

ภาคผนวก ง

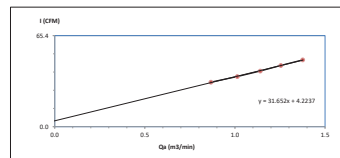
เอกสารการสอบเทียบเครื่องมือตรวจวิเคราะห์

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Sample Name	Parameter	Equipment Name	ID No	Calibrated Date	Heat Cat	Freq. Calibrated (Months)
Noise	Left Eye	Sound Calibrator	RSC_P0001	8/03/21	7/03/21	12
Noise	Right Eye	Sound Calibrator	RSC_P0002	8/03/21	7/03/21	12
Noise	Head	Sound Level Meter	RSC_P0006	21/06/21	20/06/21	12
Noise	Head	Sound Level Meter	RSC_P0007	21/06/21	20/06/21	12
Noise	Left Eye	Sound Level Meter	RSC_P0008	21/06/21	20/06/21	12
Noise	Right Eye	Sound Level Meter	RSC_P0009	21/06/21	20/06/21	12
Noise	Left Eye	Sound Level Meter	RSC_P0011	18/06/21	17/06/21	12
Noise	Right Eye	Sound Level Meter	RSC_P0012	18/06/21	17/06/21	12
Noise	Head	Sound Level Meter	RSC_P0013	19/06/21	18/06/21	12
Heat	Head	Heat Stress Monitor	RSC_P0014	1/06/21	1/06/21	12
Heat	Head	Head Stress	RSC_P0017	7/06/21	7/06/21	12
Heat	Head	Head Stress	RSC_P0018	1/06/21	1/06/21	12
Heat	Head	Head Stress Monitor	RSC_P0022	20/06/21	20/06/21	12
Heat	Head	Head Stress	RSC_P0024	09/06/21	9/06/21	12
Heat	Head	Head Stress	RSC_P0025	20/06/21	20/06/21	12
Heat	Head	Head Stress	RSC_P0026	17/06/21	16/06/21	12
Heat	Head	Head Stress Monitor	RSC_P0028	18/06/21	18/06/21	12
Heat	Head	Head Stress Monitor	RSC_P0029	17/06/21	17/06/21	12
Heat	Head	Head Stress Monitor	RSC_P0030	17/06/21	16/06/21	12
Heat	Head	Head Stress Monitor	RSC_P0036	9/06/21	9/06/21	12
Heat	Head	Head Stress Monitor	RSC_P0037	17/06/21	17/06/21	12
Heat	Head	Head Stress Monitor	RSC_P0038	15/06/21	15/06/21	12
Heat	Head	Head Stress Monitor	RSC_P0039	13/06/21	13/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0040	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0041	13/06/21	13/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0042	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0043	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0044	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0045	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0046	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0047	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0048	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0049	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0050	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0051	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0052	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0053	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0054	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0055	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0056	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0057	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0058	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0059	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0060	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0061	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0062	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0063	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0064	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0065	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0066	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0067	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0068	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0069	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0070	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0071	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0072	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0073	15/06/21	15/06/21	12
Performance	Speed	Speed Measurement System	RSC_P0074	15/06/21	15/06/21	12
Performance	Endurance	Speed Measurement System	RSC_P0075	15/06/21	15/06/21	12
Performance	Speed					

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Test No.	Delta H ₂ O (inch)	Qa (m ³ /min)	1: Chart (CFM)	Linear Regression	
1	1.6	0.867	32	Slope:	31.6525
2	2.2	1.013	36	Intercept:	4.2237
3	2.8	1.141	40	Correlation Coefficient:	0.9989
4	3.4	1.255	44		
5	4.1	1.376	48		

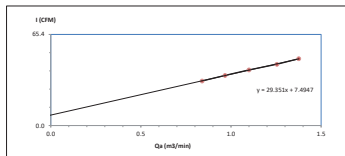


Approved by : Suppt S
(Mr. Supot Salamteah)
Field Services Section Head

FORM NO.: F 06-074 REVISION NO.: 2 ISSUE DATE: 20/11/21



Project Site :	Gulf NC Co, Ltd.	Barometric Pressure (mm Hg) :	754.7
Calibrate Location :	Saenigumpru	Temperature (°C) :	33.8
Calibrate Date :	2-Dec-25	High Volume ID :	RVC-P50192
Calibration Sheet No.:	C-021225-RVC-P50192	High Volume Model :	TE-5009X
	RVC-P50205	High Volume S/N :	5311
Calibrator Model :	TE-5028A	Calibrator Shape :	0.95091
Calibrator S/N :	1166	Calibrator Intervent :	-0.01856

