

# ภาคผนวก ง

เอกสารการสอบเทียบเครื่องมือตรวจวิเคราะห์



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Stack	Ethylene	Console Control Unit	BKK_FS0527	10-Jul-25	10-Jan-26	6
Stack	Ethylene	Pitot Tube	BKK_FS0531	10-Jul-25	10-Jan-26	6
Stack	Ethylene	Fuel Gas Analyzer	RYG_FS0563	22-Jan-25	22-Jan-26	12
Stack	Ethylene	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
Stack	Ethylene	DRYCAL FLOWMETER	BKK_FS0614	10-Sep-25	9-Sep-26	12
Stack	Ethylene	Air Sampling Pump	RYG_FS0103	7-Oct-25	7-Jan-26	3
Stack	Ethylene	Air Sampling Pump	RYG_FS0102	6-Oct-25	6-Jan-26	3
Stack	Propane	Console Control Unit	BKK_FS0527	10-Jul-25	10-Jan-26	6
Stack	Propane	Pitot Tube	BKK_FS0531	10-Jul-25	10-Jan-26	6
Stack	Propane	Fuel Gas Analyzer	RYG_FS0563	22-Jan-25	22-Jan-26	12
Stack	Propane	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
Stack	Propane	DRYCAL FLOWMETER	BKK_FS0614	10-Sep-25	9-Sep-26	12
Stack	Propane	Air Sampling Pump	RYG_FS0103	7-Oct-25	7-Jan-26	3
Stack	Propane	Air Sampling Pump	RYG_FS0102	6-Oct-25	6-Jan-26	3
Ambient	Propylene	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
Ambient	Propylene	DRYCAL FLOWMETER	BKK_FS0614	10-Sep-25	9-Sep-26	12
Ambient	Propylene	DRYCAL FLOWMETER	BKK_FS0619	10-Sep-25	9-Sep-26	12
Ambient	Ethylene	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
Ambient	Ethylene	DRYCAL FLOWMETER	BKK_FS0614	10-Sep-25	9-Sep-26	12
Ambient	Ethylene	DRYCAL FLOWMETER	BKK_FS0619	10-Sep-25	9-Sep-26	12
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0545	2-Apr-25	1-Oct-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0544	2-Apr-25	1-Oct-26	18
Noise	Leq 24 hrs	Sound Calibrator	RYG_FS0496	19-Jan-25	19-Jan-26	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0617	21-Jan-25	21-Jan-26	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0618	21-Jan-25	20-Jan-26	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0620	27-Jan-25	26-Jan-26	12
Noise	Leq 12 hrs	Sound Calibrator	RYG_FS0213	16-Jan-25	16-Jan-26	12
Noise	Leq 12 hrs	Sound Level Meter	RYG_FS0020	21-Jan-25	21-Jan-26	12
Noise	Leq 12 hrs	Sound Level Meter	RYG_FS0022	19-Jan-25	19-Jan-26	12
Noise	Leq 12 hrs	Sound Level Meter	RYG_FS0024	21-Jan-25	21-Jan-26	12
Noise	Leq 12 hrs	Sound Level Meter	RYG_FS0025	21-Jan-25	21-Jan-26	12
Noise	Leq 12 hrs	Sound Level Meter	RYG_FS0026	27-Jan-25	27-Jan-26	12
Noise	Leq 12 hrs	Sound Level Meter	RYG_FS0027	21-Jan-25	21-Jan-26	12
Noise	Leq 12 hrs	Sound Level Meter	RYG_FS0029	18-Aug-25	18-Aug-26	12
Noise	Leq 8 hrs	Sound Calibrator	RYG_FS0213	16-Jan-25	16-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0615	23-Dec-24	23-Dec-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0616	23-Dec-24	23-Dec-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0617	21-Jan-25	21-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0618	21-Jan-25	20-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0619	21-Jan-25	21-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0620	27-Jan-25	26-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0621	27-Jan-25	26-Jan-26	12
Noise	Noise Dose, TWA	Dose Badge Reader	RYG_FS0210	12-Feb-25	11-Feb-26	12
Noise	Noise Dose, TWA	Dosemeter	RYG_FS0041	17-Sep-24	17-Sep-25	12
Noise	Noise Dose, TWA	Dose Badge Reader	RYG_FS0210	12-Feb-25	11-Feb-26	12
Noise	Noise Dose, TWA	Dosemeter	RYG_FS0444	14-Mar-25	13-Mar-26	12
Workplace	Ethylene	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
Workplace	Ethylene	DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	12
Workplace	Ethylene	DRYCAL FLOWMETER	BKK_FS0614	10-Sep-25	9-Sep-26	12
Workplace	Ethylene	DRYCAL FLOWMETER	BKK_FS0619	9-Sep-24	9-Sep-25	12
Workplace	Ethylene	DRYCAL FLOWMETER	BKK_FS0619	10-Sep-25	9-Sep-26	12
Workplace	Propane	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
Workplace	Propane	DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	12
Workplace	Propane	DRYCAL FLOWMETER	BKK_FS0614	10-Sep-25	9-Sep-26	12
Workplace	Propane	DRYCAL FLOWMETER	BKK_FS0619	9-Sep-24	9-Sep-25	12
Workplace	Propane	DRYCAL FLOWMETER	BKK_FS0619	10-Sep-25	9-Sep-26	12

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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Workplace	Total Hydrocarbon as Methane	DRYCAL FLOWMETER	RYG_FS0208	27-Jan-25	26-Jan-26	12
Workplace	Total Hydrocarbon as Methane	DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	12
Workplace	Total Hydrocarbon as Methane	DRYCAL FLOWMETER	BKK_FS0614	10-Sep-25	9-Sep-26	12
Workplace	Total Hydrocarbon as Methane	DRYCAL FLOWMETER	BKK_FS0619	9-Sep-24	9-Sep-25	12
Workplace	Total Hydrocarbon as Methane	DRYCAL FLOWMETER	BKK_FS0619	10-Sep-25	9-Sep-26	12
Workplace	Total Hydrocarbon as Methane	Total Hydrocarbon Analyzer	RYG_EN0038	6-Mar-25	6-Mar-26	12
Rayong Lab	pH at 25 °C	pH meter	RYG_EN0183	18-Jul-25	18-Jan-27	18
Rayong Lab	BOD	DO meter with Sensor	RYG_EN0032	20-Jan-25	20-Jul-26	18
Rayong Lab	BOD	Incubator	RYG_EN0154	1-Nov-24	1-May-26	18
Rayong Lab	BOD	Burette	RYG_EN0216	18-Sep-25	18-Sep-26	12
Rayong Lab	COD	Spectrophotometer	RYG_EN0037	18-Mar-25	18-Sep-26	18
Rayong Lab	Total Suspended Solids	Electronic Balance	RYG_EN0163	20-Feb-25	20-Feb-26	12
Rayong Lab	Total Suspended Solids	Chamber (Oven)	RYG_EN0012	10-Sep-25	10-Mar-27	18
Rayong Lab	Total Dissolved Solids 180°C	Electronic Balance	RYG_EN0163	20-Feb-25	20-Feb-26	12
Rayong Lab	Total Dissolved Solids 180°C	Chamber (Oven)	RYG_EN0012	10-Sep-25	10-Mar-27	18
Rayong Lab	Oil & Grease	Electronic Balance	RYG_EN0003	20-Feb-25	20-Feb-26	12
Rayong Lab	Oil & Grease	Liquid Bath (Water)	RYG_EN0020	19-Dec-24	19-Dec-25	12
Rayong Lab	Temperature	pH meter	RYG_FS0605	25-Aug-25	25-Aug-26	12

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DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date :	10 Jul 25	Ambient Temperature (°C)	26.5
Calibration sheet No. :	C-100125-BKK_FS0527	Relative Humidity (%) :	40
Digital Temperature ID :	BKK_FS0527	Reference Temperature ID	BKK_FS1144
Serial No. :		Serial No. :	201090006013
Model :	C410FK07	Model :	Digicon-CC-VT-MS
		Next Calibrate :	5 Jan 26

Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	51	1	±3	Pass
	100	102	2	±3	Pass
	150	151	1	±3	Pass
	200	200	0	±3	Pass
	250	250	0	±3	Pass
	300	300	0	±3	Pass
	500	501	1	±3	Pass
Probe	100	101	1	±3	Pass
	120	121	1	±3	Pass
	140	141	1	±3	Pass
Oven	100	101	-	±3	-
	120	121	-	±3	-
	140	141	-	±3	-
Filter	100	101	1	±3	Pass
	120	121	1	±3	Pass
	140	141	1	±3	Pass
Exit	0	-1	-1	±3	Pass
	10	8	-2	±3	Pass
	20	19	-1	±3	Pass
Meter	0	-1	-1	±3	Pass
	25	24	-1	±3	Pass
	50	48	-2	±3	Pass
AUX	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass

MPE : (Maximum permissible error of measurement) ค่าความผิดพลาดสูงสุดของกาวัดที่อนุญาต

Calibrated by :

Mr. Sudamrong Chokpitinan

RYG Field Services Scientist (2)

Approved by :

(Mr. Natthapong Jengwareewong)

RYG Field Services Specialist (1)

FORM NO.: F 06-027 REVISION NO.: 2 ISSUE DATE: 16/2/23

CONSOLE CONTROL UNIT CALIBRATION TEST REPORT



Calibration of Date : 10-Jul-25 Barometric Pressure (mmHg) : 750  
Next Cal. Date : 10-Jan-26 Relative Humidity (%) : 40.0  
Temperature (°C) : 26.5

Console Control Meter Data

Calibration No. : C-100125-BKK\_FS0527 Reference Dry Gas Meter ID : BKK\_FS1122  
Dry Gas Meter ID : BKK\_FS0527 Serial No. : A2003240  
Serial No. : 1508053 Correction Factor (Y) : 1.0000  
Model No. : XD-572-V Next Calibration Date : 25-Feb-26

AH	Θ	Reference Dry Gas Meter Calibration						Console Control - Drygas Meter						Dry Gas Meter	Orifice
(mm H <sub>2</sub> O)	Minutes	W (liters)		T (°C)	Vn (liters)		Tn (°C)	To (°C)	Avg Tn (°C)	Correction Factor (Y)	Avg				
		Final	Initial		Final	Initial									
15	12.22	150.10	0.00	150.10	29.0	967170.0	967023.0	147.00	28.0	1.0162	44.2018				
25	9.25	150.10	0.00	150.10	29.0	967331.0	967184.0	147.00	28.0	1.0162	44.1493				
50	6.55	150.10	0.00	150.10	29.0	967487.0	967340.0	147.00	27.0	1.0127	44.1283				
80	5.11	150.10	0.00	150.10	29.0	967644.0	967496.0	148.00	28.0	1.0201	42.8303				
120	4.16	149.80	0.00	149.80	28.0	967802.0	967655.0	146.00	28.0	1.0141	42.7489				
									Avg.	1.0157	44.0176				

Y : Ratio of reading of reference to dry gas meter : tolerance for individual values ± 0.02 from average.

Δp<sub>avg</sub> : Orifice pressure differential that equates to 21.24 in of air @ 25 °C and 760 mm of mercury, mmH<sub>2</sub>O; tolerance for individual values ± 5.08 from average.

Procedure: 49 CFR 60 APP A METH SE6.5.3 & 7

Calibrated by :

( Mr. Sudamrong Chokpitinan )

RYG Field Services Scientist(2)

Approved by :

( Mr. Natthapong Jengwareewong )

RYG Field Services Specialist(1)

FORM NO.: F 06-027 REVISION NO.: 2 ISSUE DATE: 16/2/23



PROBE NOZZLE DIAMETER  
CALIBRATION DATA SHEET

Calibration Date : 10 Jul 25 Nozzle Set ID. : BKK\_FS0533  
Calibration Sheet No. : C-100725-BKK\_FS0533 Vernier Caliper ID. : RYG\_FS0539

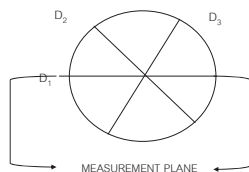
Nozzle ID #	Nozzle Diameter (cm.)			Hi - Lo	(D <sub>1</sub> + D <sub>2</sub> + D <sub>3</sub> ) / 3
	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	ΔD	D <sub>avg</sub>
1	0.316	0.312	0.310	0.006	0.313
2	0.480	0.475	0.474	0.006	0.476
3	0.536	0.535	0.540	0.005	0.537
4	0.631	0.622	0.635	0.013	0.629
5	0.787	0.792	0.789	0.005	0.789
6	0.948	0.949	0.951	0.003	0.949
7	1.084	1.080	1.089	0.009	1.084
8	1.268	1.266	1.264	0.004	1.266
9	1.600	1.592	1.598	0.008	1.597

Where :

D<sub>1</sub>, D<sub>2</sub>, D<sub>3</sub> = There different nozzle diameters at 60 degrees to each other, each measured the nearest 0.025 mm.

ΔD = Maximum distance between any two diameters, must be ≤ 0.100 mm.

D<sub>avg</sub> = (D<sub>1</sub> + D<sub>2</sub> + D<sub>3</sub>) / 3



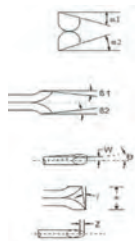
Calibrated by : Approved by :   
( Mr. Warawut Pubpa ) ( Mr. Natthapong Jengwarewong )  
RYG Field Services Scientist (3) RYG Field Services Specialist (1)

FORM NO. : F-06-004 REVISION NO. : 0 ISSUE DATE : 25/12/23



Type S Pitot Tube Calibration

Date Calibration 10-Jul-25 Due Date 10-Jan-26  
Pitot ID BKK\_FS0531 Inclinator ID BKK\_FS1131  
Pitot SN - Vernier ID RYG\_FS0539



Parameter	Value	Allowable Range	Check
α1	6.2	-10° < α1 < +10°	OK
α2	4.2	-10° < α2 < +10°	OK
β1	4.7	-5° < β1 < +5°	OK
β2	0.9	-5° < β2 < +5°	OK
γ	1.7	-	-
θ	1.6	-	-
Z = A tan γ	0.026	Z ≤ 0.125"	OK
W = A tan θ	0.024	W ≤ 0.031"	OK
Dt	0.375	0.188" to 0.375"	OK
A/2Dt	1.160	1.05 ≤ PA/Dt ≤ 1.5	OK
A	0.87	2.1Dt ≤ A ≤ 3Dt	OK

Certify that pitot tube/porbe meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube certification fact of 0.84. See 40 CFR Pt. 60, App. A, EPA Method 2.

Calibrated by : Approved by :   
( Mr. Warawut Pubpa ) ( Mr. Natthapong Jengwarewong )  
RYG Field Services Scientist (3) RYG Field Services Specialist (1)

FORM NO. : F-06-124 REVISION NO. : 0 ISSUE DATE : 25/12/23



Calibration Certificate



Certificate No: G 680048  
Date of issue : 27-Jan-25

REVIEW BY :

APPROVED BY :

NEXT CAL DATE : 22/ 01/ 2026

Instrument description : Flue Gas Analyzer  
Instrument model : Testo 350 New  
Instrument serial no. : 62985047/1121  
Control unit serial no. : 03580098/1121  
ID no. or control no. : RYG\_FS0563  
Manufacturer : Testo SE & Co. KGaA  
Probe description : -  
Probe model : -  
Probe serial no. : -  
Customer name : ALS LABORATORY GROUP (THAILAND) CO.,LTD.  
Customer address : 104 Phatthanakan 40, Phatthanakan Road, Khwaeng Phatthanakan, Khet Suan Luang, Bangkok, 10250 Thailand  
Total pages of certificate : 2 Pages  
Receiving no. : L-250179  
Receiving date : 22-Jan-25  
Parameter of calibration : Gas Calibration(Oxygen 2.50,9.984,21.02 %vol, Carbon Monoxide 80.45,302,1007 ppm)  
Nitrogen Dioxide 30.68,81.8,201.9 ppm, Nitric Oxide 30.0,151.5,322.5 ppm,  
Sulphur Dioxide 50.36,100.7,600.8 ppm)  
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, Lakes, 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 : 22-Jan-25

Mr. Kwanchai Khamdang  
Calibration Technician

Mrs. Nongluck Wongsettee  
Technical Manager

FM-CL-09-C Rev.8

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Issued Date 26/02/16



Calibration Certificate



Certificate No.: G 680048

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen ( O2 ) 2.50 % Vol	2412/23	Linde	27-Aug-27
Oxygen ( O2 ) 9.984 % Vol	CG-0113-24	Nimitt	01-Aug-29
Oxygen ( O2 ) 21.02 % Vol	CG-0041-22	Nimitt	10-Feb-27
Carbon monoxide ( CO ) 80.45 ppm	CG-0132-24	Nimitt	10-Sep-29
Carbon monoxide ( CO ) 302 ppm	1915/23	Linde	16-Jun-25
Carbon monoxide ( CO ) 1007 ppm	1870/24	Linde	17-Jun-26
Nitrogen Dioxide ( NO2 ) 30.68 ppm	2832/24	Linde	08-Sep-26
Nitrogen Dioxide ( NO2 ) 81.8 ppm	2330/24	Linde	01-Aug-26
Nitrogen Dioxide ( NO2 ) 201.9 ppm	1975/23	Linde	17-Jul-25
Nitric Oxide ( NO ) 30.0 ppm	CG-0065-24	Nimitt	06-May-26
Nitric Oxide ( NO ) 151.5 ppm	0161/23	Linde	22-Jan-25
Nitric Oxide ( NO ) 322.5 ppm	1974/23	Linde	17-Jul-25
Sulphur Dioxide ( SO2 ) 50.36 ppm	2004/23	Linde	17-Jul-25
Sulphur Dioxide ( SO2 ) 100.7 ppm	2662/24	Linde	25-Aug-26
Sulphur Dioxide ( SO2 ) 600.8 ppm	2003/23	Linde	17-Jul-25

Measured room conditions

Temperature : 22.6 °C Humidity : 64.8 %RH Pressure : 1012.7 mbar  
Gas Temperature : 23 °C Flow rate : 1,300 ml/min Gas pressure : 1016.3 mbar

Calibration Results (Without adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (1)
O2 (%Vol)	2.50	2.47	-0.03	0.15
O2 (%Vol)	9.984	9.92	-0.064	0.20
O2 (%Vol)	21.02	21.12	0.10	0.30
CO (ppm)	80.45	82	-1.55	3.0
CO (ppm)	302	305	3	6.0
CO (ppm)	1007	1011	4	12
NO2 (ppm)	30.68	28.8	-1.88	8.0
NO2 (ppm)	81.8	79.9	-1.9	8.0
NO2 (ppm)	201.9	199.7	-2.2	12
NO (ppm)	30.0	31	1.0	8.0
NO (ppm)	151.5	153	1.5	8.0
NO (ppm)	322.5	324	1.5	12
SO2 (ppm)	50.36	51	0.64	6.0
SO2 (ppm)	100.7	102	1.3	6.0
SO2 (ppm)	600.8	605	4.2	13

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

End of Report

FM-CL-09-C Rev.8

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Issued Date 26/02/16

### Certificate of Calibration

#### Customer

Name : ALS Laboratory Group Thailand Co., Ltd.  
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang,  
Bangkok 10250

Certificate No : 25-AFM-023

Request No : Req-2025-0169

#### Unit Under Calibration Details

Measurement Item : Air Flow Meter  
Manufacturer : Mesa Labs  
Model : 200-510L  
Serial Number : 130027  
ID : RYG\_FS0208  
Location of Calibration : LAB 4 AIR VELOCITY METER  
Calibration Environment and Details  
Temperature : 23 °C ± 3 °C  
Humidity : 55 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 21 January 2025  
Calibration Date : 27 January 2025  
Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Accuracy : 1% of Reading  
Sensor Model : -  
Sensor Serial Number : -  
Instrument Status : Used

REVIEW BY : *[Signature]*  
APPROVED BY : *[Signature]*  
NEXT CAL DATE : 26/01/26

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	1850101006	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	2 August 2025
Temperature meter	GT 11	08000057	Qreborn	1 March 2025
Pressure meter	CPG2400	41000KDU/651882	TPA	21 October 2025

#### Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

#### Note :

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

Calibration By : *[Signature]*  
Mr. Noppadon Luangart  
Service Calibration Engineer

Approved By : *[Signature]*  
Mr. Pacit Mathavorn  
Calibration Engineer Supervisor  
Issue Date : 27 January 2025

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

FM-708-AFM-01 Rev.04 Issue date 17/6/24

Certificate No : 25-AFM-023

Request No : Req-2025-0169

#### Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
22.50	100.90	20	19.854	-0.1	1.3	0.2	Pass1
22.50	100.90	50	49.732	-0.3	3.3	0.5	Pass1
22.60	100.90	101	100.77	-0.2	2.8	1.0	Pass1
22.70	100.90	151	150.23	-0.8	4.2	1.5	Pass1
22.70	100.90	201	200.39	-0.6	5.6	2.0	Pass1
22.70	100.90	301	300.69	-0.3	8.4	3.0	Pass1
22.80	100.90	400	402.96	3.0	11	4.0	Pass1
23.10	100.90	500	504.62	4.6	7.2	5.0	Pass1

#### Note

STD : Standard

UUC : Unit Under Calibration

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

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

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

where  $Q$  = Flow Rate  $P$  = Absolute Pressure  $T$  = Absolute Temperature

Meas = Measurement Condition ref = Standard Condition

\* Indicates non accredited

MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)

NA = Not Available, Customer does not require a statement of conformity.

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

FM-708-AFM-01 Rev.04 Issue date 17/6/24

Certificate No : 25-AFM-023

Request No : Req-2025-0169

#### Decision Rule for Statements of Conformity

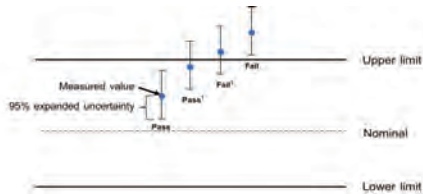
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass<sup>1</sup> = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail<sup>1</sup> = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Certificate

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

FM-708-AFM-01 Rev.04 Issue date 17/6/24

### Certificate of Calibration

#### Customer

Name : ALS Laboratory Group Thailand Co., Ltd.  
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang, Bangkok  
10250

Certificate No : 25-AFM-208

Request No : Req-2025-1986

#### Unit Under Calibration Details

Measurement Item : Air Flow Meter  
Manufacturer : Mesa Labs  
Model : 200-510M  
Serial Number : 151114  
ID : BKR\_FS0614  
Location of Calibration : LAB 4 AIR VELOCITY METER  
Calibration Environment and Details  
Temperature : 25 °C ± 3 °C  
Humidity : 55 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 3 September 2025  
Calibration Date : 10 September 2025  
Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

REVIEW BY : *[Signature]*  
APPROVED BY : *[Signature]*  
NEXT CAL DATE : 09/09/26

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	1850101006	Sensidyne	5 May 2026
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	6 May 2026
Temperature meter	GT 11	08000057	Qreborn	15 October 2025
Pressure meter	CPG2400	41000KDU/651882	TPA	21 October 2025

#### Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01 and MIT NSC-TISI-TIS Accreditation No. 0052

#### Note :

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

Calibration By : *[Signature]*  
Mr. Noppadon Luangart  
Service Calibration Engineer

Approved By : *[Signature]*  
Mr. Pacit Mathavorn  
Calibration Engineer Supervisor  
Issue Date : 10 September 2025

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

FM-708-AFM-01 Rev.06 Issue date 21/2/25



Certificate No : 25-AFM-208  
Request No : Req-2025-1986

Result of Calibration : Without Adjustment

STD Reading			UUC Reading			Error	Uncertainty	
Temperature (°C)	Pressure (kPa)	Flow (cc/min)	Temperature (°C)	Pressure (kPa)	Flow (cc/min)		(cc/min)	(°C) (kPa)
25.5	100.98	100	-	-	100.02	0.0	3.6	1.0 0.50
25.7	100.97	503	-	-	500.81	-2.2	9.5	1.0 0.50
25.8	100.89	1003	-	-	1000.4	-3	19	1.0 0.50
26.1	100.88	2000	-	-	2001.9	2	38	1.0 0.50
26.5	100.85	3014	-	-	3002.2	-12	57	1.0 0.50
26.7	100.81	4027	-	-	4000.9	-26	76	1.0 0.50
27.0	100.74	5048	-	-	5001.8	-46	95	1.0 0.50

Note: STD : Standard UUC : Unit Under Calibration  
+UUC Reference Condition : At atmospheric pressure and room temperature condition, Air ☐  
+Flow Rate was corrected for non-standard operating condition by using equation :

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

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

\* Indicates non accredited

End of Certificate

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

FM-706-AFM-01 Rev.06 Issue date 21/2/25

Certificate of Calibration

Certificate No. C-071025-RYG\_FS0103

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump  
Brand : Gillan  
Model/Type : GilaAir Plus  
Equipment ID : RYG\_FS0103  
Serial No. : 20150210170  
Calibration Date : 07-Oct-25  
Next calibration date : 07-Jan-26

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter  
Brand : MesaLabs  
Model/Type : Defender 510-L  
Equipment ID : RYG\_FS0208  
Serial No. : 130027  
Calibration Date : 27-Jan-25  
Due Date : 26-Jan-26


Reference Standard High Flow Meter

Equipment name : Air Flow Meter  
Brand : MesaLabs  
Model/Type : Defender 510-M  
Equipment ID : BKK\_FS0614  
Serial No. : 151114  
Calibration Date : 10-Sep-25  
Due Date : 09-Sep-26

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.4	19.4	19.4	19.4	5%	19 - 21	Passed
50	50.7	49.6	50.8	50.4	5%	48 - 53	Passed
100	101.0	101.0	101.1	101.0	5%	95 - 105	Passed
200	199.5	199.4	199.1	199.3	5%	190 - 210	Passed
High Flow							
500	504.4	503.9	503.6	504.0	3%	485 - 515	Passed
1000	1000.7	997.4	998.1	998.7	3%	970 - 1030	Passed
2000	2001.5	1999.0	1994.7	1998.4	3%	1940 - 2060	Passed
2500	2499.2	2491.8	2498.4	2496.5	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:   
( Mr. Nantawat Sarin )  
RYG Field Services Scientist (1)

Approved By:   
( Mr. Supot Salamteh )  
Field Services Section Head

Issue date : 08-Oct-25

Page 1 of 1

F06-115 Rev.2 Issue date 27/01/25

Certificate of Calibration

Certificate No. C-061025-RYG\_FS0102

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump  
Brand : Gillan  
Model/Type : GilaAir Plus  
Equipment ID : RYG\_FS0102  
Serial No. : 20170711501  
Calibration Date : 06-Oct-25  
Next calibration date : 06-Jan-26

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter  
Brand : MesaLabs  
Model/Type : Defender 510-L  
Equipment ID : RYG\_FS0208  
Serial No. : 130027  
Calibration Date : 27-Jan-25  
Due Date : 26-Jan-26


Reference Standard High Flow Meter

Equipment name : Air Flow Meter  
Brand : MesaLabs  
Model/Type : Defender 510-M  
Equipment ID : BKK\_FS0614  
Serial No. : 151114  
Calibration Date : 10-Sep-25  
Due Date : 09-Sep-26

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.0	20.0	19.6	19.9	5%	19 - 21	Passed
50	50.1	50.4	50.2	50.6	5%	48 - 53	Passed
100	99.1	99.2	99.9	99.4	5%	95 - 105	Passed
200	198.2	199.6	199.6	199.1	5%	190 - 210	Passed
High Flow							
500	504.3	504.1	504.2	504.2	3%	485 - 515	Passed
1000	1017.6	1012.5	1015.7	1015.3	3%	970 - 1030	Passed
2000	2000.0	1999.3	1991.7	1997.0	3%	1940 - 2060	Passed
2500	2508.8	2511.8	2510.5	2510.4	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:   
( Mr. Chanon Booncheun )  
RYG Field Services Scientist (1)  
Issue date : 07-Oct-25

Approved By:   
( Mr. Supot Salamteh )  
Field Services Section Head

Page 1 of 1

F06-115 Rev.2 Issue date 27/01/25

Certificate of Calibration

Customer: ALS Laboratory Group Thailand Co., Ltd.  
Name: ALS Laboratory Group Thailand Co., Ltd.  
Address: 104 Soi Phatthanasak 40, Phatthanasak Road, Suan Luang, Bangkok 10250  
Certificate No : 25-AFM-207  
Request No : Req-2025-1997

Unit Under Calibration Details

Measurement Item : Air Flow Meter  
Manufacturer : Mesa Labs  
Model : 200-510L  
Serial Number : 130026  
ID : BKK\_FS0619  
Sensor Model : -  
Sensor Serial Number : -  
Instrument Status : Used

Location of Calibration : LAB-4 AIR VELOCITY METER

Calibration Environment and Details


Temperature : 23 °C ± 1 °C  
Humidity : 55 %RH ± 20 %RH  
Barometric Pressure : 1013 kPa ± 10 kPa  
Received Date : 3 September 2025  
Calibration Date : 10 September 2025  
Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

REVIEW BY:   
APPROVED BY:   
NEXT CAL DATE: 09/09/26

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilberton 3 Low flow	1850101006	Semalyne	1 May 2026
Air Flow Meter	Gilberton 3 Standard flow	19031011003	Semalyne	6 May 2026
Temperature meter	GT 11	00000057	Qubovis	15 October 2025
Pressure meter	CPG2400	41000KDU031082	TPA	21 October 2025

Traceability : This Certificate is traceable to SI Unit through Semalyne AZLA Accreditation No. 2943/01 and MIT NSC-TIS-TIS Accreditation No. 0052

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

Calibration By:   
Mr. Noppadol Taungam  
Service Calibration Engineer

Approved By:   
Mr. Pasa Mathasen  
Calibration Engineer Supervisor  
Issue Date : 10 September 2025

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

FM-706-AFM-01 Rev.06 Issue date 21/2/25

Certificate No: 23-AFM-207  
Request No: Riq/2025-1987

Result of Calibration : Without Adjustment

STD Reading			UUC Reading			Error		Uncertainty	
Temperature (°C)	Pressure (kPa)	Flow (cc/min)	Temperature (°C)	Pressure (kPa)	Flow (cc/min)	(cc/min)	(cc/min)	(°C)	(kPa)
25.5	100.98	20	-	-	20.042	-0.0	1.6	1.0	0.50
25.5	100.90	50	-	-	49.921	-0.1	4.0	1.0	0.50
25.5	100.91	100	-	-	100.09	0.1	5.6	1.0	0.50
25.4	100.86	150	-	-	150.34	0.3	5.4	1.0	0.50
25.6	100.93	199	-	-	200.17	1.2	5.2	1.0	0.50
25.6	100.95	301	-	-	300.03	-1	11	1.0	0.50
25.7	100.96	402	-	-	401.03	-1	14	1.0	0.50
25.7	100.95	503	-	-	500.26	-3	10	1.0	0.50

Note: STD: Standard, UUC: Unit Under Calibration  
- UUC Reference Condition: At atmospheric pressure and room temperature condition, Air  
- Your Rate was corrected for non-standard operating condition by using equation:

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

where: Q = Flow Rate, P = Absolute Pressure, T = Absolute Temperature  
meas = Measurement Condition, ref = Standard Condition

\* Indicates not accredited

End of Certificate

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

FM-708-AFM-01 Rev.06 Issue date 21/2/25



JIRANATEE ASSOCIATES CO., LTD.

