT CO., LTD.
90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Environment Condition:	Temperature:	21 °C	±	2.0 °C
	Relative Humidity:	51 %	±	5.2 %
	Voltage:	229 VAC	±	2.0 VAC

Calibration Place: LIFE & ENVIRONMENT CO., LTD. (Water & Soil Testing Laboratory)
90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Calibration By: Mr. Tweewong Thaiithiang
Calibration Date: 05 November 2025
The Method Used: In house method, CAL-WI-16, base on TLAS-G20
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.
Certificate No. C10250009

Person in charge



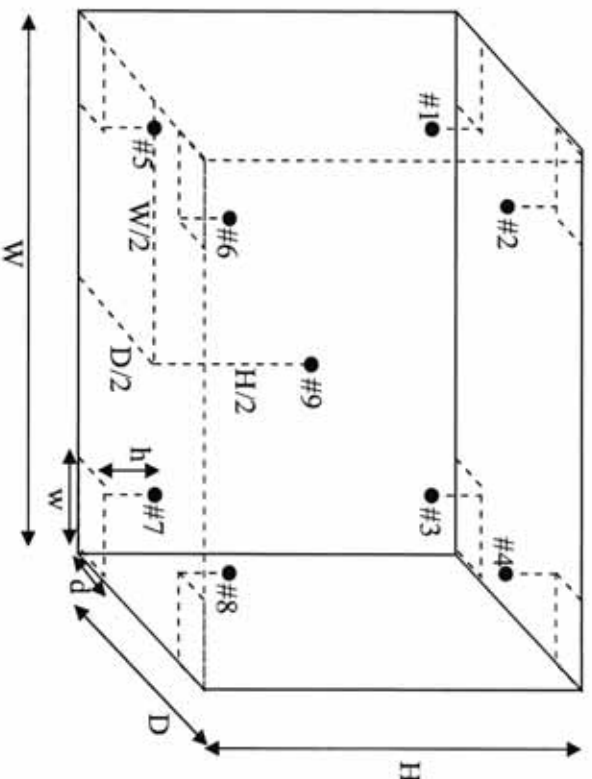
Authorized signatory



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 Evaluation of measurement data - Guide to the expression of uncertainty in measurement (JCGM 100).

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Standard Installation Locations

Volume (Calibration Zone)= 102 (Liters)

Inside chamber:

$$W = 50 \text{ (cm)}$$

$$D = 50 \text{ (cm)}$$

$$H = 104 \text{ (cm)}$$

Standard Locations (#1, #2, #3, #4):

$$w = 5 \text{ (cm)}$$

$$d = 5 \text{ (cm)}$$

$$h = 30 \text{ (cm)}$$

Standard Locations (#5, #6, #7, #8):

$$w = 5 \text{ (cm)}$$

$$d = 5 \text{ (cm)}$$

$$h = 10 \text{ (cm)}$$

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	101	102	103	104	105	106	107	108	109

Definitions

Indicating Temperature. The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature. The average reading of standards at any positions or location.

Measured Uniformity. The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

Measured Stability. The one-half of greatest maximum difference of measured temperatures at any one probe.

Overall Variation. The difference of maximum and minimum measured temperatures throughout observation time.

Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 20.0 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	20.18	0.18	0.35
#2	20.24	0.24	0.32
#3	20.11	0.11	0.38
#4	20.20	0.20	0.40
#5	20.17	0.17	0.32
#6	20.26	0.26	0.29
#7	20.11	0.11	0.34
#8	20.10	0.10	0.34
#9	20.12	0.12	0.39

Temperature Distribution

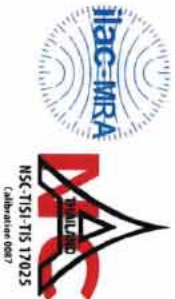
Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
20.0	20.0	20.0	20.18	20.24	20.11	20.20	20.17	20.26	20.11	20.10	20.12	0.40

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
20.0	0.31	0.30	0.67

Note: * Maximum uncertainty of the each position

The End of Certificate



Certificate of Calibration

Equipment:	Incubator	Certificate No.:	C31252397
Manufacturer:	Memmert	Issued Date:	05 November 2025
Model:	INE 400	Job No.:	WO-00092325
Serial No.:	E407.1277	Ventilation Valve:	Closed
ID No.:	WM-IB-02/51	Page:	1 of 3
Shelves(pc.):	1		
Condition of the item:	Normal		

Customer: LIFE & ENVIRONMENT CO., LTD.
90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Environment Condition:

Temperature:	25 °C	±	0.7 °C
Relative Humidity:	60 %	±	4.4 %
Voltage:	228 VAC	±	1.5 VAC

Calibration Place: LIFE & ENVIRONMENT CO., LTD. (Microbiological Laboratory)
90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Calibration By: Mr. Ampol Srisumphan

Calibration Date: 05 November 2025

The Method Used: In house method, CAL-WI-16, base on TLAS-G20

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.
Certificate No. C10250016

Person in charge



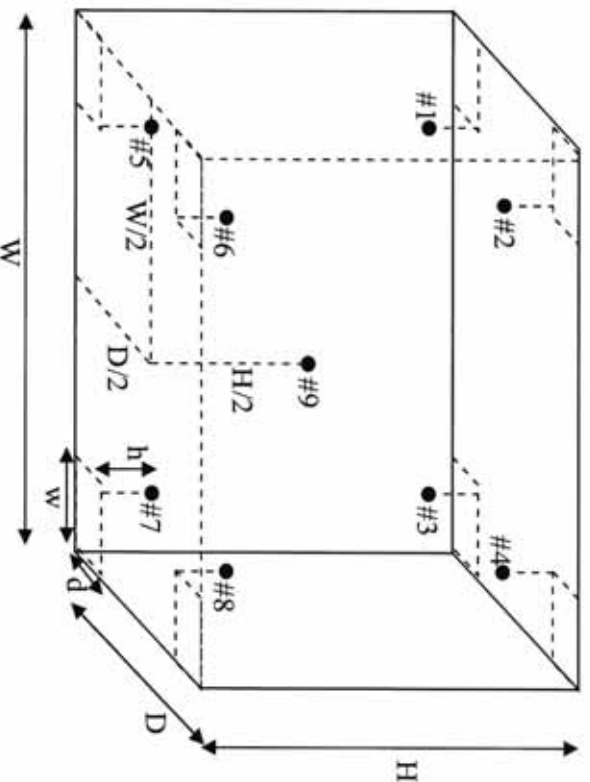
Authorized signatory



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.

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Standard Installation Locations

Volume (Calibration Zone)= 21 (Liters)

Inside chamber:

$W = 40 \text{ (cm)}$

$D = 33 \text{ (cm)}$

$H = 40 \text{ (cm)}$

Standard Locations (#1, #2, #3, #4):

$w = 5 \text{ (cm)}$

$d = 5 \text{ (cm)}$

$h = 5 \text{ (cm)}$

Standard Locations (#5, #6, #7, #8):

$w = 5 \text{ (cm)}$

$d = 5 \text{ (cm)}$

$h = 5 \text{ (cm)}$

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	101	102	103	104	105	106	107	108	109

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

Overall Variation: The difference of maximum and minimum measured temperatures throughout observation time.

Calibration Results:
Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 35.0 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	35.03	0.03	0.23
#2	35.06	0.06	0.23
#3	35.07	0.07	0.23
#4	35.14	0.14	0.23
#5	35.17	0.17	0.24
#6	35.26	0.26	0.24
#7	35.28	0.28	0.24
#8	35.54	0.54	0.24
#9	35.50	0.50	0.24

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
35.0	35.0	35.0	35.03	35.06	35.07	35.14	35.17	35.26	35.28	35.54	35.50	0.24

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
35.0	0.53	0.07	0.58

Note: * Maximum uncertainty of the each position

The End of Certificate



Certificate of Calibration

Equipment:	Cooled Incubator	Certificate No.:	C31252396
Manufacturer:	Accuplus	Issued Date:	05 November 2025
Model:	I250	Job No.:	WO-00092325
Serial No.:	0812-0414	Ventilation Valve:	None
ID No.:	W-RE-01/55	Page:	1 of 3
Shelves(pc.):	2		
Condition of the item:	Normal		

Customer: LIFE & ENVIRONMENT CO., LTD.
90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Environment Condition:

Temperature:	21 °C	±	1.9 °C
Relative Humidity:	51 %	±	5.2 %
Voltage:	229 VAC	±	2.0 VAC

Calibration Place: LIFE & ENVIRONMENT CO., LTD. (Water & Soil Testing Laboratory)
90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Calibration By: Mr. Tweewong Thaitiang
Calibration Date: 05 November 2025

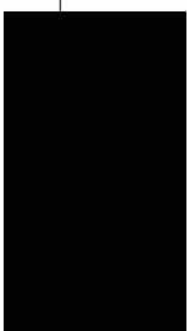
The Method Used: In house method, CAL-WI-16, base on TLAS-G20