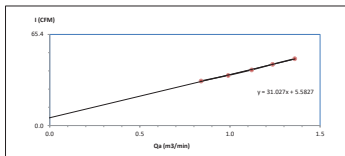


Approved by : Suppt S
(Mr. Supot Salamteh)
Field Services Section Head

FORM NO.: F 06-074 REVISION NO.:2 ISSUE DATE: 20/11/23



Project Site:	Guil NC Co., Ltd.	Barometric Pressure (mm Hg):	754.7
Calibrate Location:	30°32'23"N 103°03'39"E	Temperature (°C):	33.8
Calibrate Date:	2-Dec-25	High Volume ID:	RYG-P50399
Calibration Sheet No.:	C-021225-RYG-P50399	High Volume Model:	TE-5509X3
Calibrator:	RYG-P50205	High Volume S/N:	5463
Calibrator Model:	TE-5028A	Calibrator Slope:	0.95091
Calibrator S/N:	1166	Calibrator Intercept:	-0.01856

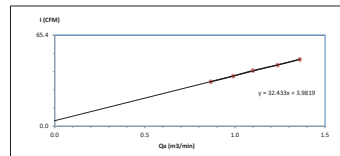


Approved by: Supt S
(Mr. Supot Salamteh)
Field Services Section Head

FORM NO.: F-06-074 REVISION NO.:2 ISSUE DATE: 20/11/23



Project Site:	Gulf NC Co. Ltd.	Barometric Pressure (mm Hg):	754.7
Calibrate Location:	TE509075/509086	Temperature (°C):	31.8
Calibrate Date:	2-Dec-25	High Volume ID:	RVC P30665
Calibration Sheet No:	C-021225-RVC P30665	High Volume Model:	TE-50909
Calibrator ID:	RVC P30205	High Volume S/N:	6204
Calibrator Model:	TE 5028BA	Calibrator Slope:	0.92091
Calibrator S/N:	1166	Calibrator Intercept:	-0.01856

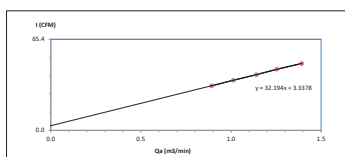


Approved by : Suppt S.
(Mr. Supot Salamteah)
Field Services Section Head

FORM NO.: F 06-074 REVISION NO.: 2 ISSUE DATE: 20/11/2



Project Site:	Gulf NC Co., Ltd.	Barometric Pressure (mm Hg):	754.7
Calibrate Location:	ศูนย์วิเคราะห์	Temperature (°C):	33.8
Calibrate Date:	2-Dec-25	High Volume ID:	RYG-P50398
Calibration Sheet No.:	C-021225-RYG-P50398	High Volume Model:	TE-5009X
Calibrator ID:	RYG-P50205	High Volume S/N:	5684
Calibrator Model:	TE-5028A	Calibrator Shape:	0.95091
Calibrator S/N:	1166	Calibrator Intercept:	-0.01856

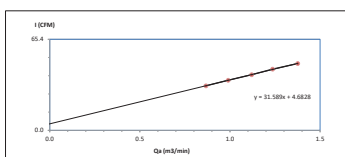


Approved by : Supt S
(Mr. Supot Salamteh)
Field Services Section Head

FORM NO - E-66-074, EDITION NO-2, ISSUE DATE-20/11/2015



Project Site:	Gulf Ref Co., Ltd.	Barometric Pressure (mm Hg):	754.7
Calibrate Location:	๓๐๖๒๙๔๗๘๑๕	Temperature (°C):	33.8
Calibration Date:	2-Dec-25	High Volume ID:	BVG-P30188
Calibration Sheet No.:	C-621225-BVG-P30188	High Volume Model:	TE-5009X
Calibrator:	BVG-P30205	High Volume S/N:	4796
Calibrator Model:	TE-5028A	Calibrator Slope:	0.95091
Calibrator S/N:	1166	Calibrator Intercept:	-0.01856