Innovative Associates Co., Ltd.  
63/14-15, 67/25-36  
Petchakum 2, 7/1, 8/1 Wachapara, Bangkok  
Bangkok 10000 (Thailand)  
Tel: +6688480812  
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E-mail: jnac-calibration@jiranatee.com  
Web site: www.jiranatee.com

Accredited calibration laboratory  
ISO/IEC 17025:2017  
NSC-TIS-TIS 17025  
CALIBRATION 0367

Air speed measurement laboratory  
Calibration services department



NSC-TIS-TIS 17025  
CALIBRATION 0367

Certificate Number

CWS-011-68

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

Cup anemometer:  
: Novalyne  
: Sensor: WS-02F  
: Data logger: 110-WS-25D1-D  
: Sensor: WSD-AS816  
: Data logger: AS816  
: R/W: FS0545  
: Used item  
: ALS laboratory group (Thailand) Co., Ltd.  
104 Phatthakanan 40, Phatthakanan Rd, Khwaeng Suan Luang,  
Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

14 Mar 2025  
02 Apr 2025  
02 Apr 2025

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature: 23.0 ± 3.0 °C  
Relative Humidity: 55.0 ± 15.0 %RH  
Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION

: Effel-type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITIONS

: Wind tunnel cross-section area<sup>1</sup>: 900 cm<sup>2</sup>  
Cup anemometer frontal area<sup>2</sup>: 100 cm<sup>2</sup>  
Diameter of mounting pipe<sup>3</sup>: 1 mm  
Blockage ratio of test object<sup>4</sup>: 0.111 [-]

Preconditioning

Measurement Condition

: 24 hours at ambient conditions.  
The average values during measurement are (24.5) °C, (48.4) %RH and (1008.5) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.



Approved signature

Mr. Panyra Booncharoen  
Calibration Department Manager

REVIEW BY

APPROVED BY

NEXT CAL DATE: 01/10/2026

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY



JIRANATEE ASSOCIATES CO., LTD.

Innovative Associates Co., Ltd.  
63/14-15, 67/25-36  
Petchakum 2, 7/1, 8/1 Wachapara, Bangkok  
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Tel: +6688480812  
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E-mail: jnac-calibration@jiranatee.com  
Web site: www.jiranatee.com

Accredited calibration laboratory  
ISO/IEC 17025:2017  
NSC-TIS-TIS 17025  
CALIBRATION 0367

Wind direction measurement laboratory  
Calibration services department



NSC-TIS-TIS 17025  
CALIBRATION 0367

Certificate Number

CWD-011-68

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

Wind Direction Sensor:  
: Novalyne  
: Sensor: WS-02F  
: Data logger: 110-WS-25D1-D  
: Sensor: WSD-AS816  
: Data logger: AS816  
: R/W: FS0545  
: Used item  
: ALS laboratory group (Thailand) Co., Ltd.  
104 Phatthakanan 40, Phatthakanan Rd, Khwaeng Suan Luang,  
Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

14 Mar 2025  
02 Apr 2025  
02 Apr 2025

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature: 23.0 ± 3.0 °C  
Relative Humidity: 55.0 ± 15.0 %RH  
Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION

: Effel-type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITION

: Wind tunnel cross-section area<sup>1</sup>: 900 cm<sup>2</sup>  
Wind direction frontal area<sup>2</sup>: 129 cm<sup>2</sup>  
Diameter of mounting pipe<sup>3</sup>: 1 mm  
Blockage ratio of test object<sup>4</sup>: 0.143 [-]

Preconditioning

Measurement Condition

: 24 hours at ambient conditions.  
The average values during measurement are (24.6) °C, (51.0) %RH and (1012.1) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.



Approved signature

Mr. Panyra Booncharoen  
Calibration Department Manager

Remark:  
<sup>1</sup> Nozzle cross-section area of the wind tunnel  
<sup>2</sup> Projected cross-section area of the tested object include mounting pipe  
<sup>3</sup> Diameter of mounting pipe  
<sup>4</sup> Ratio<sup>2</sup> to<sup>1</sup>

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Page 2 of 2 Pages

MEASUREMENT RESULTS<sup>1</sup>

The Cup anemometer, Unit Under Calibration (UUC) was exercise at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer which was installed 50 mm away from wind tunnel nozzle and installed 40 mm away from top of the test section and the standard air velocity 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 50 mm away from wind tunnel nozzle and installed 40 mm away from top of the test section. UUC was mounted on a round vertical tube of the gauge plate at center of test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

V <sub>ref</sub> (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V <sub>meas</sub> (m/s)	Error (m/s)	U (k=2) (m/s)
1.014	24.68	24.50	0.9	-0.1	0.31
2.232	24.54	24.50	2.0	-0.2	0.31
3.042	24.66	24.50	2.9	-0.1	0.31
4.239	24.66	24.50	4.0	-0.2	0.31
4.96	24.44	24.50	5.0	0.0	0.31
5.96	24.60	24.50	5.9	-0.1	0.31
7.02	24.30	24.50	7.1	0.1	0.31
7.96	24.50	24.50	8.0	0.0	0.31
9.00	24.22	24.50	9.0	0.0	0.31
10.00	24.60	24.50	9.9	-0.1	0.31
11.00	24.30	24.50	11.1	0.1	0.31
11.97	24.60	24.50	12.0	0.0	0.31
12.95	24.40	24.50	13.1	0.1	0.31
14.00	24.60	24.50	14.0	0.0	0.39
15.01	24.40	24.50	15.0	0.0	0.39
15.99	24.48	24.50	16.2	0.2	0.32

Remark:  
<sup>1</sup> Calibration results only count for the tested circumstances and environmental conditions during with calibration took place  
<sup>2</sup> Velocity of standard  
<sup>3</sup> Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration set-up of the Cup anemometer calibration in the wind tunnel of Jiranatee Associates Co., Ltd. The Cup anemometer shows may differ from size-calibrated one. Remark: The proportion of the set-up is not true to scale due to imaging geometry.





Certificate Number

CWO-013-68

Page 2 of 2 Pages

MEASUREMENT RESULTS<sup>1</sup>

The wind direction sensor was calibrated against standard rotary encoder by comparison method. During calibration, the measurement was carried out at 45° intervals in clockwise and counterclockwise directions after offset adjustment has been made. The flow speed of wind tunnel (usually 5 m/s) is kept constant while the sensor is rotated around its vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below:

Air speed m/s	D <sub>90</sub> Degree (°)	D <sub>180</sub> Degree (°)	Error Degree (°)	U (k=2) Degree (°)
4.99	45.000	41	-4	0.80
	90.000	87	-3	0.80
	135.000	133	-2	0.80
	180.000	181	1	0.80
	225.000	229	4	0.80
	270.000	273	3	0.80
	315.000	318	3	0.80
	360.000	359	-1	0.80

## Remark:

<sup>1</sup> Calibration results only count for the tested circumstances and environmental conditions during which calibration took place.

<sup>2</sup> Direction of standard.

<sup>3</sup> Direction of Unit Under Calibration.

\*\*\*End of Certificate of Calibration\*\*\*



JIRANATEE ASSOCIATES CO., LTD.

Jiranatee Associates Co., Ltd.  
63/34-35, 61/35-36  
Rachasri 1/12 Rd. Vachanasri, Bangkok  
Bangkok 10001 (Thailand)  
Tel: +6628808012  
Mobile: +66288079413  
E-mail: jnac-calibration@jiranatee.com  
Web site: www.jiranatee.com

Accredited calibration laboratory  
ISO/IEC 17025:2017  
NSC-TISI-TIS 17025  
CALIBRATION 0367

Temperature measurement laboratory  
Calibration services department



## CERTIFICATE OF CALIBRATION

Certificate No. : CDT-076-68

Page 1 of 2 Pages

## MEASUREMENT ITEM

: Data Logger with Temperature sensor

## MANUFACTURER

: Novalynx

## MODEL/TYPE

: 110-WS-25DL-D

## SERIAL NUMBER

: AS816

## ID NUMBER

: RYG\_F50545

## CONDITION AS-RECEIVED

: Used item

## CUSTOMER

: ALS laboratory group (Thailand) Co., Ltd.  
104 Phatthanakan 40, Phatthanakan Rd.,  
Khwaeang Suan Luang, Khet Suan Luang,  
Bangkok 10250 Thailand.

## Calibration procedure:

The temperature calibration was done by In-House calibration method as Wt-CL-001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale use was based on ITS-90.

## Traceability:

The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT). Certificate number: T1-0047-24, Certificate number: ER-0113-24.

## Reference Used During Calibration:

1. Standard Temperature Probe  
Model: STS-100 AS08, Serial No.: 667692-09  
2. Digital Temperature Indicator  
Model: DTI-1000-A MK II, Serial No.: 671407-00591

## Uncertainty of Measurement:

The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM 'Evaluation of measurement data - Guide to the expression of uncertainty in measurement'.

## RECEIVED DATE

: 14 Mar 2025

## MEASUREMENT DATE

: 02 Apr 2025

## ISSUE DATE

: 02 Apr 2025

## ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature :  $23.0 \pm 3.0$  °C  
Relative Humidity :  $55.0 \pm 15.0$  %RH

NOTED: The certificate is valid only to the item calibrated on date and place of calibration.

## TABULATION OF RESULTS:

The table on next page give the measured values.



Calibrated by:  
☐ Mr. Seawit Thachalad  
☒ Miss Jitraporn Lertsomphol  
☐ Miss Ruangrumpal Phoommit

Approved signatory:

Mr. Parinya Booncharon  
Calibration Department Manager

THIS CERTIFICATE MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY



Continuation of Certificate of Calibration Number CDT-076-68

Page 2 of 2 Pages

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 °C to 40 °C

## Function:

Table 1: This equipment was connected with temperature sensor Model: HMP60 5/N: T2320595.  
Dimension: Diameter 12 mm. Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.074	19.6	-0.5	0.09%
80	25.049	24.6	-0.4	0.09%
80	30.035	29.6	-0.4	0.09%
80	35.026	34.5	-0.5	0.09%
80	40.014	39.5	-0.5	0.09%

UUC\*: Unit Under Calibration

\*\*\*End of Certificate of Calibration\*\*\*



JIRANATEE ASSOCIATES CO., LTD.

Jiranatee Associates Co., Ltd.  
63/34-35, 61/35-36  
Rachasri 1/12 Rd. Vachanasri, Bangkok  
Bangkok 10001 (Thailand)  
Tel: +6628808012  
Mobile: +66288079413  
E-mail: jnac-calibration@jiranatee.com  
Web site: www.jiranatee.com

Accredited calibration laboratory  
ISO/IEC 17025:2017  
NSC-TISI-TIS 17025  
CALIBRATION 0367

Relative humidity and Air Temperature measurement laboratory  
Calibration services department



## CERTIFICATE OF CALIBRATION

Certificate No. : CRT-010-68

Page 1 of 2 Pages

## MEASUREMENT ITEM

: Relative humidity with data logger

## MANUFACTURER

: Novalynx

## MODEL/TYPE

: 110-WS-25DL-D

## SERIAL NUMBER

: Sensor: HMP60

## ID NUMBER

: Data Logger: AS816

## CONDITION AS-RECEIVED

: Sensor: T2320595

## CUSTOMER

: RYG\_F50545

: Used item

: ALS laboratory group (Thailand) Co., Ltd.  
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,  
Khet Suan Luang, Bangkok 10250 Thailand

## Calibration procedure:

The Relative humidity and Air Temperature calibration was done by In-House calibration method as Wt-CL-002 and Wt-CL-010 according to comparison method with Standard Chilled Mirror hygrometer with Temperature sensor and standard Humidity generator chamber.

## Traceability:

The measurements are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT). Certificate number: TH0245-24 and Jiranatee Associates Co., Ltd. Certificate number: CDT-026-68.

## Uncertainty of Measurement:

The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM 'Evaluation of measurement data - Guide to the expression of uncertainty in measurement'.

## RECEIVED DATE

: 14 Mar 2025

## MEASUREMENT DATE

: 02 Apr 2025

## ISSUE DATE

: 02 Apr 2025

## ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature :  $23.0 \pm 3.0$  °C  
Relative Humidity :  $55.0 \pm 15.0$  %RH

NOTED: The certificate is valid only to the item calibrated on date and place of calibration

## TABULATION OF RESULTS:

The table on next page give the measured values.



Calibrated by:  
☐ Mr. Seawit Thachalad  
☒ Miss Jitraporn Lertsomphol  
☐ Miss Ruangrumpal Phoommit

Approved signatory:

Mr. Parinya Booncharon  
Calibration Department Manager

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Continuation of Certificate of Calibration Number: CKT-010-68

Page 2 of 2 Pages

#### Measurement Results

The results of calibration and associated measurement uncertainties are reported in the table below.

Result of Calibration: ☐ Without Adjustment ☒ With Adjustment

Table 1: The results of calibration of relative humidity at 30 °C are reported in table below.

Calibration Range: 20%RH to 80%RH

Air Temperature (°C)	Standard Reading (%RH)	UUC Reading (%RH)	Error (%RH)	Uncertainty ± (%RH)
29.69	19.79	21.6	1.8	0.82
29.73	51.04	50.8	-0.3	1.3
29.74	82.47	80.0	-2.5	2.3

UUC: Unit Under Calibration

\*\*\*End of Certificate of Calibration\*\*\*



Accredited calibration laboratory  
ISO/IEC 17025:2017  
NSC-TIS-TIS 17025  
CALIBRATION 0367

Air speed measurement laboratory  
Calibration services department



Certificate Number

CWS-010-68

## CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

#### MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

Cup anemometer

Novelty

Sensor: WS-02F

Data logger: 110-WS-250L-D

Sensor: WSD-A5662

Data logger: AS662

RYG, F50544

Used item

ALS laboratory group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,

Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

14 Mar 2025

02 Apr 2025

02 Apr 2025

#### ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature

Relative Humidity

Atmospheric Pressure

23.0 ± 3.0 °C

55.0 ± 15.0 %RH

1010 ± 10 hPa

#### PLACE OF CALIBRATION

Effel-type wind tunnel of Jiranatee Associates Co., Ltd.

#### CALIBRATION CONDITIONS

Wind tunnel cross-section area<sup>1</sup>

Cup anemometer (rotational) area<sup>2</sup>

Diameter of mounting pipe<sup>3</sup>

Blockage ratio of test object<sup>4</sup>

900 cm<sup>2</sup>

100 cm<sup>2</sup>

mm

0.111 [-]

#### Preconditioning

Measurement Condition

24 hours at ambient conditions.

The average values during measurement are (24.1) °C, (45.8) %RH and (1011.4) hPa.

#### TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

02 Mr. Sarawit Thongkiet

03 Miss Jitraporn Lertrachit



Approved signature:

Mr. Parinya Booncharoen  
Calibration Department Manager

REVIEW BY

APPROVED BY

NEXT CAL DATE

01/10/2026

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

Page 2 of 2 Pages

#### MEASUREMENT RESULTS<sup>1</sup>

The Cup anemometer, Unit Under Calibration (UUC) was exercise at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer which was installed 50 mm away from wind tunnel nozzle and installed 40 mm away from top of the test section and the standard air velocity 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 50 mm away from wind tunnel nozzle and installed 40 mm away from top of the test section. UUC was mounted on a round vertical tube of the lower plate at center of test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

V <sub>ref</sub> (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V <sub>ref</sub> (m/s)	Error (m/s)	U (k=2) (m/s)
1.054	24.70	24.50	0.8	-0.2	0.31
2.223	24.48	24.50	2.0	-0.2	0.31
3.042	24.64	24.50	2.9	-0.3	0.31
4.221	24.66	24.50	4.0	-0.2	0.31
4.95	24.52	24.50	4.9	-0.3	0.31
5.57	24.44	24.50	6.0	0.0	0.31
7.04	24.40	24.50	6.9	-0.3	0.31
7.96	24.50	24.50	7.9	0.0	0.31
9.02	24.50	24.50	9.0	-0.1	0.31
9.99	24.64	24.50	10.0	0.0	0.31
11.06	24.50	24.50	11.1	0.1	0.31
11.99	24.70	24.50	12.1	0.3	0.31
12.97	24.50	24.50	13.1	0.3	0.31
14.00	24.68	24.50	14.3	0.3	0.31
15.02	24.52	24.50	15.3	0.3	0.31
16.01	24.60	24.50	16.3	0.3	0.31

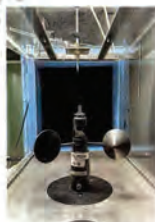
#### Remarks:

<sup>1</sup> Calibration results only count for the tested circumstances and environmental conditions during which calibration took place

<sup>2</sup> Velocity of standard

<sup>3</sup> Velocity of Unit Under Calibration

#### PHOTO OF CALIBRATION SET-UP



Calibration set-up of the Cup anemometer calibration in the wind tunnel of Jiranatee Associates Co., Ltd. The Cup anemometer shown may differ from the calibrated unit. Remark: The proportion of the set-up is not true to scale due to imaging geometry.

\*\*\*End of Certificate of Calibration\*\*\*



Accredited calibration laboratory  
ISO/IEC 17025:2017  
NSC-TIS-TIS 17025  
CALIBRATION 0367

Wind direction measurement laboratory  
Calibration services department



Certificate Number

CWD-010-68

## CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

#### MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

Wind Direction Sensor

Novelty

Sensor: WS-02F

Data logger: 110-WS-250L-D

Sensor: WSD-A5662

Data logger: AS662

RYG, F50544

Used item

ALS laboratory group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,

Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

14 Mar 2025

02 Apr 2025

02 Apr 2025

#### ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature

Relative Humidity

Atmospheric Pressure

23.0 ± 3.0 °C

55.0 ± 15.0 %RH

1010 ± 10 hPa

#### PLACE OF CALIBRATION

Effel-type wind tunnel of Jiranatee Associates Co., Ltd.

#### CALIBRATION CONDITION

Wind tunnel cross-section area<sup>1</sup>

Wind direction (rotational) area<sup>2</sup>

Diameter of mounting pipe<sup>3</sup>

Blockage ratio of test object<sup>4</sup>

900 cm<sup>2</sup>

129 cm<sup>2</sup>

mm

0.143 [-]

#### Preconditioning

Measurement Condition

24 hours at ambient conditions.

The average values during measurement are (24.7) °C, (51.0) %RH and (1012.4) hPa.

#### TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

02 Mr. Sarawit Thongkiet

03 Miss Jitraporn Lertrachit



Approved signature:

Mr. Parinya Booncharoen  
Calibration Department Manager

REVIEW BY

APPROVED BY

NEXT CAL DATE

01/10/2026

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY



Certificate Number
CWD-010-68

Page 2 of 2 Pages

#### MEASUREMENT RESULTS<sup>1</sup>

The wind direction sensor was calibrated against standard rotary encoder by comparison method. During calibration, the measurement was carried out at 45° intervals in clockwise and counterclockwise directions after offset adjustment has been made. The flow speed of wind tunnel (usually 5 m/s) is kept constant while the sensor is rotated around its vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below.

Air speed m/s	D <sub>rot</sub> Degree (°)	D <sub>rev</sub> Degree (°)	Error Degree (°)	U (k=2) Degree (°)
5.01	45.000	41	-4	0.80
	90.000	87	-3	0.80
	135.000	132	-3	0.80
	180.000	180	0	0.80
	225.000	228	3	0.80
	270.000	273	3	0.80
	315.000	318	3	0.80
	360.000	359	-1	0.80

#### Remark:

<sup>1</sup> Calibration results only count for the tested circumstances and environmental conditions during which calibration took place

<sup>2</sup> Direction of standard

<sup>3</sup> Direction of Unit Under Calibration

\*\*\*End of Certificate of Calibration\*\*\*



Jiranatee Associates Co., Ltd.  
65/34-35, 67/25-36,  
Petchburi 3, 3/1, Rd. Vachirajon, Bangkok  
Bangkok 10007 (Thailand)  
Tel: +662 6840812  
Mobile: +662 6704412  
E-mail: jnac-calibration@jiranatee.com  
Web site: www.jiranatee.com

Accredited calibration laboratory  
ISO/IEC 17025:2017  
NSC-TISI-TIS 17025  
CALIBRATION 0367

Temperature measurement laboratory  
Calibration services department



## CERTIFICATE OF CALIBRATION

Certificate No. : CDT-075-68

Page 1 of 2 Pages

#### MEASUREMENT ITEM

MANUFACTURER : Novalynx  
MODEL/TYPE : 110-WS-250L-D  
SERIAL NUMBER : A5662  
ID NUMBER : RYG\_F50544  
CONDITION AS-RECEIVED : Used Item  
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.  
104 Phatthanakan Rd.,  
Khuang Suan Luang, Khet Suan Luang,  
Bangkok 10250 Thailand.

: Data Logger with Temperature sensor

: Novalynx

: 110-WS-250L-D

: A5662

: RYG\_F50544

: Used Item

: ALS laboratory group (Thailand) Co., Ltd.  
104 Phatthanakan Rd.,  
Khuang Suan Luang, Khet Suan Luang,  
Bangkok 10250 Thailand.

RECEIVED DATE : 14 Mar 2025

MEASUREMENT DATE : 02 Apr 2025

ISSUE DATE : 02 Apr 2025

#### ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature : 23.0 ± 3.0 °C

Relative Humidity : 55.0 ± 15.0 %RH

NOTED: The certificate is valid only to the item calibrated on date and place of calibration.

#### TABULATION OF RESULTS:

The table on next page give the measured values.

#### Calibration procedure:

The temperature calibration was done by In-House calibration method as WPCL-001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale use was based on ITS-90.

#### Traceability:

The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT) Certificate number: TI-Q047-24, Certificate number: ER-0113-24

#### Reference Used During Calibration:

1. Standard Temperature Probe  
Model: STS-100 A500, Serial No.: 667682-09  
2. Digital Temperature Indicator  
Model: DTI-1000-A MK II, Serial No.: 671407-00591

#### Uncertainty of Measurement:

The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2, Which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM 'Evaluation of measurement data - Guide to the expression of uncertainty in measurement'



Calibrated by:

- ☐ Mr. Sazawit Thachalad
- ☐ Miss Jittaporn Lertsomphol
- ☐ Miss Ruangrumpai Phoommit

Approved signatory:

Mr. Parnya Booncharoen  
Calibration Department Manager

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Continuation of Certificate of Calibration Number CDT-075-68

Page 2 of 2 Pages

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 °C to 40 °C

#### Function:

Table 1: This equipment was connected with temperature sensor Model: HMP60 S/N: T2320591.  
Dimension: Diameter 12 mm. Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.074	19.6	-0.5	0.095
80	25.049	24.6	-0.4	0.095
80	30.035	29.7	-0.3	0.095
80	35.026	34.6	-0.4	0.095
80	40.014	39.5	-0.5	0.095

UUC\*: Unit Under Calibration

\*\*\*End of Certificate of Calibration\*\*\*



Jiranatee Associates Co., Ltd.  
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Accredited calibration laboratory  
ISO/IEC 17025:2017  
NSC-TISI-TIS 17025  
CALIBRATION 0367

Relative humidity and Air Temperature measurement laboratory  
Calibration services department



## CERTIFICATE OF CALIBRATION

Certificate No. : CRT-009-68

Page 1 of 2 Pages

#### MEASUREMENT ITEM

MANUFACTURER : Novalynx  
MODEL/TYPE : 110-WS-250L-D  
SERIAL NUMBER : A5662  
ID NUMBER : RYG\_F50544  
CONDITION AS-RECEIVED : Used Item  
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.  
104 Phatthanakan Rd.,  
Khet Suan Luang, Bangkok 10250 Thailand.