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.
Certificate No. C10250009

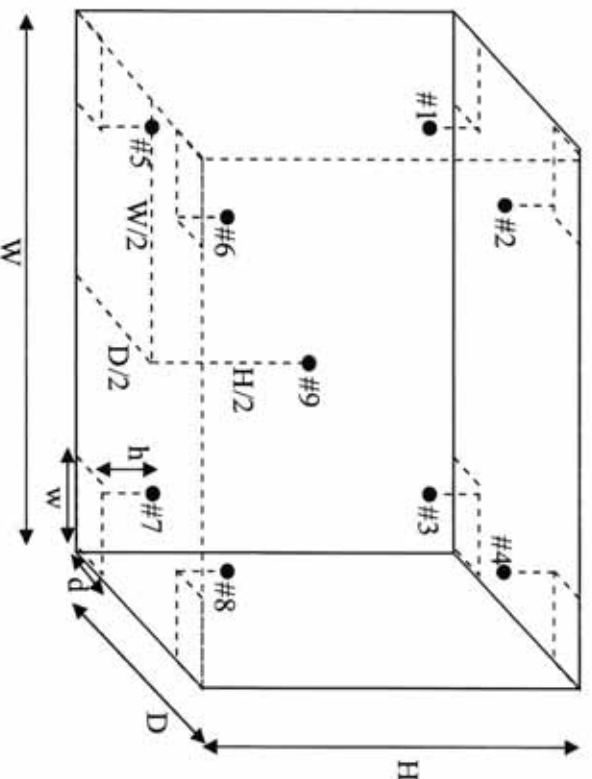
Person in charge



Authorized signatory



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Standard Installation Locations

Volume (Calibration Zone)= 102 (Liters)

Inside chamber:

$W = 50$ (cm)

$D = 50$ (cm)

$H = 104$ (cm)

Standard Locations (#1, #2, #3, #4):

$w = 5$ (cm)

$d = 5$ (cm)

$h = 30$ (cm)

Standard Locations (#5, #6, #7, #8):

$w = 5$ (cm)

$d = 5$ (cm)

$h = 10$ (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	201	202	203	204	205	206	207	208	209

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

Overall Variation: The difference of maximum and minimum measured temperatures throughout observation time.

บริษัท ดีเคเอส เทคโนโลยี จำกัด

DKSH Technology Limited

2533 หมู่ 10 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260

2533 Sukhumvit Road, Bangchak, Phrahanong, Bangkok 10260

Phone: +66 2639 7000 Email: info.calibration@dksh.com

Website: www.dksh.com/scientific-thailand

Delivering Growth – in Asia and Beyond.

Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 4.0 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	3.73	-0.27	0.87
#2	3.63	-0.37	1.02
#3	4.04	0.04	0.72
#4	4.08	0.08	0.81
#5	4.26	0.26	0.55
#6	3.89	-0.11	0.70
#7	3.98	-0.02	0.65
#8	3.90	-0.10	0.66
#9	3.64	-0.36	0.89

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
4.0	4.0	4.0	3.73	3.63	4.04	4.08	4.26	3.89	3.98	3.90	3.64	1.02

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
4.0	1.03	0.84	1.89

Note: * Maximum uncertainty of the each position

The End of Certificate



Certificate of Calibration

Equipment:	Liquid Bath	Certificate No.:	C13250417
Manufacturer:	GLF	Issued Date:	05 November 2025
Model:	1013	Job No.:	WO-00092325
Serial No.:	10637804J	Page:	1 of 3
ID No.:	WM-WB-01/05		
Forced Circulation:	None		
Condition of the item:	Normal		

Customer: LIFE & ENVIRONMENT CO., LTD.
90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Environment Condition:

Temperature:	27 °C	±	0.1 °C
Relative Humidity:	60 %	±	4.3 %
Voltage:	228 VAC	±	1.4 VAC

Calibration Place: LIFE & ENVIRONMENT CO., LTD. (Microbiological Laboratory)
90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Calibration By: Mr. Ampol Srisumphan

Calibration Date: 05 November 2025

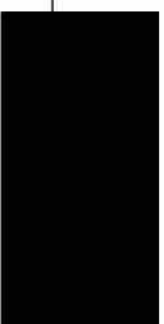
The Method Used: In house method, CAL-WI-17, base on ASTM E715-80

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.
Certificate No. C10250016

Person in charge



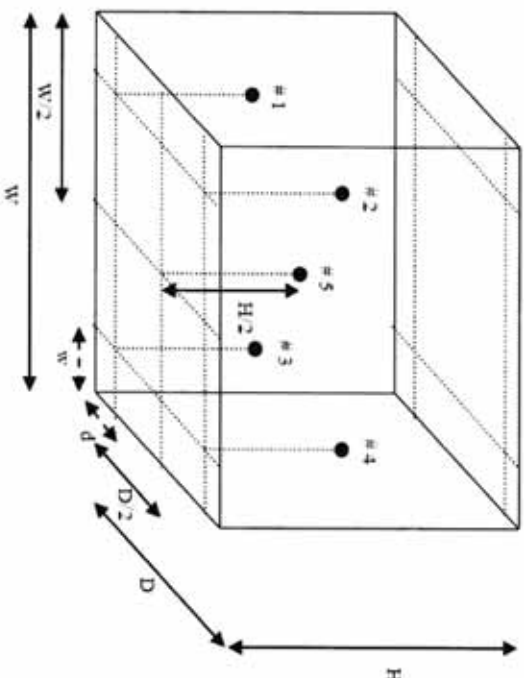
Authorized signatory



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Standard Installation Locations

Midway between the diffuser plate and the water surface

Inside bath: W = 40 (cm) D = 25 (cm) H = 17 (cm) Volume = 17 (Liters)

Standard Locations #1: w = 5 (cm) d = 5 (cm)

Standard Locations #2: w = 5 (cm) d = 5 (cm)

Standard Locations #3: w = 5 (cm) d = 5 (cm)

Standard Locations #4: w = 5 (cm) d = 5 (cm)

Standard Locations #5: Center of any probes. (#1 - #4)

Position of Std	#1	#2	#3	#4	#5
Channel of Logger	201	202	203	204	205

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the bath.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the bath at steady-state. The reference probe is preferably located in the geometric center of the bath.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

Overall Variation: The difference of maximum and minimum measured temperatures throughout observation time.

Calibration Results:
Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 44.5 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty ($\pm$ °C)
#1	44.49	-0.01	0.15
#2	44.50	0.00	0.15
#3	44.49	-0.01	0.15
#4	44.48	-0.02	0.15
#5	44.48	-0.02	0.16

Temperature Distribution

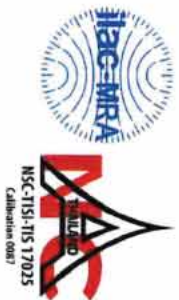
Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)					Uncertainty ($\pm$ °C)*
			#1	#2	#3	#4	#5	
44.5	44.5	44.5	44.49	44.50	44.49	44.48	44.48	0.16

Bath Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability ($\pm$ °C)	Overall Variation (°C)
44.5	0.02	0.02	0.04

Note: * Maximum uncertainty of the each position

The End of Certificate



Certificate of Calibration

Equipment:	Autoclave	Certificate No.:	C11250330
Manufacturer:	ALP	Issued Date:	10 December 2025
Model:	88	Job No.:	WO-00097669
Serial No.:	105611	Page:	1 of 3
ID No.:	-		
Condition of the item:	Normal		

Customer: LIFE & ENVIRONMENT CO., LTD.
90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Environment Condition:

Temperature:	24 °C	±	0.5 °C
Relative Humidity:	56 %	±	4.9 %
Voltage:	225 VAC	±	1.1 VAC

Calibration Place: LIFE & ENVIRONMENT CO., LTD. (Microbiology Testing Laboratory)
90, 92, 94 Soi On-nuch 64, Srinakarin Road, On-nuch,
Suanluang, Bangkok 10250 Thailand

Calibration By: Mr. Atachai Ngamchanat

Calibration Date: 10 December 2025

The Method Used: In house method, CAL-WI-18, base on BS 2646 : Part 5

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through Quality reborn Co., Ltd.
Certificate No.QR24-3470

Person in charge



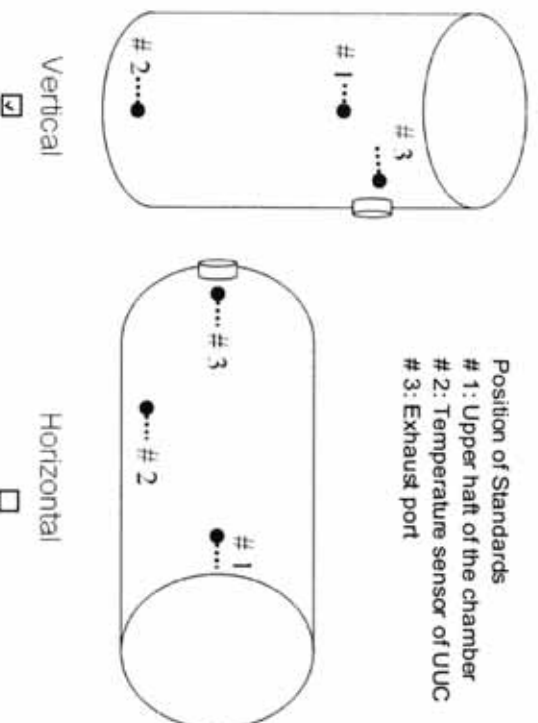
Authorized signatory



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Standard Installation Locations

Standard Locations (#1):

Upper haft of the chamber

Standard Locations (#2):

Distance from temperature sensor of UUC 2 (cm.)