Approved by : Supt S
(Mr. Supot Salamteah)
Field Services Section Head

FORM NO- E-06-074 REVISION NO-2 ISSUE DATE- 20/11/22



Calibration certificate

Calibration Certificate No. 25BKL0001

Customer	ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
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Order no. 2230

Date of calibration 20 Feb 2025

NEXT CAL DATE.....20/02/26

This collection certificate may not be reproduced other than in full except with the permission of NRC 7101 710 47000 and the

The user is obliged to have the object recalibrated at appropriate intervals.

Date	06 Mar 2025	Approval of the Calibration Certificate	Person in charge
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Qm's Kachen


Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang
10310 Bangkok

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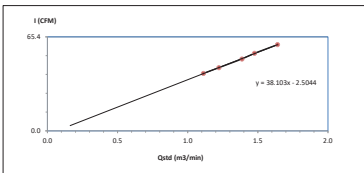
Calibration certificate No. 256K001 Calibration Certificate																					
<h2>Adjustment Status</h2> <p>The measuring device was internally adjusted before the calibration.</p> <h2>Environmental and measuring conditions</h2> <p>Date of calibration: 20 Feb 2025</p> <p>Temperature at place of calibration Temp. diff. T_{avg} T_{max} T_{min} Measuring conditions</p> <p>Comments</p> <p>The installation site is suitable. The device was leveled. Balance was loaded up to Max before test.</p> <p>Humidity 58.0 %RH</p>																					
<h2>Measurement results Measurement uncertainties</h2>																					
Repeatability Test load (nominal): 10 g 100 g					Corrected Test load (nominal): 10 g 100 g																
1	10.0000 g	100.0000 g	Center	50.0000 g	1	10.0000 g	100.0000 g	Center	50.0000 g												
2	9.9999 g	100.0000 g	Back left	50.0000 g	2	9.9999 g	100.0000 g	Back left	50.0000 g												
3	10.0000 g	99.9999 g	Back right	49.9999 g	3	10.0000 g	99.9999 g	Back right	49.9999 g												
4	10.0000 g	100.0000 g	Front right	50.0000 g	4	10.0000 g	100.0000 g	Front right	50.0000 g												
5	10.0000 g	99.9999 g	Maximum deviation from center loading indication																		
6	9.9999 g	99.9999 g	[Max] max = 0.0001 g																		
7	10.0000 g	100.0000 g																			
8	10.0000 g	100.0000 g																			
9	10.0000 g	100.0000 g																			
10	10.0000 g	100.0000 g																			
± 0.00004 g		± 0.000003 g																			
<h2>Error of indication</h2>																					
Testload	Indication	Error	Expansion factor	Uncertainty	Uncertainty relative																
L	F	E	k	U(E)	U_{rel}(E)																
0.0050 g	0.0100 g	0.0000 g	2.00	0.00013 g	1.2 %																
0.0500 g	0.0500 g	0.0000 g	2.00	0.00013 g	0.25 %																
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 %																
2.0000 g	2.0000 g	0.0000 g	2.00	0.00013 g	0.0065 %																
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	0.00069 %																
50.0000 g	50.0000 g	0.0000 g	2.00	0.00021 g	0.00041 %																
100.0000 g	100.0000 g	0.0000 g	2.00	0.00021 g	0.00021 %																
100.0000 g	149.9999 g	-0.0001 g	2.00	0.00028 g	0.00019 %																
Maximum error of indication		[E] _{max} = 0.0001 g																			
<p><i>U_{rel}(E)</i> is the quotient of <i>U(E)</i> and test load. The uncertainty of measurement <i>U(E)</i> is valid only if error is not considered. You will find reference values on the certificate of measurement or on our website. Applicable to the calibration certificate. Uncertainty of measurement results.</p> <p>Reference Note: The reported expanded uncertainty of measurement is stated at the standard uncertainty <i>U(E)</i> multiplied by the coverage factor <i>k</i> = 2, which corresponds to a probability that the value of the measurand is within the expanded uncertainty of measurement is approximately 95 %.</p>																					
End of calibration certificate																					
Sartorius (Thailand) Co. Ltd. 125 Rama 9 Road, Huaywang 10130 Bangkok </																					