: Relative humidity with data logger

: Novalynx

: 110-WS-250L-D

: Sensor: HMP60

: Data Logger: A5662

: Sensor: T2320591

: RYG\_F50544

: Used Item

: ALS laboratory group (Thailand) Co., Ltd.  
104 Phatthanakan Rd.,  
Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE : 14 Mar 2025

MEASUREMENT DATE : 02 Apr 2025

ISSUE DATE : 02 Apr 2025

#### ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature : 23.0 ± 3.0 °C

Relative Humidity : 55.0 ± 15.0 %RH

NOTED: The certificate is valid only to the item calibrated on date and place of calibration

#### TABULATION OF RESULTS:

The table on next page give the measured values.

Calibration procedure:  
The Relative humidity and Air Temperature calibration was done by In-House calibration method as WI-CL-009 and WI-CL-030 according to comparison method with Standard Certified Minor hygrometer with Temperature sensor and standard Humidity generator chamber.

#### Traceability:

The measurements are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT) Certificate number: TH046-24 and Jiranatee Associates Co., Ltd. Certificate number: CDT-026-68.

#### Uncertainty of Measurement:

The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2, Which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM 'Evaluation of measurement data - Guide to the expression of uncertainty in measurement'



Calibrated by:

- ☐ Mr. Sazawit Thachalad
- ☐ Miss Jittaporn Lertsomphol
- ☐ Miss Ruangrumpai Phoommit

Approved signatory:

Mr. Parnya Booncharoen  
Calibration Department Manager

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Continuation of Certificate of Calibration Number: CRT-009-68

Page 2 of 2 Pages

**Measurement Results:**

The results of calibration and associated measurement uncertainties are reported in the table below.

**Result of Calibration:** ☐ Without Adjustment ☒ With Adjustment

**Table 1:** The results of calibration of relative humidity at 30 °C are reported in table below.

**Calibration Range:** 20%RH to 80%RH

Air Temperature (°C)	Standard Reading (NHR)	UUC Reading (NHR)	Error (NHR)	Uncertainty ±(NHR)
29.69	19.79	22.0	2.2	0.82
29.71	51.04	51.5	0.4	1.3
29.74	82.54	81.0	-1.5	2.3

UUC\*: Unit Under Calibration

\*\*\*End of Certificate of Calibration\*\*\*



Page 1 of 3

**Certificate of Calibration**

**Customer**

Name : ALS Laboratory Group Thailand Co., Ltd.  
Address : 104 Soi Phatthamakan 40, Phatthamakan Road, Suan Luang,  
Bangkok 10250

Certificate No : 25-ACT-042  
Request No : Req-2025-0604

**Unit Under Calibration Details**

Measurement item : Acoustic Calibrator  
Manufacturer : RION  
Model : NC-75  
Serial Number : 35002736  
ID : RYG\_FS0496

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

**Calibration Environment and Details**

Temperature : (23 ± 2 °C)  
Humidity : (50 ± 20 %RH)  
Barometric Pressure : (1013 ± 10.0 hPa)  
Received Date : 6 March 2025  
Calibration Date : 19 March 2025  
Location of Calibration : LAB 1 Acoustic  
Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators

REVIEW BY: *[Signature]*  
APPROVED BY: *[Signature]*  
NEXT CAL DATE: 19/03/26

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Sound Calibrator	SV 35A	58079	EEL	12 June 2025
THD Multimeter	2015	1047765	NIMT	4 February 2026

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

**Note**

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

**Calibrated By :**

*[Signature]*  
Mr. Noppadon Luangart  
Service Calibration Engineer

**Approved By :**

*[Signature]*  
Mr. Pait Maitavorn  
Calibration Engineer Supervisor  
Issue Date : 19 March 2025

The results stated only for the items calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

IMA-708-ACT-02 Rev 03 Issue date 5/6/24



Page 2 of 2

Certificate No : 25-ACT-042  
Request No : Req-2025-0604

**Sound pressure level**

**Calibration Results : Without Adjustment**

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty (± dB)	Acceptance limit Class 1 (± dB)	Result
	Measured	Deviated value	Measured	Deviated value			
94 dB / 1000 Hz	94.06	0.06	-	-	0.13	0.25	Pass

**Frequency of Sound pressure level**

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)	Acceptance limit Class 1 (± %)	Result
	Measured (Hz)	Deviated	Measured (Hz)	Deviated			
94 dB / 1000 Hz	1000.00	0.00	-	-	0.01	0.70	Pass

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

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)	Acceptance limit Class 1 (± %)	Result
	Measured (%)	Deviated	Measured (%)	Deviated			
94 dB / 1000 Hz	0.98	-	-	-	0.40	2.5	Pass

**Note :**

Function	Maximum-permitted Uncertainty of measurement
Sound pressure level	0.15 dB
Frequency	0.20%
Total distortion+noise	0.50%

( Acceptance limit was IEC60912:2017 Class 1 )

\*The calibration results exclude the calibration pressure correction

\*The calibration results exclude the microphone volume correction

The results stated only for the items calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

IMA-708-ACT-02 Rev 03 Issue date 5/6/24



Page 1 of 3

Certificate No : 25-ACT-042  
Request No : Req-2025-0604

**Decision Rule for Statements of Conformity**

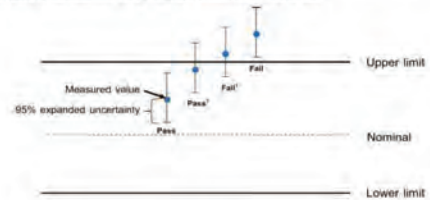
The standard decision rule employed for the statements of conformity at each calibration result will be applied using ILAC-G8-09:2019, Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

Pass - The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass<sup>1</sup> - The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail<sup>1</sup> - The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail - The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Calibration

The results stated only for the items calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

IMA-708-ACT-02 Rev 03 Issue date 5/6/24

Cert. No. : ACL25077  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42A/ Microphone UC-52 / Preamplifier NH-24  
Serial No.: 00623392 / 198639 / 26420  
ID No.: RYG\_FS0617

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

Location : -  
Ambient Temperature : ( 23.0 ± 3 ) °C  
Pressure : ( 101.3 ± 3 ) kPa  
Relative Humidity : ( 50.0 ± 20 ) %

Received Date : 07 JANUARY 2025  
Calibration Date : 21 - 23 JANUARY 2025  
Date of Issue : 24 JANUARY 2025

REVIEW BY : S.P.S.  
APPROVED BY : [Signature]  
NEXT CAL DATE : 21/01/2026

Calibrated by : Nathakorn Pisutpaisan

Approved by : [Signature]  
( Thanakul Petchurai )

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL25077  
Job No. : VC68AC0059  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

## Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).

The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

## Condition of this result of calibration :

## 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL-BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL-BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

[Signature]

Cert. No. : ACL25077  
Job No. : VC68AC0059  
Pages : 3 of 8

## Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

[Signature]

Cert. No. : ACL25077  
Job No. : VC68AC0059  
Page : 4 of 8

## Result of calibration :

## 1. Absolute sensitivity

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93.94)	93.9	0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value ( dB )
15.4

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

Frequency Weighting ( dB )	Weighting ( dB )
A - weight	12.6
C - weight	18.7
Flat	24.4

## 3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	1.2	1.2	1.2	± 5.0

[Signature]



Cert. No. : ACL25077  
Job No. : VC68AC0059  
Pages : 5 of 8

## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	-0.1	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.0	0.0	±5.0

## 5. Frequency and time weightings at 1 kHz

## 5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

## 5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	93.9	-0.1	± 0.1
Leq	94.0	94.0	0.0	± 0.1

## 6. Long - term stability

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.1	0.1	± 0.3

T. Petch

Cert. No. : ACL25077  
Job No. : VC68AC0059  
Pages : 6 of 8

## 7. Level linearity on the reference level range

Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.1	0.1	± 1.1
134.0	134.1	0.1	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.1	0.1	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.1	0.1	± 1.1
114.0	114.1	0.1	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.1	0.1	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	27.0	0.0	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	25.0	0.0	± 1.1

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Job No. : VC68AC0059  
Pages : 7 of 8

## 8. Level linearity including the level range control

Range	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
130	29.0	28.9	-0.1	±1.1

## 9. Tone burst response

Time Weighting	Tone burst duration, Tb ( ms )	Cycle	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	116.9	-0.1	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.8	-0.2	1.5 ; -5.0
	2	8	108.0	107.9	-0.1	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

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Cert. No. : ACL25077  
Job No. : VC68AC0059  
Pages : 8 of 8

## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value ( dB )	Measured Value, L <sub>peak</sub> ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

## 11. Overload indication

Measured value ( dB )		Deviated Value ( dB )	Acceptance Limits ( dB )
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

## 12. High level stability

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

T. Petch

Cert. No. : ACL25078  
Pages : 1 of 8

## Calibration Certificate

**Equipment :** SOUND LEVEL METER  
**Manufacturer :** RION  
**Model :** NL-42A/ Microphone UC-52 / Preamplifier NH-24  
**Serial No.:** 00623393 / 198640 / 26421  
**ID No.:** RYG\_FS0618

**Condition As Found :** GOOD

**Customer :** ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

**Location :** -  
**Ambient Temperature :** ( 23.0 ± 3 ) °C  
**Pressure :** ( 101.3 ± 3 ) kPa  
**Relative Humidity :** ( 50.0 ± 20 ) %

**Received Date :** 07 JANUARY 2025  
**Calibration Date :** 21 - 23 JANUARY 2025  
**Date of Issue :** 24 JANUARY 2025

REVIEW BY : *[Signature]*  
APPROVED BY : *[Signature]*  
NEXT CAL DATE : 20/ 01/ 2026

**Calibrated by :** Nathakorn Pisutpaisan

**Approved by :** *[Signature]*  
( Thanakul Petchurai )

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL25078  
Job No. : VC68AC0059  
Pages : 2 of 8

**Calibration Procedure :** CP-AC-01

### Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).  
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.  
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

### Condition of this result of calibration :

#### 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL_BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL_BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL_BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KA1	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

*[Signature]*

Cert. No. : ACL25078  
Job No. : VC68AC0059  
Pages : 3 of 8

### Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

*[Signature]*

Cert. No. : ACL25078  
Job No. : VC68AC0059  
Page : 4 of 8

### Result of calibration :

#### 1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	93.9	0.0	±0.3

#### 2. Self-generated noise

##### 2.1 Normal test

Measured Value (dB)
16.6

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

Frequency Weighting	Weighting (dB)
A - weight	13.1
C - weight	17.9
Flat	24.4

#### 3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.5	0.5	0.5	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	2.3	2.2	2.3	±5.0

*[Signature]*

Cert. No. : ACL25078  
Job No. : VC68AC0059  
Pages : 5 of 8

## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	-0.1	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

## 5. Frequency and time weightings at 1 kHz

## 5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

## 5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

## 6. Long - term stability

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.3

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Cert. No. : ACL25078  
Job No. : VC68AC0059  
Pages : 6 of 8

## 7. Level linearity on the reference level range

Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.0	0.0	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

x. Petch.

Cert. No. : ACL25078  
Job No. : VC68AC0059  
Pages : 7 of 8

## 8. Level linearity including the level range control

Range	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
130	29.0	28.9	-0.1	±1.1

## 9. Tone burst response

Time Weighting	Tone burst duration, Tb ( ms )	Cycle	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

x. Petch.

Cert. No. : ACL25078  
Job No. : VC68AC0059  
Pages : 8 of 8

## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value ( dB )	Measured Value, L <sub>peak</sub> ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

## 11. Overload indication

Measured value ( dB )		Deviated Value ( dB )	Acceptance Limits ( dB )
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

## 12. High level stability

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

x. Petch.



Cert. No. : ACL25111  
Pages : 1 of 8

## Calibration Certificate

**Equipment :** SOUND LEVEL METER  
**Manufacturer :** RION  
**Model :** NL-42A / Microphone UC-52 / Preamplifier NH-24  
**Serial No.:** 00623395 / 198642 / 26423  
**ID No.:** RYG\_FS0620

**Condition As Found :** GOOD

**Customer :** ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

**Location :** -  
**Ambient Temperature :** ( 23.0 ± 3 ) °C  
**Pressure :** ( 101.3 ± 3 ) kPa  
**Relative Humidity :** ( 50.0 ± 20 ) %

**Received Date :** 14 JANUARY 2025  
**Calibration Date :** 27-29 JANUARY 2025  
**Date of Issue :** 30 JANUARY 2025

REVIEW BY: *S/S*  
APPROVED BY: *STH*  
NEXT CAL DATE: 26/01/2026

**Calibrated by :** Nathakorn Pisutpaisan

**Approved by :** *T. Petchur*  
( Thanakul Petchurai )

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL25111  
Job No. : VC68AC0064  
Pages : 2 of 8

**Calibration Procedure :** CP-AC-01

### Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).  
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.  
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

### Condition of this result of calibration :

#### 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL_BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL_BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL_BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KA1	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

*T. Petchur*

Cert. No. : ACL25111  
Job No. : VC68AC0064  
Pages : 3 of 8

### Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

*T. Petchur*

Cert. No. : ACL25111  
Job No. : VC68AC0064  
Page : 4 of 8

### Result of calibration :

#### 1. Absolute sensitivity

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93.94)	93.9	0.0	±0.3

#### 2. Self-generated noise

##### 2.1 Normal test

Measured Value ( dB )
14.2

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

Frequency Weighting	Weighting ( dB )
A - weight	9.9
C - weight	16.5
Flat	22.3

#### 3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.5	0.5	0.5	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	0.4	0.4	0.4	± 5.0

*T. Petchur*

Cert. No. : ACL25111  
Job No. : VC68AC0064  
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## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.1	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

## 5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

## 6. Long - term stability

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.3

T. Petch.

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## 7. Level linearity on the reference level range

Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	78.9	-0.1	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	63.9	-0.1	± 1.1
59.0	59.0	0.0	± 1.1
54.0	53.9	-0.1	± 1.1
49.0	48.9	-0.1	± 1.1
44.0	44.0	0.0	± 1.1
39.0	38.9	-0.1	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.0	0.0	± 1.1
27.0	27.0	0.0	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.1	0.1	± 1.1

T. Petch.

Cert. No. : ACL25111  
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## 8. Level linearity including the level range control

Range	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
130	29.0	29.0	0.0	±1.1

## 9. Tone burst response

Time Weighting	Tone burst duration, Tb ( ms )	Cycle	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

T. Petch.

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## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value ( dB )	Measured Value, L <sub>peak</sub> ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

## 11. Overload indication

Measured value ( dB )		Deviated Value ( dB )	Acceptance Limits ( dB )
Positive one-half cycle	Negative one-half cycle		
89.5	89.6	0.1	±1.5

## 12. High level stability

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

T. Petch.

### Certificate of Calibration

#### Customer

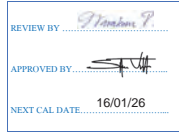
Name : ALS Laboratory Group Thailand Co., Ltd. Certificate No : 25-ACT-010  
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang, Request No : Req-2025-0091  
Bangkok 10250

#### Unit Under Calibration Details

Measurement item : Acoustic Calibrator Class : 1  
Manufacturer : RION Range : 94 dB / 1000 Hz  
Model : NC-74 Instrument Status : Used  
Serial Number : 34178121  
ID : RYG\_FS0213

#### Calibration Environment and Details

Temperature : ( 23 ± 2 °C )  
Humidity : ( 50 ± 20 %RH )  
Barometric Pressure : ( 1013 ± 10.0 hPa )  
Received Date : 15 January 2025  
Calibration Date : 16 January 2025  
Location of Calibration : LAB 1 Acoustic  
Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators



Reference Standard	Model	Serial Number	Traceable	Due Calibration
Sound Calibrator	SV 35A	58079	EEL	12 June 2025
THD Multimeter	2015	1047765	NIMT	16 January 2025

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

#### Note

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

Calibrated By : Approved By :   
Mr. Noppadon Luangart Mr. Pacit Mathavorn  
Service Calibration Engineer Calibration Engineer Supervisor  
Issue Date : 16 January 2025

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

FM-708-ACT-02 Rev.03 Issue date 5/6/24

Certificate No : 25-ACT-010

Request No : Req-2025-0091

#### Sound pressure level

#### Calibration Results : Without Adjustment

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty ( ± dB )	Acceptance limit Class 1 ( ± dB )	Result
	Measured	Deviated value	Measured	Deviated value			
94 dB / 1000 Hz	94.11	0.11	-	-	0.13	0.25	Pass

#### Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty ( ± % )	Acceptance limit Class 1 ( ± % )	Result
	Measured (Hz)	Deviated	Measured (Hz)	Deviated			
94 dB / 1000 Hz	1000.00	0.00	-	-	0.01	0.70	Pass

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

Calibration Range (Hz)	Without Adjustment	Adjustment	Uncertainty ( ± % )	Acceptance limit Class 1 ( ± % )	Result
	Measured (%)	Measured (%)			
94 dB / 1000 Hz	1.21	-	0.40	2.5	Pass

#### Note :

Function	Maximum-permitted Uncertainty of measurement
Sound pressure level	0.15 dB
Frequency	0.20%
Total distortion+noise	0.50%

- Acceptance limit was IEC60942:2017 Class 1

- The calibration results exclude the calibrator pressure correction

- The calibration results exclude the microphone volume correction

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

FM-708-ACT-02 Rev.03 Issue date 5/6/24

Certificate No : 25-ACT-010

Request No : Req-2025-0091

#### Decision Rule for Statements of Conformity

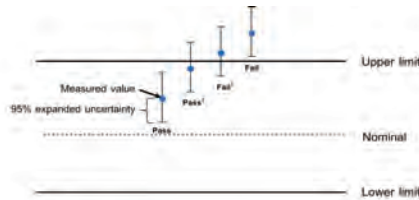
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass<sup>1</sup> = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail<sup>1</sup> = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Calibration

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

FM-708-ACT-02 Rev.03 Issue date 5/6/24

## SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

451-451/1 Sirinthorn Road, Bangbunru, Bangkok, 10700 Thailand  
Tel. +66 2433 8331 Email: calibration@sithiporn.com



Cert. No. : ACL25111  
Pages : 1 of 8

## Calibration Certificate

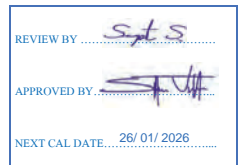
Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24  
Serial No. : 00623395 / 198642 / 26423  
ID No. : RYG\_FS0620

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

Location : -  
Ambient Temperature : ( 23.0 ± 3 ) °C  
Pressure : ( 101.3 ± 3 ) kPa  
Relative Humidity : ( 50.0 ± 20 ) %

Received Date : 14 JANUARY 2025  
Calibration Date : 27-29 JANUARY 2025  
Date of Issue : 30 JANUARY 2025



Calibrated by : Nathakorn Pisutpaisan

Approved by :   
( Thanakul Petchurai )

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.



Cert. No. : ACL25111  
Job No. : VC68AC0064  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

**Calibration Method :**

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).  
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.  
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

**Condition of this result of calibration :**

## 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL_BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL_BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL_BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

T. Petch.

Cert. No. : ACL25111  
Job No. : VC68AC0064  
Pages : 3 of 8**Summary of Measurement Result :**

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

T. Petch.

Cert. No. : ACL25111  
Job No. : VC68AC0064  
Page : 4 of 8**Result of calibration :**

## 1. Absolute sensitivity

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93.94)	93.9	0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value ( dB )
14.2

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

Frequency Weighting	Weighting ( dB )
A - weight	9.9
C - weight	16.5
Flat	22.3

## 3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.5	0.5	0.5	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	0.4	0.4	0.4	±5.0

T. Petch.

Cert. No. : ACL25111  
Job No. : VC68AC0064  
Pages : 5 of 8

## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.1	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

## 5. Frequency and time weightings at 1 kHz

## 5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

## 5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

## 6. Long - term stability

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.3

T. Petch.

Cert. No. : ACL25111  
Job No. : VC68AC0064  
Pages : 6 of 8

## 7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	78.9	-0.1	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	63.9	-0.1	± 1.1
59.0	59.0	0.0	± 1.1
54.0	53.9	-0.1	± 1.1
49.0	48.9	-0.1	± 1.1
44.0	44.0	0.0	± 1.1
39.0	38.9	-0.1	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.0	0.0	± 1.1
27.0	27.0	0.0	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.1	0.1	± 1.1

T. Petch.

Cert. No. : ACL25111  
Job No. : VC68AC0064  
Pages : 7 of 8

## 8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±1.1

## 9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

T. Petch.

Cert. No. : ACL25111  
Job No. : VC68AC0064  
Pages : 8 of 8

## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

## 11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.6	0.1	±1.5

## 12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

T. Petch.

Cert. No. : ACL25073  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24  
Serial No. : 01222716 / 143832 / 22763  
ID No. : RYG\_FS0020

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHAENG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

Location :  
Ambient Temperature : ( 23.0 ± 3 ) °C  
Pressure : ( 101.3 ± 3 ) kPa  
Relative Humidity : ( 50.0 ± 20 ) %

Received Date : 07 JANUARY 2025  
Calibration Date : 21 - 23 JANUARY 2025  
Date of Issue : 24 JANUARY 2025

Calibrated by :

Nathakorn Pisutpaisan

Approved by :

T. Petch.  
( Thanakul Petchurai )

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced  
other than in full, except with the prior written approval of the head of Calibration Laboratory



Cert. No. : ACL25073  
Job No. : VC68AC0059  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

**Calibration Method :**

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).  
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

**Condition of this result of calibration :**

## 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL.BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL.BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL.BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KA1	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

S. Petch.

Cert. No. : ACL25073  
Job No. : VC68AC0059  
Pages : 3 of 8**Summary of Measurement Result :**

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

S. Petch.

Cert. No. : ACL25073  
Job No. : VC68AC0059  
Page : 4 of 8**Result of calibration :**

## 1. Absolute sensitivity

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93.94)	93.9	0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value ( dB )
13.4

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

Frequency Weighting	Weighting ( dB )
A - weight	10.8
C - weight	16.7
Flat	22.6

## 3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	-0.2	-0.2	-0.2	± 1.5
1000	-0.6	-0.6	-0.6	± 1.0
8000	-1.0	-1.0	-1.0	±5.0

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## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.2	0.2	0.3	±2.0
125	0.2	0.2	0.2	±1.5
250	0.1	0.1	0.1	±1.5
500	0.1	0.1	0.1	±1.5
1000	0.0	0.0	0.1	±1.0
2000	0.0	0.0	0.0	±2.0
4000	-0.1	-0.1	0.0	±3.0
8000	-0.1	0.0	0.0	±5.0

## 5. Frequency and time weightings at 1 kHz

## 5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

## 5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

## 6. Long - term stability

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.3

S. Petch.

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## 7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	140.0	3.0	± 1.1
136.0	140.0	4.0	± 1.1
135.0	140.0	5.0	± 1.1
134.0	140.0	6.0	± 1.1
133.0	133.1	0.1	± 1.1
132.0	132.1	0.1	± 1.1
131.0	131.1	0.1	± 1.1
129.0	129.1	0.1	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.1	0.1	± 1.1
114.0	114.1	0.1	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.1	0.1	± 1.1
99.0	99.1	0.1	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.1	0.1	± 1.1
29.0	29.1	0.1	± 1.1
28.0	28.2	0.2	± 1.1
27.0	27.1	0.1	± 1.1
26.0	26.2	0.2	± 1.1
25.0	25.3	0.3	± 1.1

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## 8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.2	0.2	±1.1

## 9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

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## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L <sub>peak</sub> (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	132.9	-0.1	±2.0
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

## 11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.5	-0.1	±1.5

## 12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

## INNOVATIVE INSTRUMENT CALIBRATION LAB

INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE

7/139 MOO 15, SOI SUTINSAKORN 11 TAMBON BANG KHAO,

AMPHOE BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND

TEL : 0669-2116-5860-1 FAX: 0669-2116-7140



## Certificate of Calibration

## Customer

Name : ALS Laboratory Group Thailand Co., Ltd.