Standard Locations (#3):

Distance from the wall 5 (cm.)

Position of Std	#1	#2	#3
Channel of Logger	13	14	15

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

Calibration Results:

Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 121.0 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	121.25	0.25	0.35
#2	121.18	0.18	0.35
#3	121.24	0.24	0.35

Temperature Distribution

Temperature			Pressure	Measured Temperature at Spread Locations			Uncertainty
Desired (°C)	Setting (°C)	Indicating (°C)	Indicating kg/cm²	#1 (°C)	#2 (°C)	#3 (°C)	
121.0	121.0	121.0	1.2	121.25	121.18	121.24	0.35

Chamber Characterization

Indicating Temperature (°C)	Indicating Pressure kg/cm ²	Measured Stability (± °C)
121.0	1.2	0.10

Note: * Maximum uncertainty of the each position

Record every 10 seconds after reaching steady state or after one achieved complete cycle.

The End of Certificate



Certificate of Calibration

Equipment:	Hot Air Oven	Certificate No.:	C31261132
Manufacturer:	Memmert	Issued Date:	18 May 2026
Model:	UFE 400	Job No.:	WO-00121874
Serial No.:	G412.0022	Ventilation Valve:	Closed
ID No.:	-	Page:	1 of 5
Shelves(pc.):	1		
Condition of the item:	Normal		

Customer:
LIFE & ENVIRONMENT CO., LTD.
90, 92, 94 Soi On-nuch 64, Srinakarin Road,
On-nuch, Suanluang, Bangkok 10250 Thailand

Environment Condition:

Temperature:	29 °C	±	1.6 °C
Relative Humidity:	56 %	±	5.4 %
Voltage:	230 VAC	±	1.7 VAC

Calibration Place:
LIFE & ENVIRONMENT CO., LTD. (Water & Soil Testing Laboratory)
90, 92, 94 Soi On-nuch 64, Srinakarin Road,
On-nuch, Suanluang, Bangkok 10250 Thailand

Calibration By: Mr. Preecha Phooarsai
Calibration Date: 15 May 2026
The Method Used: In house method, CAL-WI-16, base on TLAS-G20
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.
Certificate No. C10250012

Person in charge



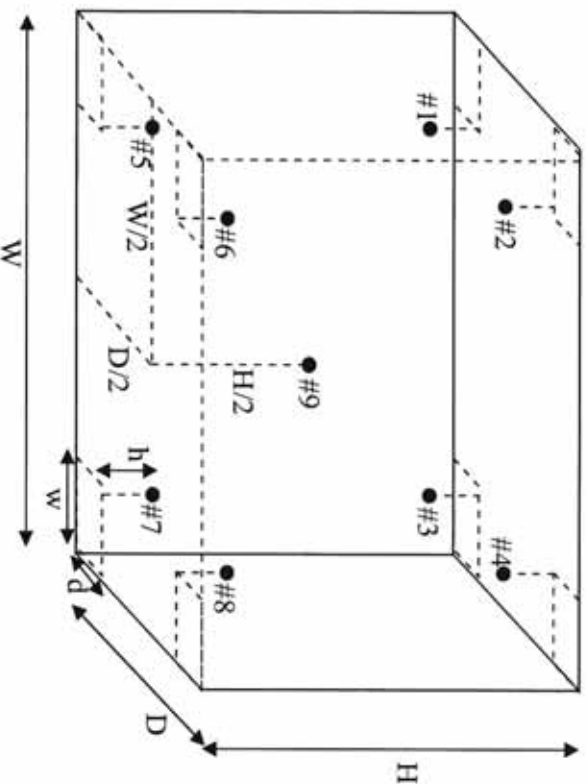
Authorized signatory



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 Evaluation of measurement data - Guide to the expression of uncertainty in measurement (JCGM 100).

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.



Standard Installation Locations

Volume (Calibration Zone)= 21 (Liters)

Inside chamber:

$W = 40$ (cm)

$D = 33$ (cm)

$H = 40$ (cm)

Standard Locations (#1, #2, #3, #4):

$w = 5$ (cm)

$d = 5$ (cm)

$h = 5$ (cm)

Standard Locations (#5, #6, #7, #8):

$w = 5$ (cm)

$d = 5$ (cm)

$h = 5$ (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	101	102	103	104	105	106	107	108	109

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

Overall Variation: The difference of maximum and minimum measured temperatures throughout observation time.

Calibration Results:
Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.0 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	104.10	0.10	0.38
#2	104.60	0.60	0.38
#3	103.66	-0.34	0.38
#4	104.06	0.06	0.38
#5	104.33	0.33	0.38
#6	104.00	0.00	0.38
#7	104.21	0.21	0.38
#8	103.41	-0.59	0.38
#9	104.24	0.24	0.38

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
104.0	104.0	104.0	104.10	104.60	103.66	104.06	104.33	104.00	104.21	103.41	104.24	0.38

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
104.0	0.90	0.07	1.29

Note: * Maximum uncertainty of the each position

Without adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 150.0 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	150.18	0.18	0.45
#2	150.95	0.95	0.46
#3	149.31	-0.69	0.45
#4	150.02	0.02	0.45
#5	150.65	0.65	0.46
#6	150.16	0.16	0.46
#7	150.47	0.47	0.46
#8	149.10	-0.90	0.46
#9	150.38	0.38	0.46

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
150.0	150.0	150.0	150.18	150.95	149.31	150.02	150.65	150.16	150.47	149.10	150.38	0.46

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
150.0	1.37	0.13	2.09

Note: * Maximum uncertainty of the each position

Without adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 180.0 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	180.15	0.15	0.52
#2	181.16	1.16	0.51
#3	179.00	-1.00	0.52
#4	179.93	-0.07	0.51
#5	180.91	0.91	0.51
#6	180.38	0.38	0.51
#7	180.67	0.67	0.52
#8	178.94	-1.06	0.51
#9	180.59	0.59	0.52

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
180.0	180.0	180.0	180.15	181.16	179.00	179.93	180.91	180.38	180.67	178.94	180.59	0.52

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
180.0	1.75	0.11	2.34

Note: * Maximum uncertainty of the each position

The 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

Cert.No.: 25CH709/1
Page.: 1 of 3

This Certificate was issued to re place to the Certificate No.25CH709

Equipment : pH Meter

Manufacturer : Mettler Toledo

Model : SevenExcellence

Serial No. : B834291445

ID No. : RYG_EN0152

Condition As-Received: Used Item

Received Date : 12 June 2025

Calibration Date : 18 June 2025

Reference : 2506-0407DSC-2

Submitted by :

ALS Laboratory Group (Thailand) Co.,Ltd.
Rayong Branch
616/10 Moo 5, T.Maenam Khu,
A.Pluakdaeng, Rayong 21140, Thailand

Ambient Temperature :

Relative Humidity :

Calibration Procedure :

(25 ± 2.5) °C

(50 ± 15) %

In - house method :

- CP-CH5 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)

- CP-CH8 by comparison with temperature standard

Calibrated by :

Approved by :

Approved Signatory

() Chakrit Waewwanjua

() Ponpan Paipim

(✓) Sathip Meangmai

Issue Date :

1 July 2025

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.: 25CH709/1

Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	54030049	130RC116	24E2759	25 Aug 2025
2) Ref. Standard Thermometer	4982054	110RC04	24I757	14 July 2025
- This measurement result is traceable to SI through Technology Promotion Association (Thailand - Japan)				

2. Certified Reference Materials

:The measurement results are traceable to SI through Hach Lange GmbH Ltd.,
Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00
:The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.007	CPA chem	1066665	18 Jan 2027
pH 7.000	Hach Lange GmbH	C03232	02 Dec 2026
pH 10.010	CPA chem	1066669	18 Jan 2026

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

Calibration Results

Function : mV Measurement

Performing standard curve by Document Process Calibrator at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement ($\pm$ mV)	Coverage factor <i>k</i>
	pH	mV	mV	pH		
pH Meter S/N : B834291445	4.000	177.48	177.3	4.000	0.058	2.00
	7.000	0.00	-0.1	7.000	0.058	2.00
	10.000	-177.48	-177.5	10.000	0.058	2.00



Cert.No.: 25CH709/1

Page.: 3 of 3

Calibration Results

Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement ($\pm$)	Coverage factor k
pH Electrode	4.007	4.006	181.1	0.0044	2.00
S/N.: 5211504	7.000	7.000	4.9	0.0084	2.00
	10.010	10.007	-170.6	0.0066	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLabEXpert Pro-ISM

- Serial No. : 5211504

Dimension of probe

- Length : 120 mm.

- Diameter : 12 mm.

- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.001	25.1	0.099	0.13	2.00

Remark - UUC* = Unit Under Calibration

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

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TEL. 0-2717-3000-24 FAX. 0-2719-9484



NSC-TIS-THAILAND
CALIBRATION 0008

Certificate of Calibration

Certificate No. : 25E1979/1
Page : 1 of 2

This Certificate was issued to replace to the Certificate No. 25E1979

Equipment :	pH Meter	
Manufacturer:	Mettler Toledo	
Model :	SevenExcellence	
Serial No.:	B834291445	
ID No.:	RYG_EN0152	
Condition As-Received:	Used Item	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.
Received Date:	12 June 2025	
Calibration Date:	16 June 2025	
Reference:	2506-0407DSC	Submitted by: <i>ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch</i>
Ambient Temperature:	(23 ± 2) °C	<i>816/10 Moo 5, T.Maenam Khu, A.Pluakdaeng,</i>
Relative Humidity:	(50 ± 10) %	<i>Rayong 21140, Thailand</i>
Procedure used:	Calibration were conducted using calibration procedure No. CP-E17 According to EURAMET cg-15.	