High Volume Air Sampler Calibration Worksheet

Project Site :	Gulf NC Co., Ltd.	Barometric Pressure (mm Hg) :	755.47
Calibrate Location :	Samarinda	Temperature (°C) :	33.8
Calibrate Date :	2-Dec-25	High Volume ID :	RYG_P50177
CalibrationSheet No.:	C-021225-RYG_P50177	High Volume Model :	TE-5170D
Calibrator ID:	RYG_P50205	High Volume S/N :	4803
Calibrator Model :	TE-5020A	Calibrator Slope :	1.51825
Calibrator S/N :	1166	Calibrator Intercept :	-0.02964


Test No.	Delta H ₂ O (inch)	Q _{air} (cc/min)	I: Chart (CFM)	Linear Regression
1	2.8	1.1121	40	Slope : 38.1826 Intercept : -2.5044 Correlation Coefficient : 0.9996
2	3.4	1.2224	44	
3	4.4	1.3885	50	
4	5.0	1.4761	54	
5	6.2	1.6403	60	



Calibrated by : 
 (Mr. Anuwat Yerna)
 RYG Field Services Scientist (1)

Approved by : 
 (Mr. Supot Salanteh)
 Field Services Section Head

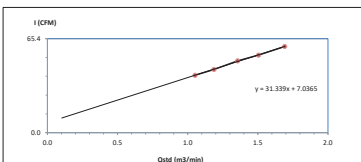
FORM NO. F-66-073 REVISION NO.-2 ISSUE DATE: 20/11/23




High Volume Air Sampler Calibration Worksheet

Project Site :	Golf NC Co., Ltd.	Barometric Pressure (mm Hg) :	754.7
Calibrate Location :	602/250255	Temperature (°C) :	33.5
Calibrate Date :	2-Dec-25	High Volume ID :	RYG-P50181
CalibrationSheet No.:	C-021225-RYG-P50181	High Volume Model :	TE-5170D
Calibrator ID :	RYG-P50205	High Volume S/N :	5314
Calibrator Model :	TE-5020A	Calibrator Slope :	1.51825
Calibrator S/N :	1166	Calibrator Intercept :	-0.02964


Test No.	Delta H ₂ O (inch)	Q _{air} (m ³ /min)	1 / Chart (CFM)	Linear Regression
1	2.5	1.0524	40	Slope: 31.3394 Intercept: 7.0365 Correlation Coefficient: 0.9993
2	3.2	1.1868	44	
3	4.2	1.3553	50	
4	5.2	1.5047	54	
5	6.6	1.6935	60	



$y = 31.339x + 7.0365$


Calibrated by: 

(Mr. Anuwet Yema)
RYG Field Services Scientist (1)

Approved by: 

(Mr. Supot Salanthub)
Field Services Section Head

FORM NO. F-06-073 REVISION NO.-2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site : Gulf NC Co., Ltd.

Calibrate Location : SPR001/HA/10/10/10

Calibrate Date : 2-Dec-25

CalibrationSheet No.: C-0211225-RVG-F50178

Calibrator ID: RYG-F50205

Calibrator Model : TE-5028A

Calibrator S/N: 1166

Barometric Pressure (mm Hg) : 754.7

Temperature (°C) : 33.8

High Volume ID : RYG-F50178

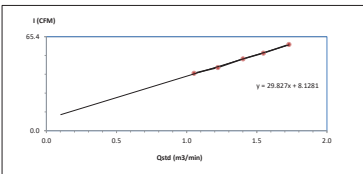
High Volume Model : TE-5170D


High Volume S/N : 4804

Calibrator Slope : 1.51825


Calibrator Intercept : -0.02964

Test No.	Delta H ₂ O (inch)	Q _{as} (m ³ /min)	1: Chart (CFM)	Linear Regression
1	2.5	1.6524	40	Slope : <u>29.8266</u> Intercept : <u>8.1281</u> Correlation Coefficient : <u>0.9985</u>
2	3.4	1.2224	44	
3	4.5	1.4819	50	
4	5.5	1.5467	54	
5	6.9	1.7208	60	