Address : 104 Soi Phantumakan 40, Phantumakan Road, Sino Luang, Bangkok 10250

Certificate No : 25-SLM-114

Request No : Req-2025-0603

## Unit Under Calibration Details

Measurement item : Sound Level Meter

Manufacturer : RION

Model : NI-42

Serial Number : 01222723

ID : RYG-F50022

Resolution : 0.1 dB

Microphone Class : 2

Microphone Model : UC-52

Microphone S/N : 143841

Preamplifier Model : NH-24

Preamplifier S/N : 22770

Instrument Status : Used

## Calibration Environment and Details

Temperature : 23 °C ± 2 °C

Humidity : 50 %RH ± 20 %RH

Barometric Pressure : 1013 hPa ± 10 hPa

Received Date : 6 March 2025

Calibrated Date : 19 March 2025

Calibration Procedure : In-house method CP-SLM-01, based on IEC 61672-3:2013 Electroacoustics - Sound level meters - Part 3: Periodic tests

Location of Calibration : Lab Acoustic

## Reference Standard

Instrument	Brand	Model	S/N	Due calibration	Traceability
Standard Microphone	Briel & Kjaer	4192	2294985	25 June 2025	NIMT
Audio Generator	Symyx	Svan401	131	15 October 2025	WK Electric

## Note

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

Calibrated By :   
Mr. Noppadol Lungsart  
Service Calibration Engineer

Approved By :   
Mr. Pichit Mathaveen  
Calibration Engineer Supervisor  
Issue Date : 19 March 2025

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

or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate



Certificate No : 25-SLM-114  
Request No : Req/2025-0603

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

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY  (± dB)	Acceptance  Limit  (± ± dB)	Result
FAST / A / 30-130		UUC	ERR	UUC	ERR			
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)			
1000 Hz 94 dB	94.06	94.0	-0.06	94.1	-0.04	0.20	0.30	Pass

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand RION, Model NC-75, SN:35002736

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

UUC Setting	Measured	UNCERTAINTY
FAST / 30-130	(dB)	(dB)
UUC Weighting	(dB)	(dB)
A	15.4	0.10

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

UUC Setting	Measured	UNCERTAINTY
FAST / 30-130	(dB)	(dB)
UUC Weighting	(dB)	(dB)
A	12.2	0.10
C	16.6	0.10
Z	20.4	0.10

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY	Acceptance Limit	Result
	A	C	Z			
	(dB)	(dB)	(dB)			
FAST / 30-130				(± dB)	(± dB)	
STD Setting						
125 Hz	0.3	0.5	0.5	0.60	1.5	Pass
1000 Hz	0.0	0.0	0.0	0.60	1.0	Pass
4000 Hz	0.4	0.4	0.4	0.60	5.0	Pass
8000 Hz	-1.3	-1.3	-1.3	0.70	5.0	Pass

The result is valid only to the item tabulated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FM-30-SLM-60 Rev.01 Issue date 19/02/21

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

UUC Setting		Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
FAST /30-130		A (dB)	C (dB)	Z (dB)			
STD Setting		A (dB)	C (dB)	Z (dB)	0.20	(± dB)	
63 Hz		-0.1	0.0	0.0		2.0	Pass
125 Hz		-0.1	0.0	0.0		1.5	Pass
250 Hz		0.0	0.0	0.0		1.5	Pass
500 Hz		0.0	0.1	0.0		1.5	Pass
1000 Hz		0.0	0.0	0.0		1.0	Pass
2000 Hz		0.0	0.1	0.0		2.0	Pass
4000 Hz		0.0	0.0	0.0		3.0	Pass
8000 Hz		0.1	0.1	0.0		5.0	Pass
16000 Hz		-1.3	-1.3	0.0		15.0	Pass

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

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit	Result
FAST / 30-130	REF	UUC ERR	(dB)	(dB)	
UUC Weighting	(dB)	(dB)	(dB)	(dB)	
A	114.00	114.0	0.0	0.20	Pass
C	114.00	114.0	0.0	0.20	Pass
Z	114.00	114.0	0.0	0.20	Pass

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit	Result
30-130 / A	REF	UUC ERR	(dB)	(dB)	
UUC Time Response	(dB)	(dB)	(dB)	(dB)	
Fast	114.00	114.0	0.0	0.10	Pass
Slow	114.00	114.0	0.0	0.10	Pass
Log	114.00	114.0	0.0	0.10	Pass

The result is valid only to the item tabulated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

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#### 7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit	Result
FAST / A / 30-130	UUC	(dB)	(dB)	
STD Setting	(dB)	(dB)	(dB)	
Initial	114.0			
Final	114.0			
Deviation	0.0	0.10	0.30	Pass

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

UUC Setting	Anticipated	Deviation	UNCERTAINTY	Acceptance Limit	Result
FAST / A / 30-130	REF	UUC ERR	(dB)	(dB)	
STD dB	(dB)	(dB)	(dB)	(dB)	
136.00	136	137.9	-0.1	1.1	Pass
134.00	134	134.0	0.0	1.1	Pass
129.00	129	129.0	0.0	1.1	Pass
124.00	124	124.0	0.0	1.1	Pass
119.00	119	119.0	0.0	1.1	Pass
114.00	114	114.0	0.0	1.1	Pass
109.00	109	109.0	0.0	1.1	Pass
104.00	104	104.0	0.0	1.1	Pass
99.00	99	99.0	0.0	1.1	Pass
94.00	94	94.0	0.0	1.1	Pass
89.00	89	89.0	0.0	1.1	Pass
84.00	84	84.0	0.0	1.1	Pass
79.00	79	79.0	0.0	1.1	Pass
74.00	74	74.0	0.0	1.1	Pass
69.00	69	69.0	0.0	1.1	Pass
64.00	64	64.0	0.0	1.1	Pass
59.00	59	59.0	0.0	1.1	Pass
54.00	54	54.0	0.0	1.1	Pass
49.00	49	49.0	0.0	1.1	Pass
44.00	44	44.0	0.0	1.1	Pass
39.00	39	39.0	0.0	1.1	Pass
34.00	34	34.0	0.0	1.1	Pass
29.00	29	29.1	0.1	1.1	Pass
24.00	24	24.0	0.0	1.1	Pass

The result is valid only to the item tabulated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FM-30-SLM-60 Rev.01 Issue date 19/02/21

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

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit	Result
FAST / A	REF	UUC ERR	(dB)	(dB)	
UUC Range	(dB)	(dB)	(dB)	(dB)	
30-130	29.50	29.7	0.2	1.1	Pass
	114	114.0	0.0	1.1	Pass

#### 10. Tone burst response

UUC Setting		STD	Anticipated	Measured		UNCERTAINTY  (± dB)	Acceptance	Result
A / 30-130		Timeburst	Ref	UUC	ERR		Limit	
UUC Time Response		(ms)	(dB)	(dB)	(dB)		(± dB)	
Fast	200	126.0	126.1	-0.1		0.20	1.0	Pass
	2	109.0	109.0	0.0			+1.0, -2.5	Pass
	0.25	100.0	99.9	-0.1			+1.5, -5.0	Pass
Slow	200	119.6	119.6	0.0			1.0	Pass
	2	100.0	100.0	0.0			+1.0, -5.0	Pass
	0.25	120.0	120.0	0.0			1.0	Pass
SEL	200	100.0	100.0	0.0			+1.0, -2.5	Pass
	2	91.0	90.9	-0.1			+1.5, -5.0	Pass
	0.25	91.0	90.9	-0.1			+1.5, -5.0	Pass

#### 11. Peak C Sound level

11. Peak C Sound level						
UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance Limit	Result
FAST / C / 55-141	REF	UUC	ERR			
STD Setting	(dB)	(dB)	(dB)	( ± dB)	( ± dB)	
Complete cycle	136.4	135.8	-0.60		3.0	Pass
Positive half cycle	135.4	135.2	-0.20	0.20	2.0	Pass
Negative half cycle	135.4	135.2	-0.20		2.0	Pass

The result is valid only to the item tabulated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FM-30-SLM-60 Rev.01 Issue date 19/02/21

Certificate No : 25-SLM-114  
Request No : Req2025-0603

#### 12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit	Result
FAST / A /30-130	UUC	( $\pm$ dB)	( $\pm$ dB)	
STD Setting	(dB)			
Positive one-half cycle	139.5			
Negative one-half cycle	139.4			
Deviated	0.1	0.20	1.5	Pass

#### 13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit	Result
FAST / A /30-130	UUC	( $\pm$ dB)	( $\pm$ dB)	
STD Setting	(dB)			
Initial	129.0			
Final	129.0			
Deviated	0.0	0.10	0.30	Pass

#### Note :

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

\* Acceptance Limit and Maximum-permitted Uncertainty was IEC 61672-1:2013

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

FORM-SLM-01 Rev.03 Issue date 19/01

Certificate No : 25-SLM-114  
Request No : Req2025-0603

#### Decision Rule for Statements of Conformity

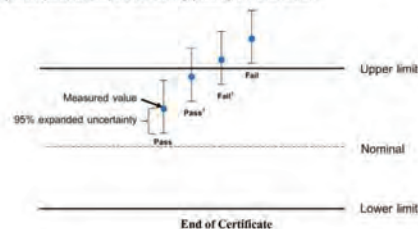
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:2019; Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

Pass - The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass<sup>1</sup> - The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail<sup>1</sup> - The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail - The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



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

FORM-SLM-01 Rev.03 Issue date 19/01

## SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

451-451/1 Srinthorn Road, Bangbunru, Bangkok, 10700 Thailand  
Tel : +66 2433 8331 Email : calibration@sithiporn.com

SITHIPORN  
associates



Cert. No. : ACL25074  
Pages : 1 of 8

## Calibration Certificate

**Equipment :** SOUND LEVEL METER  
**Manufacturer :** RION  
**Model :** NL-42 / Microphone UC-52 / Preamplifier NH-24  
**Serial No.:** 00233183 / 157777 / 22653  
**ID No.:** RYG\_FS0024

**Condition As Found :** GOOD

**Customer :** ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

**Location :** -  
**Ambient Temperature :** ( 23.0  $\pm$  3 ) °C  
**Pressure :** ( 101.3  $\pm$  3 ) kPa  
**Relative Humidity :** ( 50.0  $\pm$  20 ) %

**Received Date :** 07 JANUARY 2025  
**Calibration Date :** 21 - 23 JANUARY 2025  
**Date of Issue :** 24 JANUARY 2025

REVIEW BY *S. S.*  
APPROVED BY *[Signature]*  
NEXT CAL DATE: 21/01/2026

Calibrated by : Nathakorn Pisutpaisan

Approved by :

*T. Petchur*  
( Thanakul Petchurai )

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

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SITHIPORN ASSOCIATES  
CALIBRATION LABORATORY

Cert. No. : ACL25074  
Job No. : VC68AC0059  
Pages : 2 of 8

**Calibration Procedure :** CP-AC-01

#### Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM). The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.  
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

#### Condition of this result of calibration :

##### 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL-BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL-BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

*T. Petchur*



Cert. No. : ACL25074  
Job No. : VC68AC0059  
Pages : 3 of 8

## Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

T. Petch.

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Job No. : VC68AC0059  
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## Result of calibration :

## 1. Absolute sensitivity

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93.94)	93.9	0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value ( dB )
18.2

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

Frequency Weighting	Weighting ( dB )
A - weight	13.1
C - weight	19.2
Flat	24.9

## 3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.7	0.7	0.7	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	0.0	0.0	0.0	±5.0

T. Petch.

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Job No. : VC68AC0059  
Pages : 5 of 8

## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

## 5. Frequency and time weightings at 1 kHz

## 5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

## 5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

## 6. Long - term stability

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.3

T. Petch.

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## 7. Level linearity on the reference level range

Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	132.9	-0.1	± 1.1
132.0	131.9	-0.1	± 1.1
131.0	130.9	-0.1	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.1	0.1	± 1.1
30.0	30.1	0.1	± 1.1
29.0	29.1	0.1	± 1.1
28.0	28.1	0.1	± 1.1
27.0	27.1	0.1	± 1.1
26.0	26.2	0.2	± 1.1
25.0	25.2	0.2	± 1.1

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## 8. Level linearity including the level range control

Range	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
130	29.0	29.1	0.1	±1.1

## 9. Tone burst response

Time Weighting	Tone burst duration, Tb ( ms )	Cycle	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

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## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value ( dB )	Measured Value, L <sub>peak</sub> ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

## 11. Overload indication

Measured value ( dB )		Deviated Value ( dB )	Acceptance Limits ( dB )
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

## 12. High level stability

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor  $k = 2$   
or any value following calculation providing a level of confidence of approximately 95 %

End of Calibration Certificate

T. Petchur

SITHIPORN ASSOCIATES CO., LTD.  
CALIBRATION LABORATORY451-451/1 Sirinthorn Road, Bangbunru, Bangplud, Bangkok, 10700 Thailand  
Tel. +66 2433 8331 Email : calibration@sithiporn.comSITHIPORN  
associatesCert. No. : ACL25075  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24  
Serial No.: 00233184 / 144837 / 23232  
ID No.: RYG\_FS0025

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

Location : -  
Ambient Temperature : ( 23.0 ± 3 ) °C  
Pressure : ( 101.3 ± 3 ) kPa  
Relative Humidity : ( 50.0 ± 20 ) %

Received Date : 07 JANUARY 2025  
Calibration Date : 21 - 23 JANUARY 2025  
Date of Issue : 24 JANUARY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur  
( Thanakul Petchurai )

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced  
other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL25075  
Job No. : VC68AC0059  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

## Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).  
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference  
Standard Instruments.  
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

## Condition of this result of calibration :

## 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL_BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL_BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL_BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

T. Petchur

Cert. No. : ACL25075  
Job No. : VC68AC0059  
Pages : 3 of 8

**Summary of Measurement Result :**

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

*T. Petch*

Cert. No. : ACL25075  
Job No. : VC68AC0059  
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**Result of calibration :****1. Absolute sensitivity**

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93.94)	93.9	0.0	±0.3

**2. Self-generated noise****2.1 Normal test**

Measured Value ( dB )
18.2

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

Frequency Weighting ( dB )	Weighting ( dB )
A - weight	11.6
C - weight	17.8
Flat	23.5

**3. Acoustical signal tests of frequency weightings**

Meter free-field acoustic response at a level of 84 dB

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.4	0.4	0.4	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	-0.4	-0.4	-0.4	±5.0

*T. Petch*

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Job No. : VC68AC0059  
Pages : 5 of 8

**4. Electrical signal tests of frequency weightings**

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.1	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

**5. Frequency and time weightings at 1 kHz****5.1 Frequency weightings at 1 kHz**

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

**5.2 Time weighting at 1 kHz**

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

**6. Long - term stability**

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.3

*T. Petch*

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Job No. : VC68AC0059  
Pages : 6 of 8

**7. Level linearity on the reference level range**

Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.0	0.0	± 1.1
27.0	27.1	0.1	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.1	0.1	± 1.1

*T. Petch*

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Job No. : VC68AC0059  
Pages : 7 of 8

## 8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±1.1

## 9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

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Job No. : VC68AC0059  
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## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

## 11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.5	-0.1	±1.5

## 12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

SITHIPORN ASSOCIATES CO., LTD.  
CALIBRATION LABORATORY45/-45/1 Sirthorn Road, Bangbunru, Bangplud, Bangkok, 10700 Thailand  
Tel. +66 2433 8331 Email : calibration@sithiporn.comCert. No. : ACL25087  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24  
Serial No.: 00734220 / 157226 / 34371  
ID No.: RYG\_FS0026

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

Location : -  
Ambient Temperature : ( 23.0 ± 3 ) °C  
Pressure : ( 101.3 ± 3 ) kPa  
Relative Humidity : ( 50.0 ± 20 ) %

Received Date : 07 JANUARY 2025  
Calibration Date : 27 JANUARY 2025  
Date of Issue : 28 JANUARY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by :

*T. Petchur*  
( Thanakul Petchurai )

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL25087  
Job No. : VC68AC0059  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

## Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM). The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

## Condition of this result of calibration :

## 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL-BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL-BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.  
3. This certificate is traceable to the international system of unit maintained at :

- 3.1 National Institute of Metrology (Thailand).  
3.2 Thailand Institute of Scientific and Technological Research (TISTR).



Cert. No. : ACL25087  
Job No. : VC68AC0059  
Pages : 3 of 8

## Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

T. Petch

Cert. No. : ACL25087  
Job No. : VC68AC0059  
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## Result of calibration :

## 1. Absolute sensitivity

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93.94)	93.9	0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value ( dB )
13.1

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

Frequency Weighting	Weighting ( dB )
A - weight	9.8
C - weight	16.2
Flat	22.1

## 3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	1.5	1.5	1.5	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	-4.2	-4.2	-4.2	±5.0

T. Petch

Cert. No. : ACL25087  
Job No. : VC68AC0059  
Pages : 5 of 8

## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	-0.1	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	-0.1	0.0	0.0	±2.0
4000	-0.1	0.0	-0.1	±3.0
8000	-0.1	0.0	-0.1	±5.0

## 5. Frequency and time weightings at 1 kHz

## 5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

## 5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	93.9	-0.1	± 0.1
Leq	94.0	94.0	0.0	± 0.1

## 6. Long - term stability

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.1	0.1	± 0.3

T. Petch

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Job No. : VC68AC0059  
Pages : 6 of 8

## 7. Level linearity on the reference level range

Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.1	0.1	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.0	0.0	± 1.1
27.0	27.0	0.0	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.0	0.0	± 1.1

T. Petch

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## 8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.8	0.8	±1.1

## 9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

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## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L <sub>peak</sub> (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

## 11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.5	-0.1	±1.5

## 12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

SITHIPORN ASSOCIATES CO., LTD.  
CALIBRATION LABORATORY451-451/1 Sirinthorn Road, Bangbunmu, Bangkok, 10700 Thailand  
Tel. +66 2433 8331 Email : calibration@sithiporn.comCert. No. : ACL25076  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24  
Serial No.: 00734221 / 187363 / 23230  
ID No.: RYG\_FS0027

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHWAEANG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

Location : -  
Ambient Temperature : ( 23.0 ± 3 ) °C  
Pressure : ( 101.3 ± 3 ) kPa  
Relative Humidity : ( 50.0 ± 20 ) %

Received Date : 07 JANUARY 2025  
Calibration Date : 21 - 23 JANUARY 2025  
Date of Issue : 24 JANUARY 2025

REVIEW BY : *Sgt S*  
APPROVED BY : *[Signature]*  
NEXT CAL DATE : 21/01/2026

Calibrated by : Nathakorn Pisutpaisan

Approved by :

*T. Petchur*  
( Thanakul Petchurai )

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL25076  
Job No. : VC68AC0059  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

## Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM). The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

## Condition of this result of calibration :

## 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY33220104	EEL-BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL-BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL-BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Cert. No. : ACL25076  
Job No. : VC68AC0059  
Pages : 3 of 8

**Summary of Measurement Result :**

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

*S. Petch.*

Cert. No. : ACL25076  
Job No. : VC68AC0059  
Page : 4 of 8

**Result of calibration :****1. Absolute sensitivity**

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93.94)	93.9	0.0	±0.3

**2. Self-generated noise****2.1 Normal test**

Measured Value ( dB )
15.4

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

Frequency Weighting ( dB )	Weighting ( dB )
A - weight	12.0
C - weight	17.9
Flat	23.8

**3. Acoustical signal tests of frequency weightings**

Meter free-field acoustic response at a level of 84 dB

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.4	0.4	0.4	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	2.1	2.1	2.1	±5.0

*S. Petch.*

Cert. No. : ACL25076  
Job No. : VC68AC0059  
Pages : 5 of 8

**4. Electrical signal tests of frequency weightings**

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.1	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

**5. Frequency and time weightings at 1 kHz****5.1 Frequency weightings at 1 kHz**

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

**5.2 Time weighting at 1 kHz**

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

**6. Long - term stability**

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.3

*S. Petch.*

Cert. No. : ACL25076  
Job No. : VC68AC0059  
Pages : 6 of 8

**7. Level linearity on the reference level range**

Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	53.9	-0.1	± 1.1
49.0	49.0	0.0	± 1.1
44.0	43.9	-0.1	± 1.1
39.0	38.9	-0.1	± 1.1
34.0	33.9	-0.1	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

*S. Petch.*



Cert. No. : ACL25076  
Job No. : VC68AC0059  
Pages : 7 of 8

## 8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	28.9	-0.1	±1.1

## 9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

*S. Pichan*Cert. No. : ACL25076  
Job No. : VC68AC0059  
Pages : 8 of 8

## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L <sub>peak</sub> (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

## 11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.6	0.1	±1.5

## 12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

*S. Pichan*Cert. No. : ACL25314  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RJON  
Model : NI-42 / Microphone UC-52 / Preamplifier NH-24  
Serial No.: 00734223 / 169439 / 72460  
ID No.: RYG\_PS0029

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

Location : -  
Ambient Temperature : ( 23.0 ± 3 ) °C  
Pressure : ( 101.3 ± 3 ) kPa  
Relative Humidity : ( 50.0 ± 20 ) %

Received Date : 04 AUGUST 2025  
Calibration Date : 18-19 AUGUST 2025  
Date of Issue : 20 AUGUST 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by : *Wichok Ekpongpradit*  
( Wichok Ekpongpradit )

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Cert. No. : ACL25314  
Job No. : VC68AC0162  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

## Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM). The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

## Condition of this result of calibration :

## 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0011-25	11-FEB-26
Waveform Generator	33511B	MY52302742	EF-0012-25	11-FEB-26
Digital Multimeter	33461A	MY53220104	EEL_BP 24/0268	22-APR-26
Digital Multimeter	33461A	MY53220076	EEL_BP 23/0268	22-APR-26
Digital Multimeter	34461A	MY60024273	CA2025120EA	18-MAR-26
Programmable Attenuator	MAT-1070	62100114	EF-0006-25	11-FEB-26
Condenser Microphone	4180	2977900	AA-1002-25	19-FEB-26
Measuring Amplifier	NA-42KAI	34560495	AA-3002-25	19-FEB-26

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).
- 3.3 Electrical And Electronics Institute (EEI).

*Wichok Ekpongpradit*

Cert. No. : ACL25314  
Job No. : VC68AC0162  
Pages : 3 of 8

## Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

MICHAEL B.

Cert. No. : ACL25314  
Job No. : VC68AC0162  
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## Result of calibration :

## 1. Absolute sensitivity

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93,94)	93.9	0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value ( dB )
13.5000003

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

Frequency Weighting	Weighting ( dB )
A - weight	9.9
C - weight	16.6
Flat	22.1

## 3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.6	0.7	0.7	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	-1.6	-1.6	-1.6	±5.0

MICHAEL B.

Cert. No. : ACL25314  
Job No. : VC68AC0162  
Pages : 5 of 8

## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

## 5. Frequency and time weightings at 1 kHz

## 5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

## 5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

## 6. Long - term stability

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.1	0.1	± 0.3

MICHAEL B.

Cert. No. : ACL25314  
Job No. : VC68AC0162  
Pages : 6 of 8

## 7. Level linearity on the reference level range

Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

MICHAEL B.

Cert. No. : ACL25314  
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## 8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	28.9	-0.1	±1.1

## 9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.0 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
SEL	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

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## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L <sub>peak</sub> (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.1	0.1	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

## 11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

## 12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

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

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CALIBRATION LABORATORY451-451/1 Sirinthorn Road, Bangbunru, Bangkok, 10700 Thailand  
Tel. +66 2433 8331 Email: calibration@sithiporn.comCert. No. : ACL24421  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24  
Serial No.: 00623390 / 198637 / 26418  
ID No.: RYG\_FS0615

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

Location : -  
Ambient Temperature : ( 23.0 ± 3 ) °C  
Pressure : ( 101.3 ± 3 ) kPa  
Relative Humidity : ( 50.0 ± 20 ) %

Received Date : 12 DECEMBER 2024  
Calibration Date : 23 - 24 DECEMBER 2024  
Date of Issue : 26 DECEMBER 2024

Calibrated by : Nathakorn Pisutpaisan

Approved by :

*T. Petchurai*  
( Thanakul Petchurai )

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Job No. : VC68AC0051  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

## Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).  
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.  
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

## Condition of this result of calibration :

## 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL-BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL-BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

*T. Petchurai*



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**Summary of Measurement Result :**

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

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**Result of calibration :**

**1. Absolute sensitivity**

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93.94)	93.9	0.0	±0.3

**2. Self-generated noise**

**2.1 Normal test**

Measured Value ( dB )
14.6

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

Frequency Weighting	Weighting ( dB )
A - weight	13.1
C - weight	19.5
Flat	24.8

**3. Acoustical signal tests of frequency weightings**

Meter free-field acoustic response at a level of 84 dB

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.5	0.5	0.5	± 1.5
1000	0.2	0.2	0.2	± 1.0
8000	0.0	0.0	0.0	±5.0

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Job No. : VC68AC0051  
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**4. Electrical signal tests of frequency weightings**

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	-0.1	±2.0
125	0.0	0.0	-0.1	±1.5
250	0.0	0.0	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

**5. Frequency and time weightings at 1 kHz**

**5.1 Frequency weightings at 1 kHz**

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

**5.2 Time weighting at 1 kHz**

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

**6. Long - term stability**

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.3

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**7. Level linearity on the reference level range**

Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	132.9	-0.1	± 1.1
132.0	131.9	-0.1	± 1.1
131.0	130.9	-0.1	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	27.0	0.0	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

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**8. Level linearity including the level range control**

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±1.1

**9. Tone burst response**

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

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**10. Peak C sound level**

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

**11. Overload indication**

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.6	0.0	±1.5

**12. High level stability**

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

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

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Cert. No. : ACL24422  
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**Calibration Certificate**

**Equipment :** SOUND LEVEL METER  
**Manufacturer :** RION  
**Model :** NL-42A / Microphone UC-52 / Preamplifier NH-24  
**Serial No.:** 00623391 / 198638 / 26419  
**ID No.:** RYG\_FS0616

**Condition As Found :** GOOD

**Customer :** ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

**Location :** -  
**Ambient Temperature :** ( 23.0 ± 3 ) °C  
**Pressure :** ( 101.3 ± 3 ) kPa  
**Relative Humidity :** ( 50.0 ± 20 ) %

**Received Date :** 12 DECEMBER 2024  
**Calibration Date :** 23 - 24 DECEMBER 2024  
**Date of Issue :** 26 DECEMBER 2024

**Calibrated by :** Nathakorn Pisutpaisan

**Approved by :**

*T. Petchur*  
( Thanakul Petchurai )

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Cert. No. : ACL24422  
Job No. : VC68AC0051  
Pages : 2 of 8

**Calibration Procedure :** CP-AC-01

**Calibration Method :**

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).  
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.  
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

**Condition of this result of calibration :**

**1. Reference Standard Instruments :**

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL_BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL_BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL_BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

*T. Petchur*



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**Summary of Measurement Result :**

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

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**Result of calibration :**

**1. Absolute sensitivity**

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93.94)	93.9	0.0	±0.3

**2. Self-generated noise**

**2.1 Normal test**

Measured Value ( dB )
15.7

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

Frequency Weighting	Weighting ( dB )
A - weight	14.8
C - weight	21.3
Flat	26.9

**3. Acoustical signal tests of frequency weightings**

Meter free-field acoustic response at a level of 84 dB

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.6	0.6	0.6	± 1.5
1000	0.2	0.2	0.2	± 1.0
8000	-0.7	-0.6	-0.6	± 5.0

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**4. Electrical signal tests of frequency weightings**

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	0.0	±2.0
125	0.0	0.0	-0.1	±1.5
250	0.0	0.0	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

**5. Frequency and time weightings at 1 kHz**

**5.1 Frequency weightings at 1 kHz**

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

**5.2 Time weighting at 1 kHz**

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

**6. Long - term stability**

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.3

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Job No. : VC68AC0051  
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**7. Level linearity on the reference level range**

Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.0	0.0	± 1.1
27.0	27.0	0.0	± 1.1
26.0	26.0	0.0	± 1.1
25.0	24.9	-0.1	± 1.1

*7. Petch*

**SITHIPORN ASSOCIATES CO., LTD.**  
**CALIBRATION LABORATORY**

451-451/1 Sirinthorn Road, Bangbunru, Bangkok, 10700 Thailand  
Tel. +66 2433 8331 Email : calibration@sithiporn.com

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Cert. No. : ACL24422  
Job No. : VC68AC0051  
Pages : 7 of 8

**8. Level linearity including the level range control**

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.4	0.4	±1.1

**9. Tone burst response**

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

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Cert. No. : ACL24422  
Job No. : VC68AC0051  
Pages : 8 of 8

**10. Peak C sound level**

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L <sub>peak</sub> (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

**11. Overload indication**

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

**12. High level stability**

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

**SITHIPORN ASSOCIATES CO., LTD.**  
**CALIBRATION LABORATORY**

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Cert. No. : ACL25079  
Pages : 1 of 8

**Calibration Certificate**

**Equipment :** SOUND LEVEL METER  
**Manufacturer :** RION  
**Model :** NL-42A/ Microphone UC-52 / Preamplifier NH-24  
**Serial No.:** 00623394 / 198641 / 26422  
**ID No.:** RYG\_FS0619

**Condition As Found :** GOOD

**Customer :** ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

**Location :**  
**Ambient Temperature :** ( 23.0 ± 3 ) °C  
**Pressure :** ( 101.3 ± 3 ) kPa  
**Relative Humidity :** ( 50.0 ± 20 ) %

**Received Date :** 07 JANUARY 2025  
**Calibration Date :** 21 - 23 JANUARY 2025  
**Date of Issue :** 24 JANUARY 2025

REVIEW BY .....  
APPROVED BY .....  
NEXT CAL DATE..... 21/ 01/ 2026

Calibrated by : Nathakorn Pisutpaisan

Approved by :  
( Thanakul Petchurai )

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

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CALIBRATION LABORATORY

**Calibration Procedure :** CP-AC-01

**Calibration Method :**

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).  
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.  
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

**Condition of this result of calibration :**

**1. Reference Standard Instruments :**

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL_BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL_BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL_BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.  
3. This certificate is traceable to the international system of unit maintained at :  
3.1 National Institute of Metrology (Thailand).  
3.2 Thailand Institute of Scientific and Technological Research (TISTR).

T. Petchurai

Cert. No. : ACL25079  
Job No. : VC68AC0059  
Pages : 3 of 8

**Summary of Measurement Result :**

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

*T. Petch*

Cert. No. : ACL25079  
Job No. : VC68AC0059  
Page : 4 of 8

**Result of calibration :****1. Absolute sensitivity**

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93.94)	93.9	0.0	±0.3

**2. Self-generated noise****2.1 Normal test**

Measured Value ( dB )
14.6

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

Frequency Weighting	Weighting ( dB )
A - weight	12.6
C - weight	19.1
Flat	24.5

**3. Acoustical signal tests of frequency weightings**

Meter free-field acoustic response at a level of 84 dB

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.4	0.4	0.4	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	0.1	0.1	0.1	±5.0

*T. Petch*

Cert. No. : ACL25079  
Job No. : VC68AC0059  
Pages : 5 of 8

**4. Electrical signal tests of frequency weightings**

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

**5. Frequency and time weightings at 1 kHz****5.1 Frequency weightings at 1 kHz**

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

**5.2 Time weighting at 1 kHz**

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

**6. Long - term stability**

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.3

*T. Petch*

Cert. No. : ACL25079  
Job No. : VC68AC0059  
Pages : 6 of 8

**7. Level linearity on the reference level range**

Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.1	0.1	± 1.1
30.0	30.1	0.1	± 1.1
29.0	29.1	0.1	± 1.1
28.0	28.1	0.1	± 1.1
27.0	27.1	0.1	± 1.1
26.0	26.1	0.1	± 1.1
25.0	25.1	0.1	± 1.1

*T. Petch*



Cert. No. : ACL25079  
Job No. : VC68AC0059  
Pages : 7 of 8

## 8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	28.9	-0.1	±1.1

## 9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

T. Petchur

Cert. No. : ACL25079  
Job No. : VC68AC0059  
Pages : 8 of 8

## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L <sub>peak</sub> (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	132.9	-0.1	±2.0
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

## 11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.6	0.1	±1.5

## 12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

T. Petchur

Cert. No. : ACL25112  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24  
Serial No. : 00623396 / 198643 / 26424  
ID No. : RYG\_FS0621

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,  
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,  
BANGKOK, 10250 THAILAND.