Condition of this result of calibration

1. Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Multi-Product Calibrator	5500A	6315011	25E1627	19 May 2026
2. This result of calibration was made on requested at the point specified by customer.				
3. The certificate is valid only to the item calibrated on date and place of calibration.				
4. This measurement result is traceable to the International System of Unit maintained through:-				
-Technology Promotion Association (Thailand-Japan), NSC-ONSC Accredited No. Calibration 0008				

Calibrated by : Wutthareepom Peethong
Issue Date : 01 July 2025

Approved Signatory : _____





Cert. No.: 25E1979/1

Page.: 2 of 2

Result of calibration :- (') Without adjustment () After adjustment

Function: DC voltage measurement

Range:

2000

mV

<u>Standard Value</u>	<u>UUC* Reading</u>	<u>Error</u>	<u>Uncertainty</u>
(mV)	(mV)	(mV)	($\pm$ μ V)
-200.0000	-199.9	0.1	68
-150.0000	-150.0	0.0	65
-100.0000	-100.0	0.0	63
-50.0000	-50.0	0.0	61
0.0000	0.0	0.0	58
50.0000	50.0	0.0	61
100.0000	100.0	0.0	63
150.0000	149.9	-0.1	65
200.0000	199.9	-0.1	68

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

UUC* = Unit Under Calibration.

-o0o-

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID:	BKK_EN0059(GM-7)
Organization Name:	ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location:	104 Patthanakarn 40, Patthanakarn Rd., Khwang Suan Luang, Khet Suan Luang, Bangkok
Date:	June 25, 2025 8:40:18 PM
EQP Name:	AgilentRecommended , AgilentRecommended
EQP Revision:	GC.02.50, GCMS.02.50
Overall Qualification Status:	Pass

REVIEW BY

APPROVED

NEXT CAL. DATE

25-Dec-26

System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Accuracy

Name: 7890

Front SSL

Setpoint Status: Pass

Setpoint	Actual
Inlet Pressure: 25.0 psi	25.2 psi
Accuracy: 0.2 psi	
Agilent Recommended: <= 1.2	

Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Date: June 25, 2025 8:40:18 PM

System ID: BKK_EN0059(GM-7)

Name:	7890				
Setpoint Status:	Pass				
Zone:	Oven				
	Setpoint/Actual				
Temperature:	230.0	228.8	°C		
Accuracy:		-1.2	°C		
Agilent Recommended:		>= -1.0	% setpoint in K	(-5.0	°C)
		<= 1.0	% setpoint in K	(5.0	°C)
Setpoint Status:	Pass				
Zone:	Oven				
	Setpoint/Actual				
Temperature:	100.0	100.8	°C		
Accuracy:		0.8	°C		
Agilent Recommended:		>= -1.0	% setpoint in K	(-3.7	°C)
		<= 1.0	% setpoint in K	(3.7	°C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name:	7890
Setpoint Status:	Pass
	Setpoint/Average
Temperature:	100.0 101.0 °C
Stability:	0.0 °C
Agilent Recommended:	<= 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Log Amp

Tested Combination1	Front	SSL	/	External	SQ
Name:	5977A				

Date: June 25, 2025 8:40:18 PM
System ID: BKK_EN0069(GM-7)

Setpoint Status: Pass

Overall Log Amp Test Status

Pass

RPPA

Tested Combination1 Front SSL / External SQ
Name: 5977A

Setpoint Status: Pass

Amu: 1050 m/z Drift After Five Minutes: RPPA Voltage: 462 mV
Agilent Recommended: >= -100 and <= 100 <= 1100

Overall RPPA Test Status

Pass

Tune EI

Tested Combination1 Front SSL / External SQ
Name: 5977A

Setpoint Status: Pass

Filament: 1

Setpoint Status: Pass

Filament: 2

Overall Tune EI Test Status

Pass

Signal to Noise EI

Tested Combination1 Front SSL / External SQ
Name: 5977A

Source:	EI - Extractor	Filament:	1
Setpoint Status:	Pass		
Signal to Noise:		35794093956	
Agilent Recommended:		>= 1200	
Source:	EI - Extractor	Filament:	2
Setpoint Status:	Pass		
Signal to Noise:		32894968229	
Agilent Recommended:		>= 1200	
Overall Signal to Noise EI Test Status	Pass		

NOTE: This test's 0 comment(s) and 3 deviation(s) are available in the Attachments section.

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System	BKK_EN0059(GM-7)
System ID	BKK_EN0059(GM-7)
Manufacturer	Agilent Technologies
Name	7890
Tested Combination 1	
Injection Technique	Manual Injection
Inlet	Front
Detector	External
LTM Included?	No
Sampler 1	
Manufacturer	Agilent Technologies
Type	Manual Injection
Usage	Sample Injection
Syringe Volume (µL)	10
Mainframe 1	
Manufacturer	Agilent Technologies
Name	7890
Model Number	G3442B
Serial Number	CN14133181
Firmware Revision	B.02.03
Oven Type	Standard

Inlet 1

Manufacturer		Agilent Technologies
Name		7890
Type		SSL
Location		Front
Carrier Gas		Helium
Control Type		Electronic Pressure Control (EPC)
Purged Inlet		Yes
Detector 1		
Manufacturer		Agilent Technologies
Name		Mass Spectrometer
Type		Mass Spectrometer
Location		External
Mass Spectrometer 1		
Manufacturer		Agilent Technologies
Type		SQ
Name		5977A
Serial Number		US1415M209
Firmware Revision		5977 6.00.21
High Vacuum System		Turbo Pump
Scouting Run Standard		OFN Std
MS EI Source 1		
Manufacturer		Agilent Technologies
Source Type		EI - Extractor
Number of Filaments		2

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and login to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer:	Supasak Nimsongtham
Logged On User Name:	supasak.nimsongtham@agilent.com
Signature Creation Date:	June 25, 2025
Reason for Signature:	Executed protocol and published this original version of document

ACE Self Qualification Status

The installed version of ACE used to deliver this service passed qualification; the results conform with expected values. The self qualification summary report is available in the session folder location SDS\CleanStore\AceSelfQualification.

Regulatory Disclaimer

This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not assure compliance. Agilent Technologies makes no promises or representations as to its sufficiency for any specific regulatory program.

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User Name: supisak.nimsongtham
Report Generated by Hostname: SCG115HKC

System Id: BKK_EN0059(GM-7)
Print Date: June 25, 2025 8:40:28 PM

GM-7-2025 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 13, 2025 10:01:23 AM Audit	SessionCreated	Session		Host Name: SCG115HKC, Drive Serial Number: C2031778
June 13, 2025 10:01:24 AM start	Configuration	Session		None
June 13, 2025 10:01:24 AM Audit	Enrollment	Licensing		User is FindEngineer and does not require an unlock code
June 13, 2025 10:04:40 AM Audit	Eqpl.loaded	Session		EQP details for primary technique [3c] - File path: [ProtocolBackGnd\Configur ations\02.50(Gc,02.50,eqpl, EQP File Name: [Gc,02.50,eqpl], EQP Name: [AgilentRecommended],Proto col Revealon :[Gc,02.50] EQP details for hyphenated technique [Cchls] - File path: [ProtocolBackGnd\Config urations\02.50(Gc&A,02.50,e qpl], EQP File Name: [Gc&A,02.50,eqpl], EQP Name: [AgilentRecommended]
June 13, 2025 10:04:51 AM End	Configuration	Session		None
June 13, 2025 10:05:03 AM start	Qualification	Session		DO
June 13, 2025 10:05:05 AM start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated		None
June 13, 2025 10:05:35 AM End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated		Run Count : 1

User Name: supasak.nimsaiphum
Report Generated by Hostname: SCG1113HKC

System Id: BKK_END059(GM-7)
Print Date: June 25, 2025 8:40:20 PM

GM-7-2025 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 13, 2025 10:06:49 AM start		Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
June 13, 2025 10:06:58 AM End		Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
June 13, 2025 10:07:00 AM start		Execution	GC Oven Temperature Accuracy - 7890C - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
June 13, 2025 10:07:30 AM Au68		Date	GC Oven Temperature Accuracy - 7890C - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Date Entry
June 13, 2025 10:07:35 AM End		Execution	GC Oven Temperature Accuracy - 7890C - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
June 13, 2025 10:07:59 AM start		Execution	RFPA - 5917A SQ - Source: EI None - Extractor	
June 13, 2025 10:11:14 AM start		Execution	GC Oven Temperature Accuracy - 7890C - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
June 13, 2025 10:12:12 AM Au68		Date	GC Oven Temperature Accuracy - 7890C - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Date Entry
June 13, 2025 10:12:17 AM End		Execution	GC Oven Temperature Accuracy - 7890C - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1