Calibrated by : 

(Mr. Anuwat Tema)
RYG Field Services Scientist (1)

Approved by : 

(Mr. Supot Salanthit)
Field Services Section Head

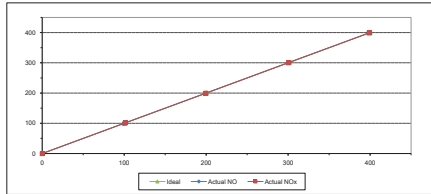
FORM NO.: F 06-073 REVISION NO.: 2 ISSUE DATE: 20/11/23



MULTIPOINT CALIBRATION REPORT

Calibration Date 3-Jul-25 Equipment Name NOx Analyzer
Manufacturer HORIBA Model APNA-370
Serial No. NV9RSYH Equipment ID RYG_FS0459
Calibrator Manufacturer Teledyne API Model 700
Serial No. 947
Std. Gas Concentration (PPM) 55.88 Cylinder No. GN0227222
Cylinder Pressure (psf) 1800 Certified By Algas Inc.
Certified Date 9-Feb-22 Expired Date 9-Feb-30

CALIBRATION RESULTS							
Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.05	0.05	0.05	0.10	0.10	0.10
1	100.00	99.50	-0.50	-0.50	101.20	1.20	1.20
2	200.00	198.70	-1.30	-0.65	199.70	-0.30	-0.15
3	300.00	301.10	1.10	0.37	301.00	1.00	0.33
4	400.00	400.30	0.30	0.08	399.80	-0.20	-0.30
AVERAGE (%)				-0.13			0.34



Calibrated By

(Mr. Jirend Saliem)
Field Environmental Scientist (3)

Approved By

(Mr. Sarayuth Jitramont)
Assistant General Manager

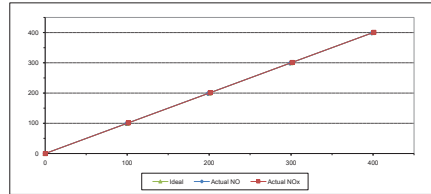
ALS Laboratory Group
FORM NO. F-08-056 REVISION NO. - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date 3-Jul-25 Equipment Name NOx Analyzer
Manufacturer Teledyne API Model N200
Serial No. 122 Equipment ID RYG_FS0732
Calibrator Manufacturer Teledyne API Model 700
Serial No. 947
Std. Gas Concentration (PPM) 55.88 Cylinder No. GN0227222
Cylinder Pressure (psf) 1800 Certified By Algas Inc.
Certified Date 9-Feb-22 Expired Date 9-Feb-30

CALIBRATION RESULTS							
Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	99.20	-0.80	-0.80	101.30	1.30	1.30
2	200.00	198.70	-1.30	-0.65	201.30	1.30	0.65
3	300.00	298.80	-1.20	-0.40	301.30	1.30	0.43
4	400.00	398.50	-1.50	-0.38	401.00	1.00	0.25
AVERAGE (%)				-0.43			0.55



Calibrated By

(Mr. Jirend Saliem)
Field Environmental Scientist (3)

Approved By

(Mr. Sarayuth Jitramont)
Assistant General Manager

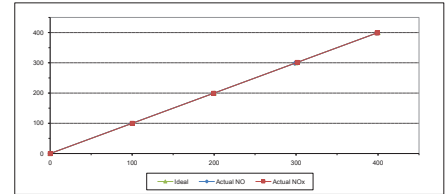
ALS Laboratory Group
FORM NO. F-08-056 REVISION NO. - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date 2-Jul-25 Equipment Name NOx Analyzer
Manufacturer HORIBA Model APNA-370
Serial No. 60514JK Equipment ID RYG_FS0284
Calibrator Manufacturer Teledyne API Model 700
Serial No. 947
Std. Gas Concentration (PPM) 55.88 Cylinder No. GN0227222
Cylinder Pressure (psf) 1800 Certified By Algas Inc.
Certified Date 9-Feb-22 Expired Date 9-Feb-30