Location :  
Ambient Temperature : ( 23.0 ± 3 ) °C  
Pressure : ( 101.3 ± 3 ) kPa  
Relative Humidity : ( 50.0 ± 20 ) %

Received Date : 14 JANUARY 2025  
Calibration Date : 27-29 JANUARY 2025  
Date of Issue : 30 JANUARY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur  
( Thanakul Petchurai )

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Cert. No. : ACL25112  
Job No. : VC68AC0064  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

## Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM). The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

## Condition of this result of calibration :

## 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL_BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL_BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL_BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.  
3. This certificate is traceable to the international system of unit maintained at :  
3.1 National Institute of Metrology (Thailand).  
3.2 Thailand Institute of Scientific and Technological Research (TISTR).

T. Petchur

Cert. No. : ACL25112  
Job No. : VC68AC0064  
Pages : 3 of 8

## Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

T. Retch.

Cert. No. : ACL25112  
Job No. : VC68AC0064  
Page : 4 of 8

## Result of calibration :

## 1. Absolute sensitivity

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93.94)	93.9	0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value ( dB )
14.8

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

Frequency Weighting ( dB )	Weighting ( dB )
A - weight	11.3
C - weight	18.9
Flat	24.4

## 3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	0.6	0.6	0.6	±5.0

T. Retch.

Cert. No. : ACL25112  
Job No. : VC68AC0064  
Pages : 5 of 8

## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.1	0.1	±2.0
125	0.1	0.1	0.1	±1.5
250	0.1	0.1	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

## 5. Frequency and time weightings at 1 kHz

## 5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

## 5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

## 6. Long - term stability

Frequency Weighting	SLM Display at initial ( dB )	SLM Display at final ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
A - weight	94.0	94.1	0.1	± 0.3

T. Retch.

Cert. No. : ACL25112  
Job No. : VC68AC0064  
Pages : 6 of 8

## 7. Level linearity on the reference level range

Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.1	0.1	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.1	0.1	± 1.1
27.0	27.1	0.1	± 1.1
26.0	26.2	0.2	± 1.1
25.0	25.1	0.1	± 1.1

T. Retch.

Cert. No. : ACL25112  
Job No. : VC68AC0064  
Pages : 7 of 8

## 8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.1	0.1	±1.1

## 9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

Cert. No. : ACL25112  
Job No. : VC68AC0064  
Pages : 8 of 8

## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L <sub>peak</sub> (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

## 11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle	0.0	±1.5
89.6	89.6		

## 12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

Z. Petch.

Z. Petch.

## CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research

DATE OF ISSUE 13 February 2025 CERTIFICATE NUMBER 232797

Cirrus Research  
Acoustic House  
Bridlington Road  
Hunmanby  
North Yorkshire  
YO14 0PH  
United Kingdom

Page 1 of 2

Approved signatory  
R. Thomas  
Electronically signed:

R. Thomas

## doseBadge Reader : IEC 60942:2003

## Instrument information

Manufacturer: Cirrus Research plc

Notes:

Model: RC:110A

Serial number: 73729

Class: 2

## Test summary

Date of calibration: 12 February 2025

The doseBadge reader detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC60942\_2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

The doseBadge Reader has been shown to conform to the Class 2 requirements for periodic testing, described in Annex B of IEC 60942:2003 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

However, as public evidence was not available, from a testing organisation responsible for pattern approval, to demonstrate that the model of doseBadge Reader conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, no general statement or conclusion can be made about conformance of the doseBadge Reader to the requirements of IEC 60942:2003.

Notes:

REVIEW BY *SJS*  
APPROVED BY *[Signature]*  
NEXT CAL DATE: 11/02/2026

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a coverage probability of approximately 95%.

## CERTIFICATE OF CALIBRATION

Certificate Number:  
232797

Page 2 of 2

## Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 101.42 kPa Temperature: 25.1 °C Humidity: 33.1 %  
After Pressure: 101.42 kPa Temperature: 25.2 °C Humidity: 35.9 %

## Test equipment

Equipment	Manufacturer	Model	Serial number
Distortion Meter	Keithley	2015	1063074
Environmental Monitor	Comet	T7510	21962628

## Initial Acoustic Results

	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Tolerance	Uncertainty
Level (dB)	114.00	112.51	112.45	112.61	112.52	-1.48	±0.75	0.11 dB
Distortion (%)	< 4.00	1.46	1.70	2.01	1.72	1.72	+4.00	0.13 %
Frequency (Hz)	1000.0	998.2	998.2	998.2	998.2	-1.8	±20.0	0.1 Hz

The measured quantities or deviations (as applicable), extended by the expanded combined uncertainty of measurement, must not exceed the corresponding tolerance.

## Adjusted Acoustic Results

	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Tolerance	Uncertainty
Level (dB)	114.00	114.00	113.99	114.01	114.00	0.00	±0.75	0.11 dB
Distortion (%)	< 4.00	0.97	0.96	0.95	0.96	0.96	+4.00	0.13 %
Frequency (Hz)	1000.0	998.1	998.1	998.1	998.1	-1.9	±20.0	0.1 Hz

## Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

End of results



## CALIBRATION REPORT

Page 1 of 1 Pages

**MEASUREMENT ITEM**  
MANUFACTURER : Dose meter  
MODEL/TYPE : Cirrus Research plc  
SERIAL NUMBER : CR-110AIS  
ID NUMBER : YF480  
CONDITION AS-RECEIVED : RYG\_FS0041  
CUSTOMER : Used item  
ALS laboratory group (Thailand) Co., Ltd.  
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,  
Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE : 16 Sep 2024  
MEASUREMENT DATE : 17 Sep 2024  
ISSUE DATE : 18 Sep 2024

### ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:  
Temperature : 23.0 ± 3.0 °C  
Relative Humidity : 55.0 ± 15.0 %RH  
Atmospheric Pressure : 1010 ± 10 hPa

### PRECONDITIONING

: The dose meter (Unit Under Calibration) was preconditioning 24 hours at ambient conditions prior to calibration being performed.

### STANDARD USED DURING CALIBRATION:

Instrument name: doseBadge Reader Manufacturer: Cirrus Research plc Model: RC-110A Serial number: 81051  
Remark: doseBadge Reader Unit with Internal Acoustic Calibrator to IEC 60942: 2003 Class 2.

### CALIBRATION RESULTS

Table 1: The results of dose meter calibration are reported in the table below.

DoseBadge Reader Level <sup>1</sup> (dB)	Noise Dosimeter reading <sup>2</sup> (dB)	Error (dB)	Status
114.0	114.0	0.0	✓

### Calibrated by:

[1] Mr. Sorawit Thachalad  
[2] Miss Jitraporn Lertsomphol



### Approved signatory:

*[Signature]*  
Mr. Parinya Booncharoen  
Calibration Department Manager

### Remark:

<sup>1</sup> The model level of standard doseBadge reader that supplied to Unit Under Calibration.  
<sup>2</sup> The measurement reading of Unit Under Calibration.

THIS CALIBRATION REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

## CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 14 March 2025 CERTIFICATE NUMBER 235796



Cirrus Research plc  
Acoustic House  
Bridlington Road  
Hunnamby  
North Yorkshire  
YO14 0PH  
United Kingdom

Page 1 of 6

Approved signatory  
N. Smith  
Electronically signed:  
*[Signature]*

## Dosimeter : IEC 61252-1993+A1:2000

### Instrument information

Manufacturer: Cirrus Research plc Notes:  
Model: CR-110AIS  
Serial number: YG571  
Firmware version: 5.2

### Test summary

Date of calibration: 14 March 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

### Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDEX6R4732
Attenuator	Cirrus Research	ZE-952	64370
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC-110A	100498

### Notes

REVIEW BY *[Signature]*  
APPROVED BY *[Signature]*  
NEXT CAL DATE: 13/ 03/ 2026

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

## CERTIFICATE OF CALIBRATION

Certificate Number:  
235796  
Page 2 of 6

### Environmental conditions

The following conditions were recorded at the time of the test:

**Before** Pressure: 100.55 kPa Temperature: 22.3 °C Humidity: 41.6 %  
**After** Pressure: 100.59 kPa Temperature: 22.3 °C Humidity: 42.1 %

### Test results summary

Test	Result
Absolute Acoustic Sensitivity	Complies
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies

## CERTIFICATE OF CALIBRATION

Certificate Number:  
235796  
Page 3 of 6

### Laboratory uncertainties

Requirement	Value
Absolute acoustic sensitivity	0.2 dB
Level linearity	0.15 dB
Short duration signals	0.2 dB
Overload latching indication	0.2 dB
Electrical freq. weighting 125 Hz	0.15 dB
Electrical freq. weighting 8 kHz	0.15 dB

# CERTIFICATE OF CALIBRATION

Certificate Number:  
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## B1: Absolute Acoustical Sensitivity

Frequency: 1000 Hz      Uncertainty: 0.2 dB

Name	Input Level (dB)	Reading (dB)	Deviation (dB)	Limits (dB)
Initial	114	114.50	-0.5	113 / 115
Adjusted	114	114.00	0	113 / 115

Result: **Passed**

## B2: Linearity Of Response To Steady Signals

Result: **Passed**

Frequency: 1000 Hz      Uncertainty: 0.2 dB      Range: 80 – 130 dB

Input Level (dB)	Expected Exposure (Pa <sup>2</sup> h)	Exposure (Pa <sup>2</sup> h)	Duration (s)	Deviation (Pa <sup>2</sup> h)	Limits (Pa <sup>2</sup> h)	Deviation (%)	Limits (%)
80	0.000222	0.000273	20	-0.000051	0.000175 / 0.000280	23	-21 / +26
90	0.002222	0.002172	20	0.000050	0.001755 / 0.002800	-2	-21 / +26
100	0.022222	0.020739	20	0.001483	0.017555 / 0.028000	-7	-21 / +26
110	0.222222	0.207390	20	0.014832	0.175555 / 0.280000	-7	-21 / +26
120	2.222222	2.073898	20	0.148324	1.755555 / 2.800000	-7	-21 / +26
130	22.222223	21.222058	20	1.000165	17.555556 / 28.000001	-5	-21 / +26

# CERTIFICATE OF CALIBRATION

Certificate Number:  
235796

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## B3: Frequency Weightings

Result: **Passed**

Reference Frequency: 1000 Hz      Reference Exposure: 5.1970572512568  
Reference Input Level: 127 dB      Duration: 10 Seconds

Frequency (Hz)	Exposure (Pa <sup>2</sup> h)	Exposure Ratio	Ratio Limit	Uncertainty
125	0.127573	0.0245	0.0174 / 0.0347	0.15
8000	2.166494	0.4169	0.246 / 2.455	0.15

## B4: Short-Duration Signals

Result: **Passed**

Uncertainty: 0.2 dB      Frequency: 4000 Hz

Input Level (dB)	Burst Level (dB)	Ratio	Duration (s)	Burst Duration (ms)	Duration Between Bursts (ms)	Expected Exposure (Pa <sup>2</sup> h)	Exposure (Pa <sup>2</sup> h)	Deviation (%)	Limits (%)
114	95	1:100	10	10	990	0.003279	0.003060	-7	-21 / +26
129	100	1:1000	10	1	999	0.010369	0.009242	-11	-29 / +41

# CERTIFICATE OF CALIBRATION

Certificate Number:  
235796

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## B6: Latching Overload Indicator

Result: **Passed**

Frequency: 1000 Hz      Uncertainty: 0.2 dB

Level (dB)	Expected To Overload	Overloaded
130	No	No
133	Yes	Yes

INNOVATIVE INSTRUMENT CALIBRATION LAB

INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE  
7 JIRAMORO 13 SOI SINTSINAKORN 11 TAMBON BANG KATOL  
AMPHOE BANG PHU SAKUNTHARAKHON PROVINCE 10540 THAILAND  
TEL: 0660-2116-5889 FAX: 0660-2116-7140



## Certificate of Calibration

### Customer

Name : ALS Laboratory Group Thailand Co., Ltd.  
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang,  
Bangkok 10250

Certificate No : 24-AFM-179

Request No : Req-2024-1987

### Unit Under Calibration Details

Measurement Item : Air Flow Meter  
Manufacturer : MesaLabs  
Model : Defender 510-M  
Serial Number : 151114  
ID : BKK\_FS0614

Accuracy : 1% of Reading

Sensor Model : -

Sensor Serial Number : -

Instrument Status : Used

Location of Calibration : LAB 4 AIR VELOCITY METER

### Calibration Environment and Details

Temperature : 23 °C ± 3 °C  
Humidity : 55 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 30 August 2024  
Calibration Date : 9 September 2024

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	1850101006	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	2 August 2025
Temperature meter	GT 11	080000957	Qreborn	1 March 2025
Pressure meter	CPG2400	41006KDU/651882	TPA	9 November 2024

### Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

### Note :

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

Calibration By : Mr. Noppadon Luangni  
Service Calibration Engineer

Approved By : Mr. Paitit Mathavorn  
Calibration Engineer Supervisor  
Issue Date : 9 September 2024



End of results

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

FM-708-AFM-01 Rev 04 Issue date 17/6/24



Certificate No : 24-AFM-179

Request No : Req-2024-1987

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
24.70	100.95	100	100.41	0.4	2.8	1.0	N/A
24.90	100.90	502	500.47	-1.5	7.1	5.0	N/A
24.90	100.97	1003	1001.3	-2	14	10.0	N/A
25.00	100.92	2014	2009.9	-4	29	20.1	N/A
25.20	101.03	5043	5058.3	15	44	30.4	N/A
25.30	101.10	4043	4005.1	-38	57	40.4	N/A
25.50	101.15	5052	5003.9	-48	74	50.5	N/A

Note : STD : Standard UUC : Unit Under Calibration  
- UUC Reference Condition : At atmospheric pressure and room temperature condition  
- Flow Rate was corrected for non-standard operating condition by using equation :

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

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

\* Indicates non accredited

MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)

N/A = Not Available, Customer does not require a statement of conformity.

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

FM-708-AFM-01 Rev.04 Issue date 17/6/24

Certificate No : 24-AFM-179

Request No : Req-2024-1987

Decision Rule for Statements of Conformity

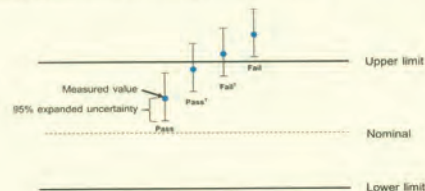
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:2019: Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass<sup>1</sup> = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail<sup>1</sup> = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Certificate

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

FM-708-AFM-01 Rev.04 Issue date 17/6/24

Certificate of Calibration

Certificate No : 24-AFM-177

Request No : Req-2024-1862

Customer

Name : ALS Laboratory Group Thailand Co., Ltd.  
Address : 104 Soi Phantanaikan 40, Phantanaikan Road, Suan Luang,  
Bangkok 10250

Unit Under Calibration Details

Measurement Item : Air Flow Meter  
Manufacturer : Bios  
Model : Defender 510-L  
Serial Number : 130026  
ID : BKK\_FS0619  
Location of Calibration : LAB 4 AIR VELOCITY METER

Accuracy : 1% of Reading

Sensor Model : -

Sensor Serial Number : -

Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 3 °C  
Humidity : 55 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 22 August 2024  
Calibration Date : 9 September 2024

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	1850101006	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	2 August 2025
Temperature meter	GT 11	080000057	Qreborn	1 March 2025
Pressure meter	CPG2400	41000KDU651882	TPA	9 November 2024

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

Note :

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

Calibration By : Mr. Noppadon Luangrat  
Service Calibration Engineer

Approved By : Mr. Pacit Muliavom  
Calibration Engineer Supervisor  
Issue Date : 9 September 2024

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

FM-708-AFM-01 Rev.04 Issue date 17/6/24

Certificate No : 24-AFM-177

Request No : Req-2024-1862

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
24.70	100.92	20	20.192	0.2	1.3	0.2	N/A
24.70	100.90	100	99.923	-0.1	2.8	1.0	N/A
24.70	100.94	201	200.7	-0.3	5.6	2.0	N/A
24.70	100.97	298	290.1	-2.1	8.4	3.0	N/A
24.70	100.99	403	399.1	-4	11	4.0	N/A
24.80	101.05	482	477.6	-4.4	6.9	4.8	N/A

Note : STD : Standard UUC : Unit Under Calibration  
- UUC Reference Condition : At atmospheric pressure and room temperature condition  
- Flow Rate was corrected for non-standard operating condition by using equation :

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

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

\* Indicates non accredited

MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)

N/A = Not Available, Customer does not require a statement of conformity.

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

FM-708-AFM-01 Rev.04 Issue date 17/6/24





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where the world's best equipment lives



Page 3/3

Certificate No : 24-AFM-177  
Request No : Req-2024-1862

#### Decision Rule for Statements of Conformity

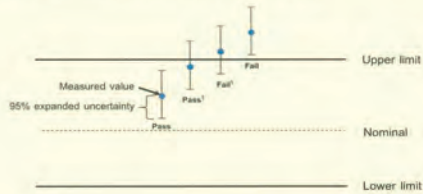
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:2019: Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

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Fail<sup>1</sup> = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Certificate

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FM-708-AFM-01 Rev.04 Issue date 17/6/24

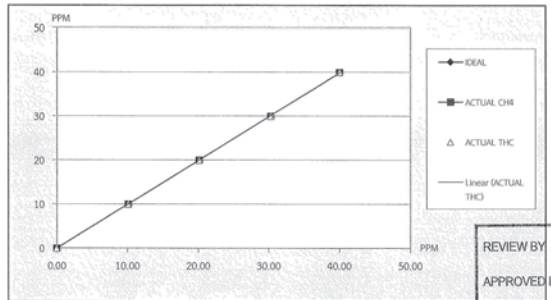


#### TEST REPORT

CUSTOMER NAME	ALS Laboratory Group (Thailand) Co., Ltd. (บริษัท แอลเอส แลบริทอรี กรุ๊ป (ประเทศไทย) จำกัด)		
EQUIPMENT NAME	THC Analyzer		
MANUFACTURER	HORIBA	MODEL	APHA-370
SERIAL NO	U430GTHB		
STANDARD GAS CONCENTRATION (PPM) (CH4)	506.1 PPM	CYLINDER NO	CC734373
CYLINDER PRESSURE (psig)	1,600 PSI	CERTIFIED DATE	12/05/2020
CERTIFIED BY	AIRGAS	EXPIRED DATE	12/05/2028

#### TEST RESULTS

POINT NO	TEST RESULTS					
	IDEAL	ACTUAL CH4	ERROR CH4	MINOR CH4	ACTUAL THC	ERROR THC
ZERO	0.00	0.00	0.00	-	0.00	0.00
1	10.00	10.05	0.05	0.50	10.05	0.05
2	20.00	20.10	0.10	0.50	20.12	0.12
3	30.00	30.29	0.29	0.97	30.27	0.27
4	40.00	40.01	0.01	0.02	40.02	0.02
AVERAGE (%)				0.50		0.51



REVIEW BY: Thanat U.  
APPROVED BY: [Signature]  
NEXT CAL. DATE: 6/03/2026

CALIBRATED BY: [Signature] DATE: 6/3/68  
CHECKED BY: [Signature] DATE: 6/3/68

สำหรับการใช้งานทางด้านเทคนิคเพิ่มเติม: เจ้าหน้าที่ฝ่ายบริการลูกค้า, โทร 02-868-0812 # 15,16, E-Mail: Engineer@jnanatee.com  
เลขที่ 63/14-15,6/735-36 ถนนพหลโยธิน 7/71 แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889

FO-FM-206 R01/22-10-14



#### CHECK LIST

CUSTOMER NAME	ALS Laboratory Group (Thailand) Co., Ltd. (บริษัท แอลเอส แลบริทอรี กรุ๊ป (ประเทศไทย) จำกัด)		
EQUIPMENT NAME	THC Analyzer		
MANUFACTURER	HORIBA	MODEL	APHA-370
SERIAL NO.	U430GTHB		

TEST VALUES			
NO.	THC Analyzer (APHA - 370)	UNIT	
1	Signal ( CH4 )	mV	35.50 35.40
2	Signal ( THC )	mV	38.40 50.10
3	Detector	Temp °C, Standard Value : Ambient temp(5°Cto15°C)	45.20 45.80
4	Ambient	Pressure kPa, Standard Value : (Ambient/1013x100-20)+4kPa	69.50 69.50
5	Purifier	kPa current atmospheric pressure	100.60 100.50
6	NMHC	°C, Standard Value : 390 °C to 430 °C	419.90 419.80
7	DC 24 V	kPa, Normal value : 8 kPa to 25 kPa	9.70 9.70
8	DC 5 V	°C, Standard Value : 230 °C to 260 °C	244.00 244.10
9	Bypass (Optional)	V, Standard Value : 24 V ± 0.5 V	23.90 23.90
10	Over Flow (Optional)	V, Standard Value : 5 V ± 0.5 V	5.00 5.00
11	CH4 Sampling Reading	L/min, Normal value : 0.9 L/min ± 0.3 L/min	- -
12	NMHC Sampling Reading	L/min, Standard Value : 0.8 L/min or More	- -
13	THC Sampling Reading	PPM	2.08 2.07
14	Zero Gas CH4/THC	PPM	0.06 0.75
15	Span Gas	PPM	2.14 2.82
16	G Gas H2	PPM	0.02/0.02 0.00/0.00
17	G Gas H2	PPM	39.64/39.70 40.01/40.02
18	G Gas H2	20 PSI	20 20

Remark : Reference EX-EN-017-56, Ambient HC Monitor APHA-370 Operation Manual Page #81

Remark : ( Ambient temperature = 5°C to 40°C )

#### รายการที่ตรวจพบ

- Service Maintenance

#### รายละเอียดการดำเนินการ

- ทำการ Service Maintenance , ทำ Calibration Zero/Span, Multipoint

#### ผลการดำเนินการ

- เขียนร้อย เครื่องสามารถดำเนินการตรวจวัดได้ตามปกติ

CALIBRATED BY: [Signature] DATE: 6/3/68  
CHECKED BY: [Signature] DATE: 6/3/68



สำหรับการใช้งานทางด้านเทคนิคเพิ่มเติม: เจ้าหน้าที่ฝ่ายบริการลูกค้า, โทร 02-868-0812 # 15,16, E-Mail: Engineer@jnanatee.com

เลขที่ 63/14-15,6/735-36 ถนนพหลโยธิน 7/71 แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889



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



#### Certificate of Calibration

Cert.No.: 25CH847  
Page.: 1 of 3

Equipment :  
Manufacturer :  
Model :  
Serial No. :  
ID No. :  
Condition As-Received:

pH Meter  
Mettler Toledo  
SevenCompact S220  
C104059460  
RYG\_EN0183

Received Date :  
Calibration Date :

Used Item  
17 July 2025  
18 July 2025

Reference :  
Submitted by :

2507-0561DSC-3  
ALS Laboratory Group (Thailand) Co.,Ltd.  
Rayong Branch  
616/10 Moo 5, T.Maenam Khu,  
A.Pluckdaeng, 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 :

Walalak Sirinthan

Approved by :

[Signature]  
Approved Signatory

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

Issue Date :

21 July 2025

The Uncertainties are for a confidence probability of approximately 95%

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Cert.No.: 25CH847  
Page.: 2 of 3

#### Condition of this calibration result

##### 1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	24E2759	25 Aug 2025
2) Ref. Standard Thermometer	3240076	60RC033	25I394	01 Apr 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 CPA chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.007	CPA chem	1066665	18 Jan 2027
pH 6.965	CPA chem	1066667	18 Jan 2026
pH 10.010	CPA chem	1114385	08 June 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	mV	pH		
pH Meter S/N.: C104059460	4.000	177.48	177.3	4.000	0.058	2.00	
	7.000	0.00	-0.2	7.000	0.058	2.00	
	10.000	-177.48	-177.6	10.000	0.058	2.00	



Cert.No.: 25CH847  
Page.: 3 of 3

#### Calibration Results

##### Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement ( $\pm$ )	Coverage factor k
pH Electrode S/N.: 5240606	4.007	4.008	184.6	0.0044	2.00
	6.965	6.966	10.2	0.0084	2.00
	10.010	10.009	-164.9	0.0065	2.00

##### Function : Temperature Measurement

##### (\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLabExpert Pro-ISM

- Serial No. : 5240606

Dimension of probe

- Length : 120 mm.

- Diameter : 12 mm.

- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement ( $\pm$ °C)	Coverage factor k
25.0	25.001	25.0	-0.001	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



## Certificate of Calibration

Certificate No.: 25E2372  
Page : 1 of 2

Equipment : pH Meter  
Manufacturer: Mettler Toledo  
Model : SevenCompact S220  
Serial No.: C104059460  
ID No.: RYG\_EN0183

Condition As-Received: Used Item

Received Date: 17 July 2025

Calibration Date: 22 July 2025

Reference: 2507-0561DSC

Ambient Temperature: ( 23  $\pm$  2 ) °C

Relative Humidity: ( 50  $\pm$  10 ) %

Submitted by: ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch

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except with the prior written approval of the head of  
Corporate Services 3: Equipment Calibration and Testing Services.

616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng,  
Rayong 21140, Thailand

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 :

Instrument	Model	Serial No.	Certificate No.	Due Date
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 : Napachanok Prasomsosir  
Issue Date : 23 July 2025

Approved Signatory :  
[ ] Phalinee Prabpaijal  
[ ] Nuntawat Khamchai  
[✓] Pongsagom Boonyaporn



Cert. No.: 25E2372  
Page.: 2 of 2

#### Result of calibration :- (\*) Without adjustment ( ) After adjustment

##### Function: DC voltage measurement

Range: 2000 mV

Standard Value	UUC* Reading	Error	Uncertainty
( mV )	( mV )	( mV )	( $\pm$ $\mu$ V )
-200.0000	-200.0	0.0	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	49.9	-0.1	61
100.0000	99.9	-0.1	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.

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## Certificate of Calibration

Cert. No.: 25LM10  
Page.: 1 of 2

Equipment : DO Meter with Sensor

Manufacturer : YSI

Model : 5000-115V

Serial No. : 15E102796

ID No. : RYG\_EN0032

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

Location : TPA On Site Calibration Laboratory

Received Order : 17 January 2025

Calibrated Date : 20 January 2025

Ambient Temperature : ( 26 ± 10 ) °C

Relative Humidity : ( 50 ± 30 ) %

AC Line Voltage : ( 220 ± 22 ) V

Calibrated by : Warakorn Lemgagrakul

Approved by :

- ( ) Chakrit Waewwanjua  
(✓) Suwit Imjai  
( ) Kunchit Promprat

Issue Date : 23 January 2025

The Uncertainties are for a confidence probability of approximately 95%

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

REVIEW BY *Phetchana S.*  
APPROVED BY *D. Imjai*  
NEXT CAL DATE: 20/07/26



Equipment : DO Meter with Sensor  
Condition As-Received : Used Item  
Reference : 2501-0600DSC-2  
Procedure Used :-

Cert. No.: 25LM10  
Page.: 2 of 2

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

### Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Digital Thermometer	2188080	2411022	TPA	17 Sep 2025

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

3. This certification is traceable to the International System of Unit.

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

Result of Calibration :- ( \* ) Without Adjustment

Function : Temperature measurement.