User Name: supasak.nimsongtham
Report Generated by Hostname: 5CG1115HXC

System ID: BKK_END059(GM-7)
Print Date: June 25, 2025 8:40:20 PM

GM-7-2025 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 13, 2025 10:12:10 AM	start	Execution	GC Oven Temperature Stability	None
			- 7890: - Temperature : Oven -	
			S: 100.0°C - L: <= 0.5°C	
June 13, 2025 10:30:39 AM	Audit	Data	GC Oven Temperature Stability	Manual Data Entry
			- 7890: - Temperature : Oven -	
			S: 100.0°C - L: <= 0.5°C	
June 13, 2025 10:30:45 AM	End	Execution	GC Oven Temperature Stability	Run Count : 1
			- 7890: - Temperature : Oven -	
			S: 100.0°C - L: <= 0.5°C	
June 13, 2025 10:30:56 AM	start	Execution	Log Amp - 5877A, SQ: - Source: None	
			EI - Extractor	
June 13, 2025 10:31:15 AM	End	Execution	Log Amp - 5877A, SQ: - Source: Run Count : 1	
			EI - Extractor	
June 13, 2025 10:34:14 AM	Audit	AcqClosed	Session	None
				Host Name: DESKTOP-6PKI2AL, Drive Serial Number: 9494EA83
June 16, 2025 11:55:53 AM	Audit	AcqRestarted	Session	
				Host Name: DESKTOP-6PKI2AL, Drive Serial Number: 9494EA83
June 16, 2025 11:55:55 AM	Audit	SessionReloaded	Session	None
				Host Name: DESKTOP-6PKI2AL, Drive Serial Number: 9494EA83
June 16, 2025 11:58:07 AM	start	Qualification	Session	OO
June 16, 2025 6:47:31 PM	Audit	AcqClosed	Session	None
June 17, 2025 1:34:47 PM	Audit	AcqRestarted	Session	
				Host Name: DESKTOP-6PKI2AL, Drive Serial Number: 9494EA83
June 17, 2025 1:39:56 PM	Audit	AcqClosed	Session	None
				Host Name: DESKTOP-6PKI2AL, Drive Serial Number: 9494EA83
June 17, 2025 1:52:55 PM	Audit	AcqRestarted	Session	
				Host Name: DESKTOP-6PKI2AL, Drive Serial Number: 9494EA83
June 17, 2025 2:03:56 PM	Audit	SessionReloaded	Session	None
				Host Name: DESKTOP-6PKI2AL, Drive Serial Number: 9494EA83
June 17, 2025 2:03:58 PM	start	Qualification	Session	OO
June 17, 2025 2:04:08 PM	Audit	AcqClosed	Session	None

User Name: supasak.nimsongtham
Report Generated by Hostname: SCG1115HKC

System Id: BKK_EN0059(GM-7)
Print Date: June 25, 2025 8:40:20 PM

GM-7-2025 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 25, 2025 3:07:51 PM	Audit	AccRedundant	Session	Host Name: SCG1115HKC, Drive Serial Number: C2031778
June 25, 2025 3:07:54 PM	Audit	SessionReloaded	Session	None
June 25, 2025 3:09:13 PM	start	Qualification	Session	CO
June 25, 2025 3:09:36 PM	start	Execution	RFPA - 5977A.SQ: - Source: EI - Extruder	None
June 25, 2025 3:10:29 PM	End	Execution	RFPA - 5977A.SQ: - Source: EI - Extruder	Run Count : 1
June 25, 2025 3:10:35 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL.SQ: - Source: EI - Extruder using Filament 1 - L: >= 1200	None
June 25, 2025 3:10:40 PM	start	Execution	Tune EI - 5977A.SQ: - Source: - EI - Extruder Filament 1 (Qualitative - No setpoints associated)	None
June 25, 2025 4:10:20 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL.SQ: - Source: EI - Extruder using Filament 1 - L: >= 1200	None
June 25, 2025 4:10:23 PM	start	Execution	Tune EI - 5977A.SQ: - Source: - EI - Extruder Filament 1 (Qualitative - No setpoints associated)	None
June 25, 2025 4:10:43 PM	End	Execution	Tune EI - 5977A.SQ: - Source: - EI - Extruder Filament 1 (Qualitative - No setpoints associated)	Run Count : 1
June 25, 2025 4:10:45 PM	start	Execution	Tune EI - 5977A.SQ: - Source: - EI - Extruder Filament 2 (Qualitative - No setpoints associated)	None

User Name: supasak.nimsongtham
Report Generated by Hostname: SCG115HKC

System ID: BKK_EN0059(GM-7)
Print Date: June 25, 2025 8:40:20 PM

GM-7,2025 Transaction Log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 25, 2025 4:11:08 PM	End	Execution	Tune EI - 5977A.SQ - Source: - Run Count : 1 EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
June 25, 2025 4:11:11 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	None
June 25, 2025 4:30:52 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	None
June 25, 2025 5:23:59 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : C:\Users\supasak\Downloads sIQQ data\IQQ data\IQQ_SN_F1_001.D
June 25, 2025 5:24:18 PM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over
June 25, 2025 5:26:41 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : C:\Users\supasak\Downloads sIQQ data\IQQ data\IQQ_SN_F1_001.D
June 25, 2025 5:27:29 PM	Audit	Reporting	Reintegration	Reintegration Count: 1 - [Integration Type: Injection;Baseline Correction Mode: Advanced;Initial Slope Sensitivity: 10;Initial Peak Width: 0.01;Initial Area Reject: 0;Initial Height Reject: 20000;Integration: Off at 0;Integration: On at 4]

User Name: supasak.rimsonghum
Report Generated by Hostname: SCG111SHKC

System Id: BKK_EN0059(GM-7)
Print Date: June 25, 2025 6:40:20 PM

GM-7-2025 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 25, 2025 5:28:45 PM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 1
June 25, 2025 5:31:32 PM	Audit	Test/Unlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Deviation filed for Run Count : 1
June 25, 2025 5:31:32 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
June 25, 2025 5:34:18 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data File Path : C:\Users\rimsonghu\Downloads\dataIQ data\OQ data\OQ data\OQ_SN_F1_001.D
June 25, 2025 5:35:03 PM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over
June 25, 2025 5:37:01 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data File Path : C:\Users\rimsonghu\Downloads\dataIQ data\OQ data\OQ_SN_F1_001.D
June 25, 2025 5:37:47 PM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- 1 Integration Type: InjectionBaseline Correction Mode: AdvancedInitial Slope Sensitivity: 10 Initial Peak Width: 0.01 Initial Area Reject: 0 Initial Height Reject: 25000 Integration: OFF at 0 Integration: ON at 41

User Name: supasak.nimsongtham
Report Generated by Hostname: SCG111SHKC

System ID: BKK_EN0059(GM-7)
Print Date: June 25, 2025 8:40:20 PM

GM-7-2025 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 25, 2025 5:40:08 PM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 2
June 25, 2025 5:41:09 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
June 25, 2025 5:44:37 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : C:\Users\lmsongtham\Download eIQO data\IQO data\IQO_SN_F2_001.D
June 25, 2025 5:48:28 PM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 1
June 25, 2025 5:49:39 PM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Deviation filed for Run Count : 1
June 25, 2025 5:49:40 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
June 25, 2025 5:57:10 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : C:\Users\lmsongtham\Download aNOQ data\IQO data\IQO_SN_F2_001.D
June 25, 2025 5:57:46 PM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over

User Name: supasak.nimsongtham
Report Generated by Hostname: SCG115HKC

System ID: BKK_EN0059(GM-7)
Print Date: June 25, 2025 8:40:20 PM

GM-7-2025 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 25, 2025 6:58:51 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : C:\Users\lmsongtham\Download sIQ data\ sIQ data\ sIQ data\ sIQ_F2_001.D
June 25, 2025 6:00:02 PM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over
June 25, 2025 6:02:07 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : C:\Users\lmsongtham\Download sIQ data\ sIQ data\ sIQ data\ sIQ_F2_001.D
June 25, 2025 6:02:24 PM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over
June 25, 2025 6:18:36 PM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over
June 25, 2025 6:27:38 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : C:\Users\lmsongtham\Download sIQ data\ sIQ data\ sIQ data\ sIQ_F2_002.D
June 25, 2025 6:33:07 PM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 2
June 25, 2025 6:34:17 PM	Audit	Test/checked	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Deviation filed for Run Count : 2
June 25, 2025 6:34:17 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	None

User Name: supasak.nimsongtham
Report Generated by Hostname: SCG1115HKC

System Id: BKK_END059(GM-7)
Print Date: June 25, 2025 8:40:20 PM

GM-7-2025 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 25, 2025 6:35:07 PM	Audit	AccClosed	Session	None
June 25, 2025 6:35:57 PM	Audit	AccRestarted	Session	Host Name: SCG1115HKC, Drive Serial Number: C2031778
June 25, 2025 6:35:58 PM	Audit	SessionReloaded	Session	None
June 25, 2025 6:38:12 PM	start	Qualification	Session	OQ
June 25, 2025 6:38:13 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
June 25, 2025 6:39:41 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path: C:\Users\tnsngtham\Downloads sIQQ data\OQ data\OQ_SN_F2_002.D
June 25, 2025 6:42:57 PM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 3
June 25, 2025 6:43:11 PM	End	Qualification	Session	OQ
June 25, 2025 6:43:11 PM	start	Reporting	Session	None
June 25, 2025 8:04:02 PM	Audit	Reporting	Session	Report Generated : Certificate
June 25, 2025 8:32:04 PM	Audit	Reporting	Session	Report Generated : Report