This instrument was connected with temperature sensor, S/N.: 15E100464

Calibration Point ( °C )	Immersion Depth ( mm )	Standard Temperature ( °C )	UUC* Reading ( °C )	Error ( °C )	Uncertainty ( ± °C )	Coverage Factor k
20.00	60	20.002	19.81	-0.192	0.15	2.00

UUC\* : Unit Under Calibration

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

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## Certificate of Testing

Cert.No.: 25TW15  
Page.: 1 of 2

Equipment : DO Meter

Manufacturer : YSI

Model : 5000-115V

Serial No. : 15E102796

ID No. : RYG\_EN0032

Received Date : 17 January 2025

Test Date : 20 January 2025

Reference : 2501-0600DSC-1

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

Laboratory Condition : Temperature ( 25 ± 5 ) °C

Humidity ( 50 ± 20 ) %

Test Procedure : In - house method : CP-CH9  
by Comparison Technique with Azide Modification Method

Tested by : Walalak Sirithean

Approved by :

- ( ) Pornthippa Tameyakul  
( ) Ponpan Paipim  
(✓) Saithip Meangmai

Issue Date : 21 January 2025

*Saithip*  
Approved Signatory



Cert.No.: 25TW15  
Page.: 2 of 2

### Condition of this result of calibration

1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1. Burette	-	130BU10	23CG1172	22 Mar 2025
2. Balance	14233821	110RC001	24MM131	04 July 2025

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate 5-Hydrate AR	KEMAUS	2203162447	99.6%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %  
Dissolved Oxygen Probe No.: 15E100464

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.20	8.20	0.0084

This report was certified only for the instrument we tested.It is allowable to use for study  
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other in full, without written approval of the laboratory

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## Certificate of Calibration

Cert. No.: 24TM1663  
Page : 1 of 3

Equipment : Low Temp. Incubator

Manufacturer : Memmert

Model : IPP750

Serial No. : V818.0084

ID No. : RYG\_EN0154

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

Location : BOD Room

Received Order : 01 November 2024

Calibration Date : 01 November 2024

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

AC Line Voltage : (220 ± 22) V

Calibrated by : Krisda Malee

Approved by :

( ) Ponpan Paipim

( ) Suwit Imjai

(✓) Kunchit Promprat

Issue Date : 07 November 2024

The Uncertainties are for a confidence probability of approximately 95%

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



Equipment : Low Temp. Incubator  
Condition As-Received : Used Item  
Reference : 2411-0002OC-1  
Procedure Used :-

Cert. No.: 24TM1663  
Page : 2 of 3

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD). The temperature scale used was based on ITS-90.

### Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1 ) Data Acquisition	MY44073381	24LM73	TPA	18 May 2025

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

3. This certification is traceable to the International System of Unit.

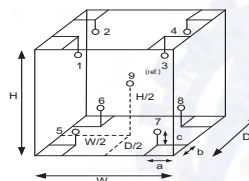
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- ( ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	24	25
REL.Humid. (%)	55	53
AC Supply ( Volt )	220	221



### Probe Installation Details :

a = 10 cm  
b = 10 cm  
c = 10 cm

### Dimension of Chamber :

D = 0.60 m  
W = 1.0 m  
H = 1.2 m  
Capacity = 0.72 m³

Position :	Ref. Std. ID No.:
1	1RTD-2/1
2	1RTD-2/2
3	22-01RTD-03
4	1RTD-2/4
5	1RTD-2/5
6	1RTD-2/6
7	23-01RTD-07
8	1RTD-2/8
9 (ref.)	23-01RTD-09



Equipment : Low Temp. Incubator  
Condition As-Received : Used Item  
Reference : 2411-0002OC-1  
Result of Calibration :- ( ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 24TM1663  
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
20.0	20.0	20.0	0.026	0.26	0.53	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	20.071	19.915	20.273	20.179	19.977	19.782	20.056	20.026	20.033	0.30

Average\* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC\* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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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## Certificate of Calibration

Cert.No.: 24CG3711  
Page.: 1 of 2

Equipment : Burette

Capacity : 50 mL

Serial No. : -

ID. No. : RYG\_EN0216

Manufacturer : Witeg

Made in : Germany

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

Ambient Temperature : (20 ± 2.5) °C

Relative Humidity : (50 ± 10) %

Barometric Pressure : 756 mmHg

Calibration Procedure : ASTM E 542 - 01

Calibrated by : Sa-ngeunkam Wongsa

Approved by :

(✓) Srisuda Khamtha

( ) Ponpan Paipim

( ) Unnopphol Harachai

Issue Date : 24 September 2024

The Uncertainties are for a confidence probability of approximately 95%

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



Equipment : Burette  
Received Date : 19 September 2024  
Condition As-Received : Used Item  
Calibration Date : 24 September 2024  
Reference : 2409-0756DSC-3

Cert.No.: 24CG3711  
Page.: 2 of 2

#### Condition of this result of calibration

##### 1. Reference Standard Instruments :

Instruments	Model	Serial No.	ID. No.	Certificate No.	Traceability	Due date
1) Balance	XP205	B134206712	140RC007	24MM316	TPA	15 July 2025
2) Data Logger	HL-20D	20683159	140EC012	23H2174	TPA	10 Oct 2024
3) Thermometer	-	1594592	140EC010	24I175	TPA	20 Feb 2025

This certification is traceable to SI Unit

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

3. True value is converted to true volume at the standard temperature of 20 °C

#### Calibration result :

Nominal capacity (mL)	Reading (mL)	Uncertainty ( $\pm$ mL)	k Factor
10	10.0259	0.0082	2.00
20	20.0214	0.0085	2.00
30	30.0006	0.0089	2.00
40	40.0003	0.0094	2.00
50	49.9988	0.011	2.00

Remark mL = cm<sup>3</sup>

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 3000-29 FAX:0 2710 9484



## Certificate of Calibration

Cert.No.: 25CG3668  
Page.: 1 of 2

Equipment : Burette  
Capacity : 50 mL  
Serial No. : -  
ID. No. : RYG\_EN0216  
Manufacturer : Witeg  
Made in : Germany  
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.  
Rayong Branch  
616/10 Moo 5 T.MaenamKoo, A.Pluakdaeng  
Rayong 21140, Thailand  
Ambient Temperature : (20  $\pm$  2.5) °C  
Relative Humidity : (50  $\pm$  10) %  
Barometric Pressure : 753 mmHg  
Calibration Procedure : ASTM E 542 - 01  
Calibrated by : Srisuda Khamtha  
Approved by :   
( ) Ponpan Paipim  
(✓) Chakrit Waewwanjua  
Issue Date : 19 September 2025

REVIEW BY   
APPROVED BY   
NEXT CAL DATE 18/09/26

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Burette  
Received Date : 16 September 2025  
Condition As-Received : Used Item  
Calibration Date : 18 September 2025  
Reference : 2509-0564DSC-3

Cert.No.: 25CG3668  
Page.: 2 of 2

#### Condition of this result of calibration

##### 1. Reference Standard Instruments :

Instruments	Model	Serial No.	ID. No.	Certificate No.	Traceability	Due date
1) Balance	XP205	B134206712	140RC007	25MM296	TPA	16 July 2026
2) Humidity/Baro/Temp	MHB-382SD	AM.42259	140EC016	25H1616	TPA	14 Aug 2026
3) Digital Thermometer	HH376	230806555	140EC013	25I1740	TPA	17 Jan 2026

This measurement result is traceable to SI Unit

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

3. True value is converted to true volume at the standard temperature of 20 °C

#### Calibration result :

Nominal capacity (mL)	Reading (mL)	Uncertainty ( $\pm$ mL)	k Factor
10	10.0264	0.0082	2.00
25	25.0141	0.0087	2.00
50	49.9952	0.010	2.00

Remark mL = cm<sup>3</sup>

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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## Certificate of Calibration

Equipment: SPECTROPHOTOMETER  
Model: DR6000  
Serial No. (or ID.): 1627845 (RYG\_EN0037)  
Manufacturer: HACH  
Condition: In Condition  
Certificate No.: C06250109  
Issued Date: 18 March 2025  
Job No.: WO-00064379  
Page: 1 of 3

Customer: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)   
616/10 Moo 5 T.Maenam Khu,  
A.Pluakdaeng, Rayong 21140, Thailand.  
APPROVED BY   
NEXT CAL DATE 18/03/26

Environment Condition: Temperature 24.4 °C  $\pm$  0.3 °C  
Humidity 60.8 %RH  $\pm$  3.5 %RH

Calibration Place: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)  
( Wet Chemistry Lab )  
616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng, Rayong 21140, Thailand

Calibration By: Mr.Preecha Phoosai  
Calibration Date: 18 March 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. 111583 and 111584  
The standard for Photometric Certificate No. 9114984 and 111588  
The standard for Stray light Certificate No. 111586 and 111585  
The standard for Spectral resolution Certificate No. 111587

(Mr. Preecha Phoosai)  
Person in charge

(Miss Kaewkan Suradech)  
Authorized signatory

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

ILAC-MRA and TAP member  
DKSH Technology Limited  
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2533 Sukhumvit Road, Bangkok, Thailand 10260  
Phone: +66 2581 7100 Email: info@dksh.com Website: www.dksh.com

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CAL-FM-C06-16 | 11 Mar 2024





Certificate No.: C06250108 Page 2 of 3

**Calibration Results:**  
**Without Adjustment**

Wavelength Accuracy (nm), The spectral bandwidth of Std at 2 nm and UUC at 2 nm				
Standard Wavelength	Unit Under Calibration	Correction	Uncertainty	
418.61	418.5	0.11	0.13	
536.66	536.7	-0.04	0.13	
637.98	638.3	-0.32	0.13	
748.48	748.8	-0.32	0.13	
807.03	807.5	-0.47	0.13	
Photometric Accuracy (Absorbance)				
Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.2930	0.291	0.0020	0.0045
	0.5168	0.518	-0.0012	0.0045
	1.0298	1.031	-0.0012	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.2867	0.285	0.0017	0.0045
	0.5073	0.508	-0.0007	0.0045
	1.0083	1.009	-0.0007	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.2516	0.250	0.0016	0.0045
	0.4595	0.461	-0.0015	0.0045
	0.9334	0.935	-0.0016	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.2461	0.246	0.0001	0.0045
	0.4652	0.466	-0.0008	0.0045
	0.9468	0.948	-0.0012	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.2594	0.259	0.0004	0.0045
	0.5040	0.505	-0.0010	0.0045
	1.0032	1.004	-0.0008	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.2579	0.258	-0.0001	0.0045
	0.4971	0.497	0.0001	0.0045
	0.9720	0.973	-0.0010	0.0045

บริษัท ดีเคอี เอเซีย จำกัด  
DKSH Technology Limited  
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110  
2533 Sukhumvit Road, Bangkok, Phra Prathung, Bangkok 10110  
Phone: +66 2029 7000 Email: info.asia@dksh.com Website: www.dksh.com/asia-thailand

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CAL-FM-C06-16 11 Mar 2024



Certificate No.: C06250108 Page 3 of 3

**Calibration Results:**  
**Without Adjustment**

Photometric Accuracy (Absorbance)				
Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0080
	0.7355	0.738	-0.0025	0.0080
257 nm	0.0000	0.000	0.0000	0.0080
	0.8574	0.857	0.0004	0.0080
313 nm	0.0000	0.000	0.0000	0.0080
	0.2864	0.290	-0.0036	0.0080
350 nm	0.0000	0.000	0.0000	0.0080
	0.6374	0.637	0.0004	0.0080
Stray light *				
Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%)	Absorbance ( A )	
260.62 +/- 0.11 nm	260.6	1.7	1.770	
391.44 +/- 0.11 nm	391.4	1.4	1.854	
Spectral Resolution *				
Nominal Concentration 0.02 % v/v	Peak	Trough	Ratio	SBW
Standard Wavelength ( nm )	268.66	266.69	1.38	2.00
UUC: Wavelength (nm)	268.2	266.2		
Std Absorbance ( A )	0.4565	0.2780		
UUC: Absorbance ( A )	0.413	0.299		

\* Calibration Marked \* Not TISI Accredited \* in this Certificate have been included for completeness.

The End of Certificate

บริษัท ดีเคอี เอเซีย จำกัด  
DKSH Technology Limited  
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110  
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CAL-FM-C06-16 11 Mar 2024



## ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: WO-00064379

ชนิดเครื่องวัด: SPECTROPHOTOMETER รุ่น: DR8000

หมายเลขเครื่อง: 1627845

ตรวจสอบ (วัน)		รายการตรวจสอบ		ตรวจสอบ (ส่ง)		หมายเหตุ
18 Mar 2025				18 Mar 2025		
ปกติ	ไม่ปกติ			ปกติ	ไม่ปกติ	
General						
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1.	ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2.	ความสะอาด ( ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3.	สวิตช์ ปิด – เปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4.	ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5.	หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Spectrophotometer						
<input type="checkbox"/>	<input type="checkbox"/>	6.	แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7.	ตัวควบคุมความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8.	ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	*
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9.	แหล่งกำเนิดแสง (UV < 3,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	13.5 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10.	แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	893.0 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11.	ช่องวัดหลายตัวอย่าง (Carousel Module)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
pH Meter and Conductivity Meter						
<input type="checkbox"/>	<input type="checkbox"/>	12.	ขั้วไฟฟ้า ( Electrode and Connection Cable )	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13.	ระดับสารละลายใน Electrode (Level KCl )	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14.	ผ้าปิดกันปลาย Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15.	ขาจับขั้วไฟฟ้า (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
Turbidimeter						
<input type="checkbox"/>	<input type="checkbox"/>	16.	ค่าความทึบที่ต่ำสุด (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17.	ระดับการส่องสว่างของแสง (>= 2.5 ไม่น้อย 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
Automatic titrator						
<input type="checkbox"/>	<input type="checkbox"/>	18.	สภาพ Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19.	Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20.	ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

เงื่อนไขการสอบเทียบ: \* 656.1nm = 656.1nm

\* 486.0nm = 485.7nm

Mr.Preecha Phooarsai  
Service Engineer

บริษัท ดีเคอี เอเซีย จำกัด  
DKSH Technology Limited  
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110  
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CAL-FM-R31-03 20 Jul 2022



Accredited by

NSC-TISI-TIS 17025

Calibration 0426



## Calibration certificate

Calibration Certificate No. 25BK0002

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	MCE224S-2500-U	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.	38101399   RYG_EN0163	This certificate relate and apply this equipment only.
Customer	ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)	
Order no.	2230	616/10 Moo 5 T.Moenam Khu, A.Pluak Daeng, Rayong 21140, Thailand.
Number of pages	4	
Date of calibration	20 Feb 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	06 Mar 2025	Approval of the Calibration Certificate	Person in charge
		Mr. Chonchai Inthana	Kachen Lalee

Sartorius (Thailand) Co., Ltd.  
129 Rama 9 Road, Huaykwang  
10310 BangkokVerical®  
Version 6.5

Page 1 | 4



Calibration object

Single range instrument

Model	MCE224S-2500-U
Serial Number	38101399
QM Ident. no   Inventory no.	RYG_EN0163   ---
Maximum capacity (Max. load)	220.0000 g
Measured range	220.0000 g
Scale interval	0.0001 g

Place of calibration

Address	According to page 1
Department   Cost center	Laboratory Department.   ---
Building   Floor	---   1st Floor.
Room	Balance Room.
Maximum temperature variation at place of calibration	5 K

Calibration procedure

EURAMET cg-18, V4.0 - Guidelines on the Calibration of Non-Automatic Weighing Instruments

Test equipment

Test equipment type	Test equipment ID	Valid until
Thermometer	MHB-382SD s/nB011342 Traceable to SI unit through DKSH	21 Aug 2025
Test weight set OIML R111 E2	Certificate No.M2308197S,.E2(Traceable to SI unit through TCS)	23 Aug 2025

Adjustment Status

The measuring device was internally adjusted before the calibration.

Environmental and measuring conditions

Date of calibration	20 Feb 2025
Temperature at place of calibration   Temp. diff.	24.4 °C   0.6 K
Tw Weights - Tplace	
Measuring conditions	The installation site is suitable. The device was levelled. Balance was loaded up to Max before test.
Comments	Humidity 58.0 %RH.

Measurement results | Measurement uncertainties

Repeatability	Eccentricity
Test load (nominal): 10 g   200 g	Test load (nominal): 100 g
10 g200 g	Center100.0000 g
110.0000 g200.0000 g	Front left100.0000 g
210.0000 g200.0000 g	Back left100.0000 g
310.0000 g200.0001 g	Back right100.0000 g
49.9999 g200.0000 g	Front right99.9999 g
59.9999 g200.0000 g	Maximum deviation from centric loading indication
610.0000 g200.0001 g	Δecc  max = 0.0001 g
710.0000 g200.0000 g	
810.0000 g200.0000 g	
99.9999 g200.0001 g	
1010.0000 g200.0000 g	
s = 0.00005 g s = 0.00005 g	

Error of indication	Testload	Indication	Error	Expansion factor	Uncertainty	Uncertainty relative
	L	I	E	k	U(E)	Urel(E)
	0.0100 g	0.0100 g	0.0000 g	2.00	0.00013 g	1.3 %
	0.1000 g	0.1000 g	0.0000 g	2.00	0.00013 g	0.13 %
	0.5000 g	0.5000 g	0.0000 g	2.00	0.00013 g	0.026 %
	1.0000 g	1.0000 g	0.0000 g	2.00	0.00013 g	0.013 %
	5.0000 g	5.0000 g	0.0000 g	2.00	0.00013 g	0.0026 %
	10.0000 g	9.9999 g	-0.0001 g	2.00	0.00013 g	0.0013 %
	20.0000 g	20.0000 g	0.0000 g	2.00	0.00014 g	0.00068 %
	50.0000 g	50.0001 g	0.0001 g	2.00	0.00015 g	0.00029 %
	100.0000 g	100.0000 g	0.0000 g	2.00	0.00018 g	0.00018 %
	200.0000 g	200.0000 g	0.0000 g	2.00	0.00028 g	0.00014 %
	220.0000 g	220.0000 g	0.0000 g	2.00	0.00032 g	0.00015 %
Maximum error of indication			E  max = 0.0001 g			

Urel(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 of measurement 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

Interpretation of measurement results | Appendix to the calibration certificate

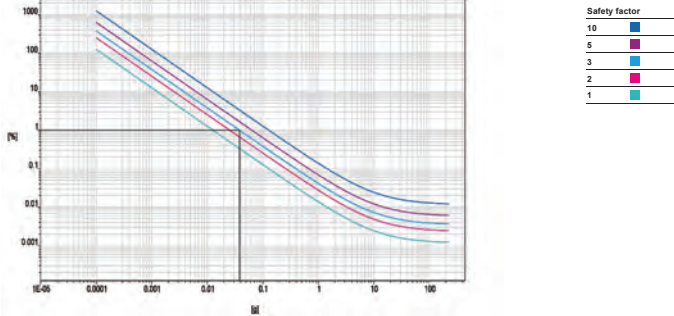
Uncertainty of measurement in use

Device adjusted before measurement	Yes
Temperature deviation considered	1.5 K (isoCAL active)
Temperature coefficient considered	1 · 10 <sup>-4</sup> /K
Uncertainty of the weighing result $U_{gI}(W)$	$U_{gI}(W) = 0.00013 \text{ g} + 1.16 \cdot 10^{-5} \cdot R$

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 of measurement 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 max load	Net indication	Uncertainty	Uncertainty relative
	R	$U_{gI}(W)$	$U_{gI}(W)_{rel}$
1 %	2.2000 g	0.00016 g	0.0071 %
25 %	55.0000 g	0.00077 g	0.0014 %
50 %	110.0000 g	0.0014 g	0.0013 %
75 %	165.0000 g	0.0020 g	0.0012 %
100 %	220.0000 g	0.0027 g	0.0012 %

Graphic realization of the relative uncertainty of measurement | process accuracy



Displayed example

Process accuracy	1.00 %
Safety factor	3
Minimum sample weight	0.0381 g

### Metrology Center

#### SCI ECO Services Company Limited

51 Moo 8, Tubkwang, Kaeng Khoi, Saraburi, Thailand 18260  
Bangkok Tel : +668 9205 6851 , +669 81924 0059  
Saraburi Tel : +669 8247 2360  
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T251530 Page 1 of 3

Certificate of Calibration

Equipment	: Chamber ( Oven )
Manufacturer	: MEMMERT
Model	: UF 110
Serial No.	: B416.2420
Customer Code	: RYG_EN0012
ID No.	: T6444A5
Customer	: ALS Laboratory Group (Thailand) Co.,Ltd. ( Rayong Branch ) 616/10 Moo 5 T.Maenamkoo, A.Pluakdaeng, Rayong 21140
Customer Location	: ENVIRONMENT LABORATORY
Date of Receipt	: 3 September 2025
Calibrated By	: Sujjar Naknakred ( Site Calibration Manager )
Approved By	: Boonchai Suriyawong (Site Calibration Manager)
Date of Issue	: 17 SEP 2025

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme 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 standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.



Certificate No. T251530

Page 2 of 3

## Calibration Report

Equipment : Chamber ( Oven )  
Date of Calibration : 10 September 2025  
Environment : Temperature : 35.7-36.6 °C  
Line Voltage : 226.8-233.7 V  
Relative Humidity : 55 - 65 %RH

### Condition of this results of calibration :

1. This equipment was calibrated by insert nine resistance thermometer detectors into its chamber , the other one resistance thermometer detector use for ambient temperature measurement . The calibration was done in according to WI-T20 ( based on ASTM E145-94 ( Reapproved 2019 ) and AS2853-1986 ).  
All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

### 2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
RTD	100 ohm	30-(CH1-10)	T242203	9 November 2025
DATA LOGGER	34970A	T47	T242203	9 November 2025

### 3. This certificate is traceable to :

National Institute of Metrology ( Thailand ) through Metrological Center ( NSC-TISI-TIS 17025 CALIBRATION 0244.

### 4. Condition of calibrated item : good

#### Equipment Description :

Time Constant 3 Hour 29 Minute At 104 °C  
Fresh Air Damper ☒ Open ☒ Min ☐ Medium ☐ Max  
☐ Close  
☐ Not Available

### 5. Adjustment :

( ) without adjustment ( X ) after adjustment

Approved By

*Don Zai*

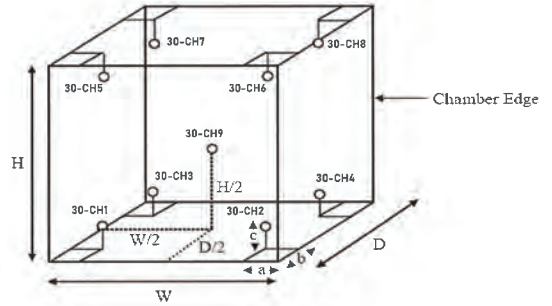
FM-TL07 102/27-03-68



Certificate No. T251530

Page 3 of 3

## Calibration Report



Remark : Internal Dimensions of Chamber : W (Width) = 56 cm , H (Height) = 48 cm, and D (Depth) = 40 cm.  
Size of Installed Standard sensor number 30-CH1 to number 30-CH8 : a = 5 cm, b = 5 cm, and c = 5 cm.  
Size of Installed Standard sensor number 30-CH9 : W/2 = 56 cm/2 , H/2 = 48 cm/2 and D/2 = 40cm/2

### Measurement Results

Average Standard Reading at each position (°C)									
Calibration Point	30-CH1	30-CH2	30-CH3	30-CH4	30-CH5	30-CH6	30-CH7	30-CH8	30-CH9
104	104.02	103.70	104.01	104.16	104.11	104.08	104.01	104.33	103.61
180	180.67	178.78	180.38	179.85	179.16	180.27	180.98	181.04	179.49

Chamber ( Oven )			Temperature Distribution				
Setting °C	Reading (°C)		Average (°C)	Stability (± °C)	Uniformity (°C)	Uncertainty (± °C)	Coverage Factor k
	Min , Max	Average					
104.0	103.9 , 104.1	104.0	104.00	0.08	0.61	0.42	2.00
180.0	179.9 , 180.1	180.0	180.07	0.21	1.51	0.52	2.00

\* The quoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 % .

End of Certificate.

Approved By

*Don Zai*

FM-TL07 102/27-03-68

# SARTORIUS



Accredited by

NSC-TISI-TIS 17025  
Calibration 0426

### Calibration certificate

Calibration Certificate No. 25BKL0003

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	MSU224S-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.	31709552   RYG_EN0003	This certificate relate and apply this equipment only.
Customer	ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)	
	616/10 Moo 5 T.Maenam Khu, A.Pluaeng Daeng, Rayong 21140, Thailand.	
Order no.	2230	
Number of pages	4	
Date of calibration	20 Feb 2025	

REVIEW BY *Tharitat*  
APPROVED BY *D. Hansen*  
NEXT CAL DATE 20/02/26

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 06 Mar 2025 Approval of the Calibration Certificate

Person in charge

*Chonchai Inthana*

Mr. Chonchai Inthana

*Kachen*

Kachen Lalee

Calibration certificate No.: 25BKL0003

Calibration Certificate

### Calibration object

#### Single range instrument

Model MSU224S-100-DU  
Serial Number 31709552  
QM Ident. no | Inventory no. RYG\_EN0003 | ---

Maximum capacity (Max. load) 220.0000 g  
Measured range 220.0000 g  
Scale interval 0.0001 g

### Place of calibration

Address According to page 1  
Department | Cost center Laboratory Department. | ---  
Building | Floor --- | 1st Floor.  
Room Balance Room.  
Maximum temperature variation at place of calibration 5 K

### Calibration procedure

EURAMET cg-18, V4.0 - Guidelines on the Calibration of Non-Automatic Weighing Instruments

### Test equipment

Test equipment type	Test equipment ID	Valid until
Thermometer	MHB-382SD s/nB011342 Traceable to SI unit through DKSH	21 Aug 2025
Test weight set OIML R111 E2	Certificate No.M2308197S .E2(Traceable to SI unit through TCS)	23 Aug 2025

## Adjustment Status

The measuring device was internally adjusted before the calibration.

## Environmental and measuring conditions

Date of calibration 20 Feb 2025

Temperature at place of calibration | Temp. diff. 24.7 °C | 0.3 K

Weights - T place

Measuring conditions The installation site is suitable. The device was levelled. Balance was loaded up to Max before test.

Comments Humidity 62.3 %RH.

## Measurement results | Measurement uncertainties

## Repeatability

Test load (nominal): 10 g | 200 g

	10 g	200 g
1	10.0000 g	200.0000 g
2	10.0000 g	200.0001 g
3	9.9999 g	200.0000 g
4	10.0000 g	200.0000 g
5	10.0000 g	200.0001 g
6	9.9999 g	200.0000 g
7	10.0000 g	200.0000 g
8	10.0000 g	200.0000 g
9	10.0000 g	200.0000 g
10	10.0000 g	200.0001 g
s = 0.00004 g		s = 0.00005 g

## Eccentricity

Test load (nominal): 100 g

Center	100.0000 g
Front left	100.0000 g
Back left	100.0001 g
Back right	99.9999 g
Front right	99.9999 g
Maximum deviation from centric loading indication  Δlecc  max = 0.0001 g	

## Error of indication

Testload <i>L</i>	Indication <i>I</i>	Error <i>E</i>	Expansion factor <i>k</i>	Uncertainty <i>U(E)</i>	Uncertainty relative <i>U<sub>rel</sub>(E)</i>
0.0100 g	0.0100 g	0.0000 g	2.00	0.00012 g	1.2 %
0.1000 g	0.1000 g	0.0000 g	2.00	0.00013 g	0.13 %
0.5000 g	0.5000 g	0.0000 g	2.00	0.00013 g	0.026 %
1.0000 g	1.0000 g	0.0000 g	2.00	0.00013 g	0.013 %
5.0000 g	5.0000 g	0.0000 g	2.00	0.00013 g	0.0026 %
10.0000 g	10.0000 g	0.0000 g	2.00	0.00013 g	0.0013 %
20.0000 g	20.0000 g	0.0000 g	2.00	0.00014 g	0.00068 %
50.0000 g	50.0000 g	0.0000 g	2.00	0.00015 g	0.00029 %
100.0000 g	100.0001 g	0.0001 g	2.00	0.00018 g	0.00018 %
200.0000 g	200.0000 g	0.0000 g	2.00	0.00028 g	0.00014 %
220.0000 g	220.0000 g	0.0000 g	2.00	0.00032 g	0.00015 %
Maximum error of indication		E  <sub>max</sub> = 0.0001 g			

*U<sub>rel</sub>(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 of measurement 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

Yes

Temperature deviation considered

1.5 K (isoCAL active)

Temperature coefficient considered

1 · 10<sup>-4</sup>/K

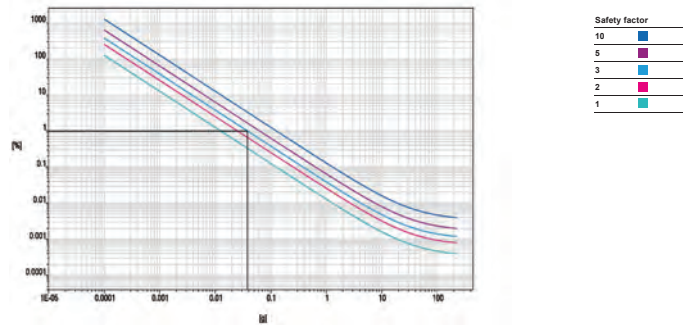
Uncertainty of the weighing result *U<sub>gi</sub>(W)*

*U<sub>gi</sub>(W)* = 0.00013 g + 3.42 · 10<sup>-4</sup> · *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 of measurement 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 max load	Net indication <i>R</i>	Uncertainty <i>U<sub>gi</sub>(W)</i>	Uncertainty relative <i>U<sub>gi</sub>(W)<sub>rel</sub></i>
1 %	2.2000 g	0.00014 g	0.0063 %
25 %	55.0000 g	0.00032 g	0.00058 %
50 %	110.0000 g	0.00051 g	0.00046 %
75 %	165.0000 g	0.00069 g	0.00042 %
100 %	220.0000 g	0.00088 g	0.00040 %

## Graphic realization of the relative uncertainty of measurement | process accuracy



## Displayed example

Process accuracy	1.00 %
Safety factor	3
Minimum sample weight	0.0380 g



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Website : www.scieco.co.th E-Mail : calibrate@scg.com



Certificate No. T242075

Page 1 of 3

## Certificate of Calibration

Equipment	: Liquid Bath ( Water )
Manufacturer	: Memmert
Model	: WNE29
Serial No.	: L623.0105
Customer Code	: RYG_EN0220
ID No.	: T5650A5
Customer	: ALS Laboratory Group (Thailand) Co.,Ltd. ( Rayong Branch ) 616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng, Rayong 21140
Customer Location	: Wet Chemistry Lab
Date of Receipt	: 11 December 2024
Calibrated By	: Atiphong Rongrat ( Technician )
Approved By	:  / Boonchai Suriyawong (Site Calibration Manager)
Date of Issue	: 20 DEC 2024

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme 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 standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrology.



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Certificate No. T242075

Page 2 of 3

## Calibration Report

Equipment	: Liquid Bath ( Water )
Date of Calibration	: 19 December 2024
Environment	: Temperature : 25.3-25.9 °C : Line Voltage : 221.4-225.4 V : Relative Humidity : 55 - 65 %RH

## Condition of this results of calibration :

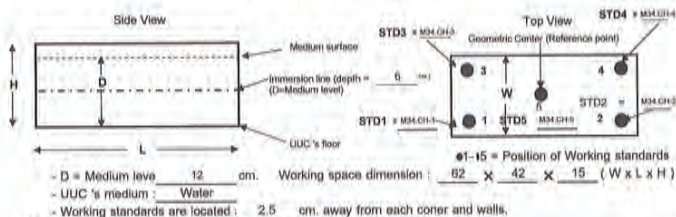
- This equipment was calibrated by insert five resistance thermometer detectors into its water bath , the other one thermocouple type T use for ambient temperature measurement . The calibration was done in according to WI-T36 ( based on ASTM E715-80 ( Reapproved 2001 ) ).  
All data show below were final values and the initial data from customer request . The temperature scale Used, was based on ITS - 90.
- Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
RTD	100 OHM	M34 (CH1-CH5)	T240400	16 March 2025
DATA LOGGER	34970A	T193	T240400	16 March 2025
- This certificate is traceable to :  
National Institute of Metrology ( Thailand ) through Metrological Center ( NSC-TIS-TIS 17025 CALIBRATION 9244 )
- Condition of calibrated item : good  
Equipment Description :  
Time Const. 1 Hour 30 Minute At 63 °C
- Adjustment :  
( X ) without adjustment ( ) after adjustment

Approved By.



## Calibration Report



### Measurement Results:

Average Standard Reading at each position (°C)					
Calibration Point	M34.CH-1	M34.CH-2	M34.CH-3	M34.CH-4	M34.CH-5
63	62.87	63.00	62.88	62.98	63.22
85	84.76	85.14	84.89	85.07	85.24

Liquid Bath ( Water )			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (±°C)	Uncertainty (±°C)	Coverage Factor k
	Min, Max	Average					
63.0	-	63.0	62.99	0.07	0.25	0.23	2.00
85.0	-	85.0	85.02	0.13	0.35	0.26	2.00

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 %.

Approved By:

PM-L15 11/18-08-66

## Certificate of Calibration

Cert.No.: 25CH1001  
Page.: 1 of 3

Equipment :  
Manufacturer :  
Model :  
Serial No. :  
ID No. :  
Condition As-Received :  
Received Date :  
Calibration Date :  
Reference :  
Submitted by :

pH Meter  
Mettler Toledo  
SevenGo S2  
C232588424  
RYG\_FS0605  
Used Item  
22 August 2025  
25 August 2025  
2508-0746DSC-1

REVIEW BY:   
APPROVED BY:   
NEXT CAL DATE: 25/08/26

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 :

Walalak Sirinthean

Approved by :

Approved Signatory

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

Issue Date :

26 August 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.: 25CH1001  
Page.: 2 of 3

### Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	58440003	130RC120	24E3731	25 Nov 2025
2) Ref. Standard Thermometer	4982054	110RC044	25I708	03 July 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 CPA chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.007	CPA chem	1066665	18 Jan 2027
pH 6.987	CPA chem	1034204	27 Sep 2025
pH 10.010	CPA chem	1114385	08 June 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 (±mV)	Coverage factor k
	pH	mV	mV	pH		
pH Meter S/N.: C232588424	4.00	177.48	178	4.00	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	10.00	-177.48	-177	10.00	0.58	2.00

### Calibration Results

Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor k
pH Electrode S/N.: 2465869	4.007	4.00	149	0.0071	2.00
	6.987	7.01	-26	0.0086	2.00
	10.010	10.01	-195	0.0092	2.00

Function : Temperature Measurement

(\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLab Expert Go-ISM  
- Serial No. : 2465869  
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	25.3	0.299	0.13	2.00
45.0	45.001	45.4	0.399	0.13	2.00

Remark : - UUC\* = Unit Under Calibration

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

-o0o-

# ภาคผนวก จ

สำเนาหนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

๗๕) นายประเสริฐ...



๗๕) นายประเสริฐ สุระพันธ์  
๗๖) นายบุญล จันทน์เยี่ยม  
๗๗) นายพิรพจน์ ทองอุดมวิศา  
๗๘) นายอนุพล ทองบุษ  
๗๙) นายบุญวัฒน์ ม่วงเพชร  
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๘๑) นายฤทธิเดช สายธรรม  
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๑๔๗) นายศักดิ์พัฒน์ บุญมี  
๑๔๘) นายสุวิทย์ อนุโล  
๑๔๙) นายชัยณรงค์ ศรีจันทร์  
๑๕๐) นางสาวอริสราวรรณ สวนสม  
๑๕๑) นางสาวณัฐพร สิงหา  
๑๕๒) นายณิรมล ฌมโ

๑๑๔) นางสาวอุบล...

๑๕๓) นางสาวอุบล เด็กศิริ  
๑๕๔) นางสาวนันทิยา ทองเพชร  
๑๕๕) นายภาณุภูมิ แทนไทย  
๑๕๖) นางสาวสุภาวดี เมธพงศ์  
๑๕๗) นางสาวพรทิศา ศาตยาณัน  
๑๕๘) นายเอกรัตน์ วิริยะนา  
๑๕๙) นายโธมัส พลพรธรรม  
๑๖๐) นายจิรเมธ ประเสริฐศิริพงษ์  
๑๖๑) นายจิรุตม์ นามะบุญ  
๑๖๒) นายธีรศักดิ์ ศรีชัย  
๑๖๓) นายณัฐฤกษ์ สะพานแก้ว  
๑๖๔) นายบุญศักดิ์ ปะที  
๑๖๕) นายธีรวัฒน์ เสมอทรัพย์  
๑๖๖) นายพิชญพงษ์ โสชา  
๑๖๗) นายภัทรพงษ์ ฌมโ  
๑๖๘) นายวสันต์ ตรีบุญ  
๑๖๙) นายภาณุเดช เพชรกุล  
๑๗๐) นายบุญล วิเศษแสง  
๑๗๑) นายพิรพจน์ มีสุข  
๑๗๒) นางสาวบุษวิ ลีละทิพย์  
๑๗๓) นางสาวสุภาวดี โคธิ์บาน  
๑๗๔) นางสาวอรณิชา เทียนคำ  
๑๗๕) นางสาวพรทิศา ขอบสน  
๑๗๖) นางสาววันวิสา ขอบทิพย์  
๑๗๗) นางสาวอรรณพ เภาทอง  
๑๗๘) นางสาวอริสรา ฌมโ  
๑๗๙) นางสาวอริสรา ฌมโ  
๑๘๐) นายวิฑูรย์ ศรีธรรม  
๑๘๑) นางสาวอริสรา ฌมโ

๑๕๓) นางสาวอุบล เด็กศิริ  
๑๕๔) นางสาวนันทิยา ทองเพชร  
๑๕๕) นายภาณุภูมิ แทนไทย  
๑๕๖) นางสาวสุภาวดี เมธพงศ์  
๑๕๗) นางสาวพรทิศา ศาตยาณัน  
๑๕๘) นายเอกรัตน์ วิริยะนา  
๑๕๙) นายโธมัส พลพรธรรม  
๑๖๐) นายจิรเมธ ประเสริฐศิริพงษ์  
๑๖๑) นายจิรุตม์ นามะบุญ  
๑๖๒) นายธีรศักดิ์ ศรีชัย  
๑๖๓) นายณัฐฤกษ์ สะพานแก้ว  
๑๖๔) นายบุญศักดิ์ ปะที  
๑๖๕) นายธีรวัฒน์ เสมอทรัพย์  
๑๖๖) นายพิชญพงษ์ โสชา  
๑๖๗) นายภัทรพงษ์ ฌมโ  
๑๖๘) นายวสันต์ ตรีบุญ  
๑๖๙) นายภาณุเดช เพชรกุล  
๑๗๐) นายบุญล วิเศษแสง  
๑๗๑) นายพิรพจน์ มีสุข  
๑๗๒) นางสาวบุษวิ ลีละทิพย์  
๑๗๓) นางสาวสุภาวดี โคธิ์บาน  
๑๗๔) นางสาวอรณิชา เทียนคำ  
๑๗๕) นางสาวพรทิศา ขอบสน  
๑๗๖) นางสาววันวิสา ขอบทิพย์  
๑๗๗) นางสาวอรรณพ เภาทอง  
๑๗๘) นางสาวอริสรา ฌมโ  
๑๗๙) นางสาวอริสรา ฌมโ  
๑๘๐) นายวิฑูรย์ ศรีธรรม  
๑๘๑) นางสาวอริสรา ฌมโ

๑๑๔) นายอนันต์ชัย...

เอกสารแนบท้ายหนังสือรับรองการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เลือก  
บริษัท เอลิแอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๒๕๐๕  
ที่ ๑๓๑๐(๑)/ ๒๕๖๒๖๘ ลงวันที่ ๒๐ พฤศจิกายน ๒๕๖๖  
ค. ขอบข่ายการดำเนินงานได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๓๕ รายการ  
น้ำเสีย จำนวน ๕๐ รายการ

ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Aldicarb	High-Performance Liquid Chromatographic Method <sup>(1)</sup>
2	Aldicarb Sulfone	High-Performance Liquid Chromatographic Method <sup>(1)</sup>
3	Aldicarb Sulfonide	High-Performance Liquid Chromatographic Method <sup>(1)</sup>
4	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(1)</sup>
5	Arsenic	1) Digestion, Inductively Coupled Plasma Method <sup>(1)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(1)</sup>
6	Barium	1) Digestion, Inductively Coupled Plasma Method <sup>(1)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(1)</sup>
7	α-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(1)</sup>
8	β-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(1)</sup>
9	δ-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(1)</sup>
10	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(1)</sup>
11	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method <sup>(1)</sup> 2) 5-Day BOD Test, Membrane Electrode Method <sup>(1)</sup>
12	Carbaryl	High-Performance Liquid Chromatographic Method <sup>(1)</sup>
13	Carbofuran	High-Performance Liquid Chromatographic Method <sup>(1)</sup>
14	Cadmium	1) Digestion, Inductively Coupled Plasma Method <sup>(1)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(1)</sup>
15	Chemical Oxygen Demand	1) Closed Reflux, Colorimetric Method <sup>(1)</sup> 2) Closed Reflux, Titrimetric Method <sup>(1)</sup>
16	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(1)</sup>
17	Chromium	1) Digestion, Inductively Coupled Plasma Method <sup>(1)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(1)</sup>
18	Color	ADM Weighted-Ordinate Spectrophotometric Method <sup>(1)</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Copper	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
20	Cyanide	Distillation, Colorimetric Method <sup>(4)</sup>
21	2,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
22	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
23	2,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
24	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
25	2,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
26	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
27	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
28	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
29	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
30	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
31	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
32	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
33	Formaldehyde	Distillation, Colorimetric Method <sup>(4)</sup>
34	Free Chlorine	1) DPD Ferrous Titrimetric Method <sup>(4)</sup> 2) DPD Colorimetric Method <sup>(4)</sup>
35	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
36	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
37	Hexavalent Chromium	Colorimetric Method <sup>(4)</sup>
38	3-Hydroxycarbofuran	High-Performance Liquid Chromatographic Method <sup>(4)</sup>
39	Lead	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>

40 Manganese...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
40	Manganese	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
41	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass spectrometric Method <sup>(4)</sup>
42	Methiocarb	High-Performance Liquid Chromatographic Method <sup>(4)</sup>
43	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
44	Methomyl	High-Performance Liquid Chromatographic Method <sup>(4)</sup>
45	Nickel	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
46	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method <sup>(4)</sup> 2) Soxhlet Extraction Method <sup>(4)</sup>
47	Oxamyl	High-Performance Liquid Chromatographic Method <sup>(4)</sup>
48	Propoxur	High-Performance Liquid Chromatographic Method <sup>(4)</sup>
49	pH	Electrometric Method <sup>(4)</sup>
50	Phenols	1) Distillation, Chloroform Extraction Method <sup>(4)</sup> 2) Distillation, Direct Photometric Method <sup>(4)</sup>
51	Selenium	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
52	Sulfide	Iodometric Method <sup>(4)</sup>
53	Temperature	Laboratory and Field Methods <sup>(4)</sup>
54	Total Dissolved Solids	Dried at 180 °C <sup>(4)</sup>
55	Total Kjeldahl Nitrogen	Semi-Micro Kjeldahl Method <sup>(4)</sup>
56	Total Phosphorus	Digestion, Colorimetric Method <sup>(4)</sup>
57	Total Suspended Solids	Dried from 103-105 °C <sup>(4)</sup>
58	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
59	Trivalent Chromium	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation <sup>(4)</sup>
60	Zinc	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>

น้ำใต้ดิน...

น้ำใต้ดิน จำนวน 126 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
5	Antimony	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
8	Barium	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
9	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
13	Benzoic Acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
15	Benzo(g,h,i)perylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>

18 Bis(2-ethylhexyl)phthalate...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
22	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
27	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
33	Chromium	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation <sup>(4)</sup>
35	Chromium (VI)	Colorimetric Method <sup>(4)</sup>

36 Chrysene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
36	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
37	Cyanide	Distillation, Colorimetric Method <sup>(4)</sup>
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
39	DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
40	DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
41	DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
42	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
43	Di-n-Butyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
47	3,3-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>

56 1,3-Dichloropropene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
57	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
58	Diethyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
63	Di-n-octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
64	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
65	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
67	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
68	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
69	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
70	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
74	α-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
75	β-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>

76 γ-HCH...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
76	γ-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
81	Lead	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
82	Manganese	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
83	Mercury	1) Digestion, Cold Vapor Atomic Absorption Spectrometric Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
84	Methanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
86	Methyl bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
87	Methylene chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
89	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
90	Methyl tert-butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
91	Naphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
92	Nickel	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>

94 N-Nitrosodiphenylamine...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
95	N-Nitrosodi-n-Propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB 1242 - PCB 1248 - PCB 1254 - PCB 1260	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
98	pH	Electrometric Method <sup>(4)</sup>
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
100	Phenol	1) Distillation, Chloroform Extraction Method <sup>(4)</sup> 2) Distillation, Direct Photometric Method <sup>(4)</sup> 3) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
102	Selenium	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
103	Silver	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
104	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
105	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
106	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
107	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
108	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
109	TPH (C <sub>8</sub> -C <sub>16</sub> )	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4,25)</sup>

110 TPH (C<sub>8</sub>-C<sub>16</sub>)...



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
110	TPH (C <sub>10</sub> -C <sub>16</sub> )	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>9,22</sup>
111	TPH (C <sub>16</sub> -C <sub>35</sub> )	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>9,22</sup>
112	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>61</sup>
113	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>61</sup>
114	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>61</sup>
115	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>61</sup>
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>61</sup>
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>61</sup>
118	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>61</sup>
119	Vanadium	1) Digestion, Inductively Coupled Plasma Method <sup>62</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup>
120	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>61</sup>
121	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>61</sup>
122	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>61</sup>
123	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>61</sup>
124	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>61</sup>
125	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>61</sup>
126	Zinc	1) Digestion, Inductively Coupled Plasma Method <sup>62</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup>

อากาศเสีย...

## อากาศเสีย (ปล่องระบาย) จำนวน 28 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup>
2	Arsenic	2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup> 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup>
3	Beryllium	2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup> 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup>
4	Cadmium	2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup> 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup>
5	Carbon Monoxide	1) Instrumental Analyzer Method <sup>62</sup> 2) Sampling Bag Non-Dispersive Infrared Method <sup>61</sup>
6	Chlorine	1) Absorption Sampling, Ion Chromatographic Method <sup>61</sup> 2) Isokinetic Sampling, Ion Chromatographic Method <sup>61</sup>
7	Chromium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup>
8	Cobalt	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup>
9	Copper	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup>
10	Cresol	Absorption Sampling, Gas Chromatographic Method <sup>61</sup>
11	Dioxins	Isokinetic Sampling <sup>61</sup>
12	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method <sup>61</sup> 2) Isokinetic Sampling, Ion Chromatographic Method <sup>61</sup>
13	Hydrogen Fluoride	1) Absorption Sampling, Ion Chromatographic Method <sup>61</sup> 2) Isokinetic Sampling, Ion Chromatographic Method <sup>61</sup>
14	Hydrogen Sulfide	Absorption Sampling, Iodometric Method <sup>61</sup>

15 Lead...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	Lead	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup>
16	Manganese	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup>
17	Mercury	1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>61</sup> 2) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method <sup>61</sup>
18	Nickel	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup>
19	Opacity	Ringelmann's Method <sup>61</sup>
20	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method <sup>61</sup> 2) Absorption Sampling, Alkaline Permanganate/Colorimetric Method <sup>61</sup> 3) Instrumental Analyzer Method <sup>61</sup>
21	Selenium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup>
22	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method <sup>61</sup> 2) Instrumental Analyzer Method <sup>61</sup>
23	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method <sup>61</sup>
24	Tellurium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup>
25	Tin	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup>
26	Total Suspended Particulate	1) Isokinetic Sampling, Gravimetric Method <sup>61</sup> 2) Paired Train, Isokinetic Sampling, Gravimetric Method <sup>61</sup>

27 Vanadium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Vanadium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>61</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>61</sup>
28	Xylene	Absorption Sampling, Gas Chromatographic Method <sup>61</sup>

## สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>1,9,26</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>16,26</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>1,26</sup>
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>1,6,16</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>1,6,17</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>7,16</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>7,17</sup>
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>1,6,16</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>1,6,17</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>7,16</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>7,17</sup>
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>1,6,16</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>1,6,17</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>7,16</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>7,17</sup>

5 Beryllium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.19)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>
9	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method <sup>(1.6.14.19)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method <sup>(1.6.17.19)</sup> 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(7.8.16.19)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(7.8.17.19)</sup>

10 Chromium (VI)...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method <sup>(1.6.19)</sup> 2) Alkaline Digestion, Colorimetric Method <sup>(8.19)</sup>
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>
14	DDO	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup>

2) Soxhlet...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Dieldrin	2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup> 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>
20	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>
21	Lindane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>

22 Mercury...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(1.6.20)</sup> 2) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method <sup>(1.6.30)</sup> 3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(20)</sup> 4) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method <sup>(20)</sup> 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method <sup>(21)</sup>
23	Methoxychlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.28)</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>
24	Mirex	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.28)</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>
27	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.26)</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>

- 2-Chlorobiphenyl...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	- 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5'-Trichlorobiphenyl - 2,4',5'-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3,3',4',6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5',6-Heptachlorobiphenyl - 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,24)</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup> Electrometric Method <sup>(23,24)</sup>
29	pH	
30	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,16)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,17)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>

31 Silver...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,16)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,17)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,16)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,17)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,24)</sup> 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,16)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,17)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>
35	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,16)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,17)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>

ดิน...

## ดิน จำนวน 125 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>
2	Acetone	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(15,25)</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(13)</sup>
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>
4	Anthracene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>
5	Antimony	1) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>
8	Barium	1) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>
9	Benz(a)anthracene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(15,25)</sup>

11 Benzo(b)fluoranthene

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
11	Benzo(b)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>
12	Benzo(k)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>
13	Benzoic acid	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>
14	Benzo(a)pyrene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>
15	Benzog(h,i)perylene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>
17	Bis(2-chloroethyl)ether	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>
18	Bis(2-ethylhexyl)phthalate	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(15,25)</sup>
20	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(15,25)</sup>
21	Butanol	Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(13,25)</sup>
22	Butyl Benzyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,29)</sup>

23 Cadmium...



ลำดับที่	สารเคมี	วิธีวิเคราะห์
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,17)</sup>
24	Carbazole	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
28	p-Chloroaniline	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
32	2-Chlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
33	Chromium	1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,17)</sup>
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(7,8,14,15)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(7,8,17,19)</sup>
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method <sup>(8,19)</sup>

36 Chrysene...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
36	Chrysene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
37	Cyanide	Extraction, Distillation, Colorimetric Method <sup>(27,28,29)</sup>
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
39	DDD	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
40	DDE	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
41	DDT	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
42	Dibenz(a,h)anthracene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
43	Di-n-Butyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
47	3,3-Dichlorobenzidine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>

49 1,2-Dichloroethane...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
53	2,4-Dichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
58	Diethyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
59	2,4-Dimethylphenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
60	2,4-Dinitrophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
61	2,4-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
62	2,6-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>

63 Di-n-Octyl Phthalate...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
63	Di-n-Octyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
67	Fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
68	Fluorene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
70	Heptachlor epoxide	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(9,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,26)</sup>
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup>
73	n-Hexane	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,25)</sup> 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method <sup>(13)</sup>

73 n-Hexane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
74	$\alpha$ -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
75	$\beta$ -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
76	$\gamma$ -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
77	Hexachlorocyclopentadiene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
78	Hexachloroethane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
79	Indeno(1,2,3-cd)pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
80	Isophorone	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
81	Lead	1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,17)</sup>
82	Manganese	1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,17)</sup>
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(20)</sup> 2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry <sup>(21)</sup> 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method <sup>(20)</sup>

84 Methanol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup> 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup>
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup>
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup>
88	2-methylphenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
89	2-Methylnaphthalene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup>
91	Naphthalene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
92	Nickel	1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,17)</sup>
93	Nitrobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
94	N-Nitrosodiphenylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
95	N-Nitrosodi-n-propylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>

96 Polychlorinated biphenyls (PCBs)

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,2',3,4,6'-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6'-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5',6'-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl Pentachlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
97	Phenanthrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>

99 Phenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
99	Phenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
100	Pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
101	Selenium	1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,17)</sup>
102	Silver	1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,17)</sup>
103	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup>
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup>
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup>
106	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup>
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,26)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,24)</sup>
108	TPH (C <sub>5</sub> -C <sub>6</sub> )	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup>
109	TPH (C <sub>8</sub> -C <sub>16</sub> )	1) Automate Extraction, Gas Chromatographic Method <sup>(12,22)</sup> 2) Solvent Extraction, Gas Chromatographic Method <sup>(12,23)</sup> 3) Ultrasonic Extraction, Gas Chromatographic Method <sup>(12,23)</sup>
110	TPH (C <sub>18</sub> -C <sub>35</sub> )	1) Automate Extraction, Gas Chromatographic Method <sup>(12,22)</sup> 2) Solvent Extraction, Gas Chromatographic Method <sup>(12,23)</sup> 3) Ultrasonic Extraction, Gas Chromatographic Method <sup>(12,23)</sup>
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup>
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup>
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup>
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,25)</sup>

115 2,4,5-Trichlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
115	2,4,5-Trichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,29)</sup>
116	2,4,6-Trichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(10,28)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(11,29)</sup>
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,23)</sup>
118	Vanadium	1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,17)</sup>
119	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,23)</sup>
120	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,23)</sup>
121	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,23)</sup>
122	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,23)</sup>
123	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,23)</sup>
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(15,23)</sup>
125	Zinc	1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,17)</sup>

## เอกสารอ้างอิง

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ที่ ๒๒/๒๕๖๖/๔๓๒๒

กรมโรงงานอุตสาหกรรม  
แบบพระราชที่ ๖ แห่งราชบัญญัติ  
เลขาธิการที่ กรุงเทพมหานคร ๑๐๕๐๐

๒๕ มีนาคม ๒๕๖๗

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอนเอเอส แล็บอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๕ มีนาคม ๒๕๖๗

ตามที่ขอที่อ้างถึง บริษัท เอนเอเอส แล็บอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ที่ขอปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๐๔-๙-๐๑๔ ของพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากร ความละเอียดดังนี้

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

- ให้อยู่เดิมจำนวนที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓ ราย
  - นางสาวพรอริสา ทุมมกร ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๔๕
  - นายกฤษณ์ สุทธิม ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๔๖
  - นางสาวศุภากร นิมมิตรา ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๔๗
- ให้เพิ่มจำนวนที่ขอปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๒ ราย
  - นางสาวฐาณิศา เกียรติจิรา ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๔๘
  - นางสาวณิพัทธ์ภัทร ลาภคำ ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๔๙
  - นางสาวณิพัทธ์ภัทร กับเขาภักดิ์ ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๕๐
  - นายอำนาจ วรภาคน ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๕๑
  - นายฤทธิเดช ธีบุญวงศ์ ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๕๒
  - นายณฐกร พรหมยา ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๕๓
  - นายวิจิตร ฝั่งสาธิตาน ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๕๔
  - นายณัฐพงศ์ โสภา ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๕๕
  - นายคณิศร ปานเพ็ญ ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๕๖
  - นายณัฐพล ชุ่มชื่น ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๕๗
  - นายธนา สุภาพงษ์ ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๕๘
  - นายบรรณ แก้วพริ้ง ทะเบียนเลขที่ ๖-๒๐๐๔-๙-๐๑๕๙

ด้วย หนังสือฉบับนี้...