Certificate of System Qualification

GC-OQ

System ID:
Organization Name:
Organization Location:

2025_ALS_GC#11_CN2303A021_OQHW
ALS Laboratory Group (Thailand) Co., Ltd.
104 Soi 40 Phatthanaken Rd, Khwang Suan Luang, Khet Suan Luang, Bangkok 10250

REVIEW BY	
APPROVED	
NEXT CAL. DATE	9 May 26

Date:
EQP Name:

May 9, 2025 11:32:14 AM
AgilentRecommended

EQP Revision:
Overall Qualification Status:

GC.02.53
Pass

CDS Logon Verification - GC
Logon:
Overall CDS Logon Verification - GC Test Status

Saenguthai Tarak
Pass

System Inspection and Basic Safety and Operation

Name:
Setpoint Status:

8890
Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Decay

Name:
Front
SSL

8890

Setpoint Status:
Pressure:
Pressure Change:
Agilent Recommended:

Pass
25.0 psi
-0.1 psi /5 minutes
>= -2.0 and <= 0.5

Date:
System ID:

May 9, 2025 11:32:14 AM
2025_ALS_GC#11_CN2303A021_OQ

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 8890

Front SSL

Setpoint Status: Pass

Setpoint Actual
Inlet Pressure: 25.0 psi 24.9 psi

Accuracy: 0.1 psi

Agilent Recommended: <= 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Inlet Pressure Decay

Name: 8890

Back SSL

Setpoint Status: Pass

Pressure: 25.0 psi

Pressure Change: -0.1 psi /5 minutes

Agilent Recommended: >= -2.0 and <= 0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 8890

Back SSL

Setpoint Status:

Pass

Setpoint Actual

Inlet Pressure: 25.0 psi 24.8 psi

Accuracy: 0.2 psi

Agilent Recommended: <= 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 8890

Front FID

Setpoint Status:

Pass

Flow Type: Fuel

Setpoint: 30.0 mL/min Measured Flow: 30.3 mL/min

Accuracy: 0.3 mL/min

Agilent Recommended: <= 10.0 % setpoint (3.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status:

Pass

Flow Type: Oxidizer

Setpoint: 400.0 mL/min Measured Flow: 398 mL/min

Accuracy: 2.0 mL/min

Agilent Recommended: <= 10.0 % setpoint (40.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status:

Pass

Flow Type: Makeup

Setpoint: 25.0 mL/min Measured Flow: 25.1 mL/min

Accuracy: 0.1 mL/min

Agilent Recommended: <= 10.0 % setpoint (2.5 mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Overall Detector Flow Accuracy Test Status

Pass

Detector Flow Accuracy

Name:

8890

Back

FID

Setpoint Status:

Pass

Flow Type:

Fuel

Setpoint:

30.0

mL/min

Measured Flow:

30.1

mL/min

Accuracy:

0.1

mL/min

Agilent Recommended:

<= 10.0

% setpoint

(3.0

mL/min

)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status:

Pass

Flow Type:

Oxidizer

Setpoint:

400.0

mL/min

Measured Flow:

391

mL/min

Accuracy:

9.0

mL/min

Agilent Recommended:

<= 10.0

% setpoint

(40.0

mL/min

)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status:

Pass

Flow Type:

Makeup

Setpoint:

25.0

mL/min

Measured Flow:

24.8

mL/min

Accuracy:

0.2

mL/min

Agilent Recommended:

<= 10.0

% setpoint

(2.5

mL/min

)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Overall Detector Flow Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name:

8890

Date: May 9, 2025 11:32:14 AM
System ID: 2025_ALS_GC#11_CN2303A021_OQ

Setpoint Status:

Pass

Zone:

Oven

Setpoint/Actual

Temperature:

230.0

230.4

°C

Accuracy:

0.4

°C

Agilent Recommended:

>=

-1.0

% setpoint in K

(

-5.0

°C

)

<=

1.0

% setpoint in K

(

5.0

°C

)

Setpoint Status:

Pass

Zone:

Oven

Setpoint/Actual

Temperature:

100.0

100.2

°C

Accuracy:

0.2

°C

Agilent Recommended:

>=

-1.0

% setpoint in K

(

-3.7

°C

)

<=

1.0

% setpoint in K

(

3.7

°C

)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name:

8890

Setpoint Status:

Pass

Setpoint/Average

Temperature:

100.0

100.2

°C

Stability:

0.0

°C

Agilent Recommended:

<=

0.5

Overall GC Oven Temperature Stability Test Status

Pass

Scouting Run

Tested Combination 1

Front

SSL

/

Front

FID

Injection Tower

Name:

7693A

Setpoint Status:

Completed

Injection Volume on Column:

1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination1

Front

SSL

/ Front

FID

Name:

8890

Setpoint Status:

Pass

Base Signal:

5.89

pA

ASTM Noise

pA

0.05

<=

0.10

Status:

Pass

Drift

pA/h

1.11

<=

2.50

Pass

Agilent Recommended:

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1

Front

SSL

/ Front

FID

Name:

7693A

Setpoint Status:

Pass

Injection Volume on Column:

1.0

uL

Area RSD:

0.06

%

Retention Time RSD:

0.19

%

Agilent Recommended:

<=

3.00

<=

1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Date:

May 9, 2025 11:32:14 AM

System ID:

2025_ALS_GC#11_CN2303A021_OO

Tested Combination1	Front	SSL	/ Front	FID
	Injection Tower			
Name:	8890			

Setpoint Status:	Pass
Signal to Noise:	994826
Agilent Recommended:	>= 300000

Overall Signal to Noise Test Status

Pass

Scouting Run

Tested Combination2	Back	SSL	/ Back	FID
	Injection Tower			
Name:	7693A			

Setpoint Status:	Completed
Injection Volume on Column:	1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination2	Back	SSL	/ Back	FID
Name:	8890			

Setpoint Status:	Pass
Base Signal:	17.79 pA
ASTM Noise	
	pA
	0.04
Agilent Recommended:	<= 0.10
Status:	Pass
Drift	
	pA/h
	0.07
Agilent Recommended:	<= 2.50
Status:	Pass

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination2

Back

SSL

/ Back

FID

Name:

7693A

Setpoint Status:

Pass

Injection Volume on Column:

1.0

uL

Area RSD:

0.52

%

Retention Time RSD:

0.23

%

Agilent Recommended:

<=

3.00

<=

1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination2

Back

SSL

/ Back

FID

Injection Tower

Name:

8890

Setpoint Status:

Pass

Signal to Noise:

837739

Agilent Recommended:

>=

300000

Overall Signal to Noise Test Status

Pass

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID2025_ALS_GC#11_CN2303A021_OQHW

ManufacturerAgilent Technologies

Name8890

Flow Data InputManual Data

Temperature Data InputManual Data or Other Data Logging

Tested Combination1

Injection TechniqueInjection Tower

Sampler IdentifierSampler 1

InletFront

DetectorFront

LTM Included?No

Tested Combination2

Injection TechniqueInjection Tower

Sampler IdentifierSampler 2

InletBack

DetectorBack

LTM Included?No

Sampler 1

ManufacturerAgilent Technologies

TypeInjection Tower

Name7693A

Model NumberG4513A

Serial NumberCN23125107

Firmware RevisionA.11.07

UsageSample Injection

LocationFront

Syringe Volume (µL)10

Date:May 9, 2025 11:32:14 AM

System ID:2025_ALS_GC#11_CN2303A021_OQ

Sampler 2

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN23125121
Firmware Revision	A.11.07
Usage	Sample Injection
Location	Back
Syringe Volume (µL)	10

Sampler 3

Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN2314054
Firmware Revision	A.12.03
Vial Heater	Not installed

Mainframe 1

Manufacturer	Agilent Technologies
Name	8890
Model Number	G3540A
Serial Number	CN2303A021
Firmware Revision	3.0.3.21
Oven Type	Standard

Inlet 1

Manufacturer	Agilent Technologies
Name	8890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Inlet 2

Manufacturer	Agilent Technologies
Name	8890
Type	SSL
Location	Back
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1

Manufacturer	Agilent Technologies
Name	8890
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen

Detector 2

Manufacturer	Agilent Technologies
Name	8890
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Back
Makeup Gas	Nitrogen

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and login to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer:	Saenguthai Tarak
Logged On User Name:	saenguthai.tarak@non.agilent.com
Signature Creation Date:	May 9, 2025
Reason for Signature:	Executed protocol and published this original version of document

ACE Self Qualification Status

The installed version of ACE used to deliver this service passed qualification; the results conform with expected values. The self qualification summary report is available in the session folder location SDS\ClearStore\AceSelfQualification.

Regulatory Disclaimer

This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not assure compliance. Agilent Technologies makes no promises or representations as to its sufficiency for any specific regulatory program.

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Date: May 9, 2025 11:32:14 AM

System ID: 2025_ALS_GC#11_CN2303A021_OO

User Name: saenguthalakrak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: 2025_ALS_GC#11_CN2303A021_OQHW
Print Date: May 9, 2025 11:32:16 AM

2025_ALS_GC11_CN2303A021_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 8, 2025 1:49:44 PM	Audit	SessionCreated	Session	Host Name: LAPTOP-CQ3SKOMV, Drive Serial Number: 64A9D8A8
May 8, 2025 1:49:44 PM	start	Configuration	Session	None
May 8, 2025 1:49:44 PM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
May 8, 2025 1:56:00 PM	Audit	EqlLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks\Gc\Configurat ions\02_53\Gc_02_53.eqp], EQP File Name: [Gc_02_53.eqp], EQP Name: [AgilentRecommended], Proto col Revision [Gc_02_53]
May 8, 2025 1:56:02 PM	End	Configuration	Session	None
May 8, 2025 1:56:09 PM	start	Qualification	Session	PM
May 8, 2025 1:56:10 PM	start	Qualification	Session	OQ
May 8, 2025 1:56:10 PM	start	Execution	System Inspection - 8890: - Mainframe	None
May 8, 2025 1:56:45 PM	End	Execution	System Inspection - 8890: - Mainframe	Run Count : 1
May 8, 2025 1:56:47 PM	start	Execution	Mainframe Maintenance - 8890: None - Mainframe: 8890	
May 8, 2025 1:56:56 PM	End	Execution	Mainframe Maintenance - 8890: Run Count : 1 - Mainframe: 8890	
May 8, 2025 1:56:56 PM	start	Execution	Inlet Maintenance - Front SSL: - None Inlet: 8890	
May 8, 2025 1:57:57 PM	End	Execution	Inlet Maintenance - Front SSL: - Run Count : 1 Inlet: 8890	

User Name: saenguthai.larek
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: 2025_ALS_GC#11_CN2303A021_OQHW
Print Date: May 9, 2025 11:32:18 AM

2025_ALS_GC11_CN2303A021_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 8, 2025 1:58:00 PM	start	Execution	Inlet Maintenance - Back SSL -	None Inlet: 8890
May 8, 2025 1:58:52 PM	End	Execution	Inlet Maintenance - Back SSL -	Run Count : 1
May 8, 2025 1:58:54 PM	start	Execution	Detector Maintenance - Front	None FID - GC Detector: 8890
May 8, 2025 1:59:48 PM	End	Execution	Detector Maintenance - Front	Run Count : 1
May 8, 2025 1:59:50 PM	start	Execution	Detector Maintenance - Back	None FID - GC Detector: 8890
May 8, 2025 2:00:25 PM	End	Execution	Detector Maintenance - Back	Run Count : 1
May 8, 2025 2:00:27 PM	start	Execution	Sampler Maintenance - Front Injection Tower - Sampler:	None 7693A
May 8, 2025 2:00:54 PM	End	Execution	Sampler Maintenance - Front Injection Tower - Sampler:	Run Count : 1 7693A
May 8, 2025 2:00:55 PM	start	Execution	Sampler Maintenance - Back Injection Tower - Sampler:	None 7693A
May 8, 2025 2:01:05 PM	End	Execution	Sampler Maintenance - Back Injection Tower - Sampler:	Run Count : 1 7693A
May 8, 2025 2:01:09 PM	start	Execution	Service Review - 8890 - Qualitative Test - No setpoints associated	None
May 8, 2025 2:01:41 PM	End	Execution	Service Review - 8890 - Qualitative Test - No setpoints associated	Run Count : 1
May 8, 2025 2:01:43 PM	End	Qualification	Session	PM

User Name: saengulha,lawak
Report Generated by Hostname: LAPTOP-GQ3SKOMW

System Id: 2025_ALS_GC#11_CN2303A021_OQIHW
Print Date: May 9, 2025 11:32:16 AM

2025_ALS_GC11_CN2303A021_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 8, 2025 2:01:43 PM	start	Qualification	Sensor	OQ
May 8, 2025 2:01:43 PM	start	Execution	CDS Logon Verification - GC - 8890: - Qualitative test	None
May 8, 2025 2:06:13 PM	End	Execution	CDS Logon Verification - GC - 8890: - Qualitative test	Run Count : 1
May 8, 2025 2:06:16 PM	start	Execution	System Inspection and Basic Safety and Operation - 8890: - Qualitative Test - No setpoints associated	None
May 8, 2025 2:06:30 PM	End	Execution	System Inspection and Basic Safety and Operation - 8890: - Qualitative Test - No setpoints associated	Run Count : 1
May 8, 2025 2:06:43 PM	start	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
May 8, 2025 2:11:09 PM	End	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	Run Count : 1
May 8, 2025 2:11:11 PM	start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
May 8, 2025 2:12:26 PM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
May 8, 2025 2:12:27 PM	start	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None

User Name: saenguthalarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: 2025_ALS_GC#11_CN2303A021_OQHW
Print Date: May 9, 2025 11:32:16 AM

2025_ALS_GC#11_CN2303A021_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 8, 2025 2:17:04 PM	End	Execution	Inlet Pressure Decay - Back	Run Count : 1 SSL - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and ≤ 0.5 psi
May 8, 2025 2:17:06 PM	start	Execution	Inlet Pressure Accuracy - Back	None SSL - Pressure Controlled Inlet - S: 25.0 psi - L: ≤ 1.2 psi
May 8, 2025 2:18:01 PM	End	Execution	Inlet Pressure Accuracy - Back	Run Count : 1 SSL - Pressure Controlled Inlet - S: 25.0 psi - L: ≤ 1.2 psi
May 8, 2025 2:18:04 PM	start	Execution	Detector Flow Accuracy - Front	None FID - Type : Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint
May 8, 2025 2:18:27 PM	Audit	Data	Detector Flow Accuracy - Front	Manual Data Entry FID - Type : Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint
May 8, 2025 2:18:30 PM	End	Execution	Detector Flow Accuracy - Front	Run Count : 1 FID - Type : Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint
May 8, 2025 2:18:32 PM	start	Execution	Detector Flow Accuracy - Front	None FID - Type : Oxidizer - S: 400.0 mL/min - L: ≤ 10.0% setpoint
May 8, 2025 2:19:04 PM	Audit	Data	Detector Flow Accuracy - Front	Manual Data Entry FID - Type : Oxidizer - S: 400.0 mL/min - L: ≤ 10.0% setpoint
May 8, 2025 2:19:06 PM	End	Execution	Detector Flow Accuracy - Front	Run Count : 1 FID - Type : Oxidizer - S: 400.0 mL/min - L: ≤ 10.0% setpoint
May 8, 2025 2:19:08 PM	start	Execution	Detector Flow Accuracy - Front	None FID - Type : Makeup - S: 25.0 mL/min - L: ≤ 10.0% setpoint

User Name: saengulbalarak
Report Generated by Hostname: LAPTOP-CQ3SK0W

System Id: 2025_ALS_GC#11_CN230JA021_OQHW
Print Date: May 9, 2025 11:32:16 AM

2025_ALS_GC11_CN230JA021_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 8, 2025 2:20:02 PM	Audit	Data	Detector Flow Accuracy - Front FID - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
May 8, 2025 2:20:06 PM	End	Execution	Detector Flow Accuracy - Front FID - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
May 8, 2025 2:20:08 PM	start	Execution	Detector Flow Accuracy - Back FID - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None
May 8, 2025 2:21:13 PM	Audit	Data	Detector Flow Accuracy - Back FID - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
May 8, 2025 2:21:14 PM	End	Execution	Detector Flow Accuracy - Back FID - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
May 8, 2025 2:21:17 PM	start	Execution	Detector Flow Accuracy - Back FID - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
May 8, 2025 2:21:31 PM	Audit	Data	Detector Flow Accuracy - Back FID - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
May 8, 2025 2:21:35 PM	End	Execution	Detector Flow Accuracy - Back FID - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
May 8, 2025 2:21:37 PM	start	Execution	Detector Flow Accuracy - Back FID - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
May 8, 2025 2:22:03 PM	Audit	Data	Detector Flow Accuracy - Back FID - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
May 8, 2025 2:22:05 PM	End	Execution	Detector Flow Accuracy - Back FID - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1