อนึ่ง ทนุสือฉบับนี้จะส่งมอบพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
ในวันที่ ๒ กันยายน ๒๕๖๒

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายพรศ กสิณารอง)  
รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมอุตสาหกรรมพิเศษ

กองวิจัยและพัฒนาผลิตภัณฑ์โรงงาน  
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนห้องปฏิบัติการ  
โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕  
โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕  
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ที่ อก ๐๓๑๐(๑)/ ๑๒๓๖ ๘ ๑



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๘ ธันวาคม ๒๕๖๑

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๒ ธันวาคม ๒๕๖๑

ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ  
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ  
เขตสวนหลวง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์  
จำนวน ๘ ราย ได้แก่

๑) นายประพนธ์ วรรณชัย	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๐
๒) นายจิรชัย ขาวละออ	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๑
๓) นายพิพัฒน์ กำคำ	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๒
๔) นางสาวอรุษา คำคำล่อง	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๓
๕) นายกิตติพงศ์ แซ่ลี้	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๔
๖) นายจิรเมธ ประเสริฐศิริพงษ์	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๕
๗) นายภัทรพงษ์ มณฑาทอง	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๖
๘) นางสาวจารุวรรณ กระจำพันธุ์	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๗

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายธีรศักดิ์ อิศรางกูร ณ อยุธยา)  
รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนาผลิตภัณฑ์โรงงาน  
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนห้องปฏิบัติการ  
โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕  
โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕  
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ที่ อก ๐๓๑๐(๑)/ ๑๒๓๖ ๘ ๐



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๐ เมษายน ๒๕๖๒

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๒ เมษายน ๒๕๖๑

ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ  
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ  
เขตสวนหลวง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์  
จำนวน ๒ ราย ได้แก่

๑) นายสิริพงศ์ บัวแดง	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๒
๒) นายมงคล ผลาทิพย์	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๓

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายธีรศักดิ์ อิศรางกูร ณ อยุธยา)  
รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนาผลิตภัณฑ์โรงงาน  
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนห้องปฏิบัติการ  
โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕  
โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕  
ไปรษณีย์อิเล็กทรอนิกส์ sarabang@dw.mail.go.th

ที่ อก ๐๓๑๐(๑)/ ๑๒๓๖ ๘ ๑



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๐๕ มิถุนายน ๒๕๖๒

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๙ พฤษภาคม ๒๕๖๑

ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ  
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ  
เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้เพิ่มเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน  
จำนวน ๑๑ ราย ได้แก่

๑) นายอุดมกร มั่นชื่น	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๔
๒) นายชัชวาล แสนมา	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๕
๓) นายเอกรินทร์ บุคสิทธิ์	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๖
๔) นายพิชญานันท์ อินทริ	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๗
๕) นายศตวรรษ แก้วกันหา	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๘
๖) นายวิกรม มีศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๐๙
๗) นายศุภณันท์ คำจันทร์	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๑๐
๘) นายธีรวิทย์ มีใหญ่	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๑๑
๙) นายธีรพงษ์ ศรีคำแหง	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๑๒
๑๐) นายอภิสิทธิ์ ศรีคำแหง	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๑๓
๑๑) ว่าที่ร้อยตรี ภาณุพงศ์ แสนศิริ	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๑๔

อนึ่ง ทนุสือฉบับนี้จะส่งมอบพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
ในวันที่ ๒ กันยายน ๒๕๖๑

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายธีรศักดิ์ อิศรางกูร ณ อยุธยา)  
รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนาผลิตภัณฑ์โรงงาน  
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนห้องปฏิบัติการ  
โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕  
โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕  
ไปรษณีย์อิเล็กทรอนิกส์ sarabang@dw.mail.go.th



ที่ ฮก ๐๓๑๐(๒)/ ๒๕๐๘

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๐๐๐

๒๑ สิงหาคม ๒๕๖๕

เรื่อง เปลี่ยนแปลงสารมลพิษที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท แอลแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษที่ต้องปฏิบัติการวิเคราะห์เอกสาร  
ลงวันที่ ๒๗ มิถุนายน ๒๕๖๔

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์

บริษัท แอลแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด จำนวน ๖ แผ่น

ตามคำขอที่อ้างถึง บริษัท แอลแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ต้องปฏิบัติตาม  
วิเคราะห์เอกสาร เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ  
เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงสารมลพิษที่วิเคราะห์ ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท แอลแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด  
เพิ่มขอบข่ายชนิดสารมลพิษที่วิเคราะห์ในใบที่ได้ยื่น สิ่งปลูกและวัสดุที่ไม่ใช่แล้ว และคืน ตามสิ่งที่ส่งมาด้วย  
อนึ่ง หนังสือฉบับนี้จะมีผลใช้บังคับเมื่อได้รับแจ้งจากบริษัทขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกสาร  
ในวันที่ ๒ กันยายน ๒๕๖๕

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นางสาวปัทมวรรณ คุณประเสริฐ)  
ผู้อำนวยการศูนย์ประเมินผลสิ่งแวดล้อม  
ปฏิบัติการตามแผนปฏิบัติการด้านอุตสาหกรรม

กองวิจัยและพัฒนาสิ่งแวดล้อมโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๖ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๖ ๖๓๑๒ ต่อ ๒๑๐๓

ไปรษณีย์อิเล็กทรอนิกส์ srabanguldw@mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์

บริษัท แอลแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ๖-๒๐๔

ที่ ฮก ๐๓๑๐(๒)/ ๒๕๐๘

ลงวันที่ ๒๑ สิงหาคม ๒๕๖๕

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๔๐ รายการ

นำสืบ จำนวน ๔ รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aluminum	Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(2)</sup>
2	Copper	Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(2)</sup>
3	Iron	Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(2)</sup>
4	Molybdenum	Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(2)</sup>

สิ่งปลูกและวัสดุที่ไม่ใช่แล้ว จำนวน 17 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,4)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(4,6)</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4,7)</sup>
2	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,4)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(4,6)</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4,7)</sup>
3	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,4)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(4,6)</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4,7)</sup>

Beryllium

- ๒ -

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
4	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,4)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(4,6)</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4,7)</sup>
5	Gadolinium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,4)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(4,6)</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4,7)</sup>
6	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,4)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(4,6)</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4,7)</sup>
7	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method <sup>(1,3,4,8)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method <sup>(1,3,7,8)</sup> 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(4,5,6,8)</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(4,5,7,8)</sup>
8	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,4)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,3,7)</sup>

3) Digestion...

- ๓ -

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Copper	3) Digestion, Inductively Coupled Plasma Method <sup>(4,6)</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4,7)</sup> 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,4)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(4,6)</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4,7)</sup>
10	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,4)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(4,6)</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4,7)</sup>
11	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,4)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(4,6)</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4,7)</sup>
12	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,4)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(4,6)</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4,7)</sup>
13	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,4)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(4,6)</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4,7)</sup>

14 Silver...



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
14	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,6)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
15	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,6)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
16	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,6)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
17	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,3,6)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3,7)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>

สิ้น จำนวน 19 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aluminum	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
2	Antimony	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>

3 Arsenic...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Arsenic	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
4	Barium	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
5	Beryllium	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
6	Cadmium	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
7	Chromium	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
8	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(4,5,6,8)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(4,5,6,8)</sup>
9	Copper	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
10	Iron	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
11	Lead	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
12	Manganese	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
13	Molybdenum	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
14	Nickel	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>

15 pH...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	pH	Electrometric Method <sup>(9)</sup>
16	Selenium	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
17	Silver	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
18	Vanadium	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>
19	Zinc	1) Digestion, Inductively Coupled Plasma Method <sup>(6,6)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(6,7)</sup>

เอกสารอ้างอิง

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๓๗



ที่ อก ๐๓๐๓(๑)๕๐ ๑๑๑

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒๖ กันยายน ๒๕๖๔

เรื่อง เปลี่ยนแปลงบุคลากร ชื่อตัวและชื่อสกุลของบุคลากร

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขอมติการสมัครของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๑ สิงหาคม ๒๕๖๔

ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัดต้องปฏิบัติตามวิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๓๐๔ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากร ชื่อตัวและชื่อสกุลของบุคลากร สอดคล้องตามเอกสารแนบ

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้อยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย

๑) นางสาวพุดดี คุณนาม ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๓๔

๒) นางสาวอรณิศา เทียนคำ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๓๔

๒. ให้เปลี่ยนชื่อตัวและชื่อสกุลของเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จากเดิม นายอาทิตย์ ศรีเสน เป็น นายวิฑูรย์ ทวีกิจวรรณ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๔๔

อนึ่ง หนังสือฉบับนี้จะสิ้นสุดอายุพร้อมหนังสือต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ในวันที่ ๒ กันยายน ๒๕๖๔

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

๒

(นางสาวปัทมาวรรณ คุณประเสริฐ)  
ผู้อำนวยการอาวุโสและผู้อำนวยการฝ่ายบริหาร  
ปฏิบัติการทางเทคนิคกรมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนามิเตอร์โรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๒๒ ต่อ ๒๑๐๑๔

โทรสาร ๐ ๒๕๓๐ ๖๓๒๒ ต่อ ๒๑๐๑๔

ไปรษณีย์อิเล็กทรอนิกส์ sarabangadiv@mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"







๐๘ สิงหาคม ๒๕๖๗

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอนแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๗ พฤษภาคม ๒๕๖๗

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอนแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด จำนวน ๓ แผ่น

ตามคำขอที่อ้างถึง บริษัท เอนแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๒๓ สถานที่ตั้งเลขที่ ๖๓๖/๑๐ หมู่ที่ ๕ ตำบลแม่ไม้ อำเภอลำปาง จังหวัดลำปาง

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอนแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน

๑) นายเดช ช้างชน

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๑

๒) นางสาวณิษฐ์ บริรักษ์

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๒

๓) นายสุพจน์ สยามเดช

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๓

ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน

๑) นายณัฐพงษ์ เพ็ชรนา

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๑

๒) นางสาวกัญจนา รักษ์

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๒

๓) นางสาวจุฑาภรณ์ สีทองกลาง

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๓

๔) นางสาวจิตสุภา ประเทืองสุข

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๔

๕) นายสรสรณ์ คุ้มกลอย

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๕

๖) นายณัฐวุฒิ อมรมพรวราช

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๖

๗) นายจิตรกร สีเสนา

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๗

๘) นายสิทธิพร สุวรรณรัตน์

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๘

๙) นายสิทธิพันธ์ เสนาธิ์

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๙

๑๐) นายอนุวัฒน์ เตม

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๐

๑๑) นายสุวิทย์ นาทพงษ์

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๑

๑๒) นายณัฐพล เขียววิวัฒน์

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๒

๑๓) นายชานนท์ บุญชื่น

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๓

๑๔) นายณัฐกานต์ วงศ์อินทร์

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๔

๑๕) นายอานันท์ โพธิ์พรหม

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๕

๑๖) นายณิชาพล...

๑๖) นายณิชาพล ถักกลาง  
๑๗) นายศุภณัฐ พิสัยพันธ์  
๑๘) นายสันต์ คินันต์  
๑๙) นายวิญญู วัฒนศิริ  
๒๐) นายศุภณัฐ สกฤตคิมศักดิ์  
๒๑) นายเอกชัย ถิ่นทอง  
๒๒) นายพงษ์เทพ สิทธิเสนา  
๒๓) นายพินกร ภุมมา  
๒๔) นางสาวนันทยา บุญจันทร์  
๒๕) นายสิทธิชัย อันพิมาย  
๒๖) นางสาวภาวณีน หลอดทอง  
๒๗) นางสาวพจนา สีดา  
๒๘) นางสาวอนิศา กลุศิริวงศ์  
๒๙) นายพิทยา ทองแดง  
๓๐) นางสาวธิดา สุขเกษ  
๓๑) วาที่ร้อยตรี ธนชัย ม่วงมา  
๓๒) นายวรวิทย์ พันพา  
๓๓) นายศักดิ์รินทร์ จรัสกาย  
๓๔) นายสุรศักดิ์ สาขิน  
๓๕) นายสฤตกร งามแก้ว  
๓๖) นายสุทธิดำรง โชคดีนันท์  
๓๗) นายวิมล ทนโชติ  
๓๘) นางสาววนิดา เจริญตระกูล  
๓๙) นายธนสิทธิ์ วงศ์ไชย  
๔๐) นายชัยนุสรณ์ เลิศนันทกุลชัย  
๔๑) นายสุจิตา เพ็ชรแสง  
๔๒) นายกมลภณ มณีสัมพันธ์  
๔๓) นายอริณทร อธิจินดา  
๔๔) นายศุภชัย วงศ์สุริยา  
๔๕) นายโสภณ ดันท์  
๔๖) นางสาวกิตติยา สัตยารักษ์  
๔๗) นางสาวอริณทร ดิวิงค์  
๔๘) นายพิพัฒน์ นิกิตร์เศรษฐ์  
๔๙) นายศิริพงษ์ เรืองสม  
๕๐) นายปารเมศ สัตยาคุณ  
๕๑) นายณพนาถ ธรรมเสโร  
๕๒) นางสาวศุภกานต์ โสจันทร์

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๗  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๘  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๙  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๒๐  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๒๑  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๒๒  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๒๓  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๒๔  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๒๕  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๒๖  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๒๗  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๒๘  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๒๙  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๓๐  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๓๑  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๓๒  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๓๓  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๓๔  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๓๕  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๓๖  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๓๗  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๓๘  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๓๙  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๔๐  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๔๑  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๔๒  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๔๓  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๔๔  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๔๕  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๔๖  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๔๗  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๔๘  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๔๙  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๐  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๑  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๒  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๓

๕๓) นายพชรกร...

๕๒) นายพชรกร เจริญ  
๕๓) นายทิวากร เจริญ  
๕๔) นายอนุวัตร ทองขจรศักดิ์  
๕๕) นายอภิชาติ วิลาศ  
๕๖) นายจิรวิทย์ ศรีวิภา  
๕๗) นายประสาธน์ เจริญพร  
๕๘) นายภาณุวัฒน์ วิ่ง  
๕๙) นายสันติ ชัยชนะ  
๖๐) นายทินกร กุลชาติ

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๔  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๕  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๖  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๗  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๘  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๙  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๖๐  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๖๑  
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๖๒

ค. ขอบข่ายชนิดสารเคมีที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย

ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒๘ มิถุนายน ๒๕๖๘ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๖๐ วัน ก่อนวันสิ้นสุดของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายพชรกิต วัฒนศิริ)  
รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและพัฒนาระบบพลังงานภาคตะวันออก  
โทร. ๐ ๓๓๓๓ ๖๐๕๔ ต่อ ๕๐๐๑-๒  
อีเมล: ewr@dw.mae.go.th



อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนาอุตสาหกรรมสีเขียว



เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน  
บริษัท เอนแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๒๒๓  
ที่ อก ๐๑๒๐/ ๗ ๕๓ ๘ ลงวันที่ ๐๘ สิงหาคม ๒๕๖๗

ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๔ รายการ  
น้ำเสีย จำนวน ๑๔ รายการ

ลำดับ ที่	สารเคมี	วิธีวิเคราะห์
1	Biochemical Oxygen Demand	1) 5-Day BOD Test, Membrane Electrode Method <sup>[2]</sup> 2) 5-Day BOD Test, Azide Modification Method <sup>[2]</sup>
2	Chemical Oxygen Demand	1) Open Reflux, Titrimetric Method <sup>[2]</sup> 2) Closed Reflux, Colorimetric Method <sup>[2]</sup> 3) Closed Reflux, Titrimetric Method <sup>[2]</sup>
3	Color	ADMI Weighted-Ordinate Spectrophotometric Method <sup>[2]</sup>
4	Cyanide	Distillation, Colorimetric Method <sup>[2]</sup>
5	Formaldehyde	Distillation, Colorimetric Method <sup>[1]</sup>
6	Free Chlorine	DPD Ferrous Titrimetric Method <sup>[2]</sup>
7	Oil and Grease	Liquid-Liquid, Partition-Gravimetric Method <sup>[2]</sup>
8	pH	Electrometric Method <sup>[2]</sup>
9	Phenols	1) Distillation, Chloroform Extraction Method <sup>[2]</sup> 2) Distillation, Direct Photometric Method <sup>[2]</sup>
10	Sulfide	ZnS Precipitation, Iodometric Method <sup>[2]</sup>
11	Temperature	Field Method <sup>[2]</sup>
12	Total Dissolved Solids	Dried at 180 °C <sup>[2]</sup>
13	Total Kjeldahl Nitrogen	Semi-Macro Kjeldahl Method <sup>[2]</sup>
14	Total Suspended Solids	Dried at 103-105 °C <sup>[2]</sup>

น้ำใต้ดิน จำนวน 3 รายการ

ลำดับ ที่	สารเคมี	วิธีวิเคราะห์
1	Cyanide	Distillation, Colorimetric Method <sup>[2]</sup>
2	pH	Electrometric Method <sup>[2]</sup>
3	Phenols	Distillation, Direct Photometric Method <sup>[2]</sup>

อากาศเสีย...

อากาศเสีย (ปล่อยระบาย) จำนวน 7 รายการ

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
1	Carbon Monoxide	1) Sampling Bag, Non-Dispersive Infrared Method <sup>[5]</sup> 2) Instrumental Analyzer Method <sup>[9]</sup>
2	Hydrogen Sulfide	Absorption Sampling, Iodometric Method <sup>[5]</sup>
3	Opacity	Ringelmann's Method <sup>[5,4]</sup>
4	Oxide of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method <sup>[8]</sup> 2) Instrumental Analyzer Method <sup>[10]</sup>
5	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Acid Method <sup>[5]</sup> 2) Instrumental Analyzer Method <sup>[11]</sup>
6	Sulfuric Acid	Isokinetic Sampling, Barium – Titrimetric Method <sup>[6]</sup>
7	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method <sup>[7]</sup>

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11. United States Environmental Protection Agency. Determination of Sulfur dioxide Emission from Stationary Sources; Instrumental Analyzer Procedure. 40 CFR 60. Appendix A Method 6C, 2017.



ที่อก ๐๓๑๐/ ๑๐๐๕๕



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๐๕ ตุลาคม ๒๕๖๕

เรื่อง แก้ไขรายชื่อเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอนแอล เอส แอวราทอรี่ กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง หนังสือ บริษัท เอนแอล เอส แอวราทอรี่ กรุ๊ป (ประเทศไทย) จำกัด เลขที่ EN 2024/005

ลงวันที่ ๑๓ สิงหาคม ๒๕๖๕

ตามที่บริษัทที่อ้างถึง บริษัท เอนแอล เอส แอวราทอรี่ กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๒๓ สถานที่ตั้งเลขที่ ๖๑๖/๑๐ หมู่ที่ ๕ ตำบลแม่ไม้ อำเภอบึงสามพัน จังหวัดพะเยา ขอแก้ไขเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน เนื่องจากมีความคลาดเคลื่อน ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรม ได้รับทราบและดำเนินการแก้ไขรายชื่อเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๕ ราย ตามที่แจ้งเวียนเรียบร้อยแล้ว เป็นดังนี้

ลำดับที่ ๒๗ นางพจนา สีดา

ลำดับที่ ๒๘ นายสุวณัฐ ภู่วรรณ

ลำดับที่ ๓๐ นายชัชวาล สุบงกช

ลำดับที่ ๓๖ นายสุทธิศักดิ์ โชคดีสิน

ลำดับที่ ๔๒ นายกันตพล มณีสัมพันธ์

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

  
(นายพรชัย กลิ่นกรวย)  
รองอธิบดี (ปฏิบัติ) สาขามลพิษ  
สิ่งแวดล้อมและสุขภาพ

ศูนย์วิจัยและพัฒนาระบบนิเวศวิทยาทางอากาศตะวันออก

โทร. ๐ ๓๓๓๓ ๖๐๕๕ ต่อ ๕๐๐๑-๒

ไปรษณีย์อิเล็กทรอนิกส์ ewa@dw.mail.go.th

 "อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่อก ๐๓๑๐(๒)/ ๔๒๔๖



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒๐ พฤษภาคม ๒๕๖๕

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอนแอล เอส แอวราทอรี่ กรุ๊ป (ประเทศไทย) จำกัด


อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๑๐ เมษายน ๒๕๖๕

ตามที่คำขอที่อ้างถึง บริษัท เอนแอล เอส แอวราทอรี่ กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๒๓ สถานที่ตั้งเลขที่ ๖๑๖/๑๐ หมู่ที่ ๕ ตำบลแม่ไม้ อำเภอบึงสามพัน จังหวัดพะเยา ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ออกให้เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑ ราย ได้แก่ นายปารมศ สัตยาคุณ ทะเบียนเลขที่ ๖-๑๒๓-๖๐๐๕๑

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

  
(นายประสม ดำรงพงษ์)  
ผู้อำนวยการศูนย์พัฒนาระบบนิเวศวิทยาทางอากาศตะวันออก

ศูนย์วิจัยและพัฒนาระบบนิเวศวิทยาทางอากาศตะวันออก

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ที่ อก ๐๓๑๐(๓)/ ๕๕๐ ๕



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒๗ พฤษภาคม ๒๕๖๘

เรื่อง เปลี่ยนแปลงชื่อ-สกุลบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๑๕ พฤษภาคม ๒๕๖๘

ตามคำขอที่ยังถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ  
วิเคราะห์เอกชน เลขทะเบียน ๖-๓๒๓ สถานที่ตั้งเลขที่ ๖๑๖/๑๐ หมู่ที่ ๕ ตำบลแม่ไม้คู อำเภอลำปางหลวง  
จังหวัดพะเยา ขอเปลี่ยนแปลงชื่อ-สกุลบุคลากร ความละเอียดแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้เปลี่ยนแปลงชื่อ-สกุลบุคลากร จำนวน ๑ ราย  
จากนายธนสิทธิ์ วงศ์ไชย เป็น นายอมลวิทย์ วงศ์ไชย

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายประสม ดำรงพงษ์)  
ผู้อำนวยการกองวิจัยและเฝ้าระวังมลพิษโรงงาน  
ปฏิบัติการตามหนังสือกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเฝ้าระวังมลพิษโรงงานภาคตะวันออก  
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"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่ อก ๐๓๑๐(๓)/ ๕๗๖ ๔



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๐๒ ธันวาคม ๒๕๖๘

เรื่อง เปลี่ยนแปลงสารมลพิษที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๓๑ ตุลาคม ๒๕๖๘

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด จำนวน ๒ แผ่น

ตามคำขอที่ยังถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ  
วิเคราะห์เอกชน เลขทะเบียน ๖-๓๒๓ สถานที่ตั้งเลขที่ ๖๑๖/๑๐ หมู่ที่ ๕ ตำบลแม่ไม้คู อำเภอลำปางหลวง  
จังหวัดพะเยา ขอเปลี่ยนแปลงสารมลพิษที่วิเคราะห์ ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด  
เพิ่มขอบข่ายชนิดสารมลพิษที่วิเคราะห์ในน้ำเสีย และน้ำใต้ดิน ตามสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือฉบับนี้จะส่งอายุพร้อมหนังสือต่ออายุฉบับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
ในวันที่ ๒๘ มิถุนายน ๒๕๖๙

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นางสาวปัทมวรรณ คุณประเสริฐ)  
ผู้อำนวยการกองวิจัยและเฝ้าระวังมลพิษโรงงาน  
ปฏิบัติการตามหนังสือกรมโรงงานอุตสาหกรรม

กองวิจัยและเฝ้าระวังมลพิษโรงงาน  
ศูนย์วิจัยและเฝ้าระวังมลพิษโรงงานภาคตะวันออก  
โทร. ๐ ๓๓๑๓ ๖๐๕๙ ต่อ ๕๐๐๑-๒  
ไปรษณีย์อิเล็กทรอนิกส์ einw@diw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๓๒๓

ที่ อก ๐๓๑๐(๓)/ ๕๗๖ ๔ ลงวันที่ ๐๒ ธันวาคม ๒๕๖๘

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๓ รายการ

น้ำเสีย จำนวน 13 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Arsenic	Digestion, Inductively Coupled Plasma Method
2	Barium	Digestion, Inductively Coupled Plasma Method
3	Cadmium	Digestion, Inductively Coupled Plasma Method
4	Chromium	Digestion, Inductively Coupled Plasma Method
5	Copper	Digestion, Inductively Coupled Plasma Method
6	Hexavalent Chromium	Colorimetric Method
7	Lead	Digestion, Inductively Coupled Plasma Method
8	Manganese	Digestion, Inductively Coupled Plasma Method
9	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method
10	Nickel	Digestion, Inductively Coupled Plasma Method
11	Selenium	Digestion, Inductively Coupled Plasma Method
12	Trivalent Chromium	Calculation
13	Zinc	Digestion, Inductively Coupled Plasma Method

น้ำใต้ดิน จำนวน 20 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aluminum	Digestion, Inductively Coupled Plasma Method
2	Antimony	Digestion, Inductively Coupled Plasma Method
3	Arsenic	Digestion, Inductively Coupled Plasma Method
4	Barium	Digestion, Inductively Coupled Plasma Method
5	Beryllium	Digestion, Inductively Coupled Plasma Method
6	Cadmium	Digestion, Inductively Coupled Plasma Method
7	Chromium	Digestion, Inductively Coupled Plasma Method
8	Chromium (III)	Calculation
9	Chromium (VI)	Colorimetric Method
10	Copper	Digestion, Inductively Coupled Plasma Method

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
11	Iron	Digestion, Inductively Coupled Plasma Method
12	Lead	Digestion, Inductively Coupled Plasma Method
13	Manganese	Digestion, Inductively Coupled Plasma Method
14	Mercury	Digestion Cold-Vapor Atomic Absorption Spectrometric Method
15	Molybdenum	Digestion, Inductively Coupled Plasma Method
16	Nickel	Digestion, Inductively Coupled Plasma Method
17	Selenium	Digestion, Inductively Coupled Plasma Method
18	Silver	Digestion, Inductively Coupled Plasma Method
19	Vanadium	Digestion, Inductively Coupled Plasma Method
20	Zinc	Digestion, Inductively Coupled Plasma Method

เอกสารอ้างอิง

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