User Name: suenguthalarak
Report Generated by Hostname: LAPTOP-CQ3SK0MW

System Id: 2025_ALS_GC#11_CN2303A021_OQHW
Print Date: May 8, 2025 11:32:16 AM

2025_ALS_GC#11_CN2303A021_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 8, 2025 2:22:08 PM	start	Execution	GC Oven Temperature	None
Accuracy - 8690C - Temperature				
: Oven - S: 230.0°C - L: >= -1.0				
AND <= 1.0 % setpoint in K				
May 8, 2025 2:23:02 PM	Audit	Data	GC Oven Temperature	Manual Data Entry
Accuracy - 8690C - Temperature				
: Oven - S: 230.0°C - L: >= -1.0				
AND <= 1.0 % setpoint in K				
May 8, 2025 2:23:07 PM	End	Execution	GC Oven Temperature	Run Count : 1
Accuracy - 8690C - Temperature				
: Oven - S: 230.0°C - L: >= -1.0				
AND <= 1.0 % setpoint in K				
May 8, 2025 2:23:09 PM	start	Execution	GC Oven Temperature	None
Accuracy - 8690C - Temperature				
: Oven - S: 100.0°C - L: >= -1.0				
AND <= 1.0 % setpoint in K				
May 8, 2025 2:25:03 PM	Audit	Data	GC Oven Temperature	Manual Data Entry
Accuracy - 8690C - Temperature				
: Oven - S: 100.0°C - L: >= -1.0				
AND <= 1.0 % setpoint in K				
May 8, 2025 2:25:05 PM	End	Execution	GC Oven Temperature	Run Count : 1
Accuracy - 8690C - Temperature				
: Oven - S: 100.0°C - L: >= -1.0				
AND <= 1.0 % setpoint in K				
May 8, 2025 2:25:07 PM	start	Execution	GC Oven Temperature Stability	None
- 8690C - Temperature : Oven -				
S: 100.0°C - L: <= 0.5°C				
May 8, 2025 2:31:03 PM	Audit	Data	GC Oven Temperature Stability	Manual Data Entry
- 8690C - Temperature : Oven -				
S: 100.0°C - L: <= 0.5°C				
May 8, 2025 2:31:04 PM	End	Execution	GC Oven Temperature Stability	Run Count : 1
- 8690C - Temperature : Oven -				
S: 100.0°C - L: <= 0.5°C				

User Name: saenguthai,tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: 2025_ALS_GC#11_CN2303A021_OQHW
Print Date: May 9, 2025 11:32:16 AM

2025_ALS_GC11_CN2303A021_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 8, 2025 2:31:12 PM	start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
May 8, 2025 2:31:35 PM	Audit	AcceClosed	Session	None
May 9, 2025 8:32:28 AM	Audit	AcceRestarted	Session	Host Name: LAPTOP-CQ3SKOMV, Drive Serial Number: 64A9D8A8
May 9, 2025 8:32:30 AM	Audit	SessionReloaded	Session	None
May 9, 2025 8:32:46 AM	start	Qualification	Session	PM
May 9, 2025 8:32:46 AM	start	Qualification	Session	OQ
May 9, 2025 8:32:46 AM	start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
May 9, 2025 8:34:41 AM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Data files Path : F:\OQ2025\Data\OQGC-11.rs
May 9, 2025 8:34:55 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 -- [Integration Type: Injection;Baseline Correction Mode: Advanced;Initial Slope Sensitivity: 10;Initial Peak Width: 0.01;Initial Area Reject: 0;Initial Height Reject: 100;Integration: Off at 0;Integration: On at 0.015;Integration: Off at 0.5]
May 9, 2025 8:35:11 AM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Run Count : 1

User Name: saengulhal/iank
Report Generated by Hostname: LAPTOP-CQ3SKQNV

System Id: 2025_ALS_GC#11_CN2303A021_OQHW
Print Date: May 9, 2025 11:32:16 AM

2025_ALS_GC11_CN2303A021_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 9, 2025 8:35:14 AM	start	Execution	Noise and Drift - Front FID - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
May 9, 2025 8:56:15 AM	Audit	Data	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : F:\OQ2025\Data\OQGC-11_2_rst\OQ_Front_ND-F.dtx
May 9, 2025 8:56:27 AM	End	Execution	Noise and Drift - Front FID - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
May 9, 2025 8:56:31 AM	start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
May 9, 2025 9:34:24 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\OQ2025\Data\OQGC-11_Front_IP_rst\OQ_Front_IP-r004.dtx
May 9, 2025 9:34:24 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\OQ2025\Data\OQGC-11_Front_IP_rst\OQ_Front_IP-r005.dtx
May 9, 2025 9:34:24 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\OQ2025\Data\OQGC-11_Front_IP_rst\OQ_Front_IP-r007.dtx

User Name: saenguthai,tarak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: 2025_ALS_GC#11_CN2303A021_OQHW
Print Date: May 9, 2025 11:32:16 AM

2025_ALS_GC11_CN2303A021_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 9, 2025 9:34:24 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\OQ2025\Data\OQGC-11_Front_IP.rsl\OQ_Front_IP-008.dx
May 9, 2025 9:34:24 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\OQ2025\Data\OQGC-11_Front_IP.rsl\OQ_Front_IP-009.dx
May 9, 2025 9:34:34 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 - [Integration Type: Injection;Baseline Correction Mode: Advanced;Initial Slope Sensitivity: 10;Initial Peak Width: 0.01;Initial Area Reject: 0;Initial Height Reject: 100;Integration: Off at 0;Integration: On at 0.015;Integration: Off at 0.5]
May 9, 2025 9:34:43 AM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
May 9, 2025 9:34:49 AM	start	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	None
May 9, 2025 9:35:19 AM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Data files Path : F:\OQ2025\Data\OQGC-11_Front_SN.rsl\OQ_Front_SN.dx

User Name: saengutthal,terak
Report Generated by Hostname: LAPTOP-CQ3SKQWY

System Id: 2025_ALS_GC#11_CN2303A021_OQHW
Print Date: May 9, 2025 11:32:16 AM

2025_ALS_GC11_CN2303A021_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 9, 2025 9:35:27 AM	Audit	Reporting	Reintegration	Reintegration Count: 1 - [Integration Type: Injection,Baseline Correction Mode: Advanced,Initial Slope Sensitivity: 10,Initial Peak Width: 0.01,Initial Area Reject: 0,Initial Height Reject: 100,Integration: Off at 0,Integration: On at 0.015,Integration: Off at 0.5]
May 9, 2025 9:35:34 AM	End	Execution		Run Count : 1 Signal to Noise - Injection Tower, Front SSL, Front FID - Detector FID - L : >= 3000000
May 9, 2025 9:35:38 AM	start	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID - Part of System Preparation - No limits associated	None
May 9, 2025 9:46:40 AM	Audit	Data	GC Scouting Run - Injection Tower, Back SSL, Back FID - Part of System Preparation - No limits associated	Data files Path : F:\OQ2025\Data\Back\OQ25GC -11_Back_SSL-1.rsl\OQ_Bac k_SC.dlx
May 9, 2025 9:46:57 AM	End	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID - Part of System Preparation - No limits associated	Run Count : 1
May 9, 2025 9:47:00 AM	start	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
May 9, 2025 10:51:05 AM	Audit	Data	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : F:\OQ2025\Data\Back\OQ25GC -11_Back_SSL-2.rsl\OQ_Bac k_ND-B.dlx

User Name: saenguthai,terak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: 2025_ALS_GC#11_CN2303A021_OQHW
Print Date: May 9, 2025 11:32:16 AM

2025_ALS_GC11_CN2303A021_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 9, 2025 10:51:12 AM	End	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
May 9, 2025 10:51:16 AM	start	Execution	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
May 9, 2025 11:09:34 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\OQ2025\DataBack\OQGC -11_Back_IP-4,rs\IOQ_Back _IP-001.d\
May 9, 2025 11:09:34 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\OQ2025\DataBack\OQGC -11_Back_IP-4,rs\IOQ_Back _IP-002.d\
May 9, 2025 11:09:34 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\OQ2025\DataBack\OQGC -11_Back_IP-4,rs\IOQ_Back _IP-003.d\
May 9, 2025 11:09:34 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\OQ2025\DataBack\OQGC -11_Back_IP-4,rs\IOQ_Back _IP-004.d\
May 9, 2025 11:09:34 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\OQ2025\DataBack\OQGC -11_Back_IP-4,rs\IOQ_Back _IP-005.d\
May 9, 2025 11:09:34 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\OQ2025\DataBack\OQGC -11_Back_IP-4,rs\IOQ_Back _IP-006.d\

User Name: saenguthai.larak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: 2025_ALS_GC#11_CN2303A021_OQHW
Print Date: May 9, 2025 11:32:16 AM

2025_ALS_GC11_CN2303A021_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 9, 2025 11:09:48 AM	End	Execution	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%	Run Count : 1
May 9, 2025 11:09:49 AM	start	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 3000000	None
May 9, 2026 11:16:51 AM	Audit	Data	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 3000000	Data files Path : F:\OQ2025\Data\Back\OQGC-11_Back_SS\sl\MOQ_Back_SC.dx
May 9, 2025 11:17:07 AM	End	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 3000000	Run Count : 1
May 9, 2025 11:17:11 AM	End	Qualification	Session	OQ
May 9, 2025 11:17:11 AM	start	Reporting	Session	None
May 9, 2025 11:24:47 AM	Audit	Reporting	Session	Report Generated : Report
May 9, 2025 11:25:23 AM	Audit	Reporting	Session	Report Signed : Report PDF Name: 2025_ALS_GC11_CN2303A021_OQHW_20250509_PM Report_1.pdf User Name: saenguthai.larak@non.agilen Lcom Full Name of Signer: Saenguthai Tanka Reason for signature: Executed protocol and published this original version of document

May 9, 2025 11:30:23 AM Audit Reporting Session

Report Generated : Certificate

User Name: saenguthai.karak
Report Generated by Hostname: LAPTOP-CQ3SKOMV

System Id: 2025_ALS_GC#11_CN2303A021_OQHW
Print Date: May 9, 2025 11:32:16 AM

2025_ALS_GC#11_CN2303A021_OQHW Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 9, 2025 11:31:17 AM	Audit	Reporting	Session	Report Generated : Report