CALIBRATION RESULTS							
Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.05	0.05	0.05	0.10	0.10	0.10
1	100.00	99.20	-0.80	-0.80	100.10	0.10	0.10
2	200.00	198.70	-1.30	-0.65	199.30	-0.70	-0.35
3	300.00	298.80	-1.20	-0.40	301.40	1.40	0.47
4	400.00	400.30	0.30	0.08	399.80	-0.20	-0.30
AVERAGE (%)				-0.44			0.00



Calibrated By

(Mr. Jirend Saliem)
Field Environmental Scientist (3)

Approved By

(Mr. Sarayuth Jitramont)
Assistant General Manager

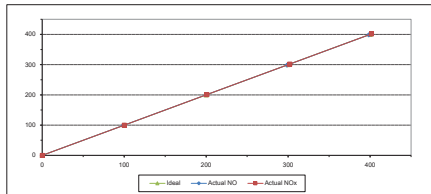
ALS Laboratory Group
FORM NO. F-08-056 REVISION NO. - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date 3-Jul-25 Equipment Name NOx Analyzer
Manufacturer HORIBA Model APNA-370
Serial No. T09HW441 Equipment ID RYG_FS0461
Calibrator Manufacturer Teledyne API Model 700
Serial No. 947
Std. Gas Concentration (PPM) 55.88 Cylinder No. GN0227222
Cylinder Pressure (psf) 1800 Certified By Algas Inc.
Certified Date 9-Feb-22 Expired Date 9-Feb-30

CALIBRATION RESULTS							
Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	98.70	-1.30	-1.30	100.10	0.10	0.10
2	200.00	201.00	1.00	0.50	201.00	1.00	0.50
3	300.00	298.70	-1.30	-0.43	302.10	2.10	0.70
4	400.00	398.40	-1.60	-0.40	401.60	1.60	0.40
AVERAGE (%)				-0.31			0.36



Calibrated By

(Mr. Jirend Saliem)
Field Environmental Scientist (3)

Approved By

(Mr. Sarayuth Jitramont)
Assistant General Manager

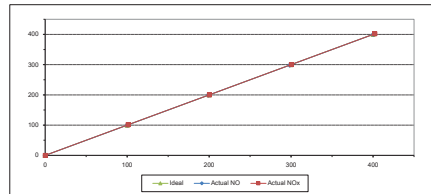
ALS Laboratory Group
FORM NO. F-08-056 REVISION NO. - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date 1-Jul-25 Equipment Name NOx Analyzer
Manufacturer Teledyne API Model T200
Serial No. 1983 Equipment ID BKQ_FS0728
Calibrator Manufacturer Teledyne API Model 700
Serial No. 947
Std. Gas Concentration (PPM) 55.88 Cylinder No. GN0227222
Cylinder Pressure (psf) 1800 Certified By Algas Inc.
Certified Date 9-Feb-22 Expired Date 9-Feb-30

CALIBRATION RESULTS							
Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	100.10	0.10	0.10	101.10	1.10	1.10
2	200.00	199.20	-0.80	-0.40	200.30	0.30	0.15
3	300.00	298.30	-1.70	-0.57	300.30	0.30	0.10
4	400.00	400.20	0.20	0.05	402.20	2.20	0.55
AVERAGE (%)				-0.14			0.40



Calibrated By

(Mr. Jirend Saliem)
Field Environmental Scientist (3)

Approved By

(Mr. Sarayuth Jitramont)
Assistant General Manager

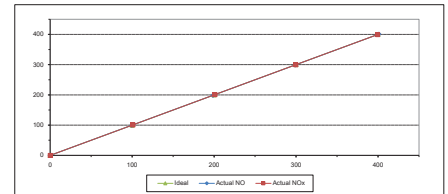
ALS Laboratory Group
FORM NO. F-08-056 REVISION NO. - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date 2-Jul-25 Equipment Name NOx Analyzer
Manufacturer HORIBA Model APNA-370
Serial No. H7SKYD1M Equipment ID BKQ_FS0797
Calibrator Manufacturer Teledyne API Model 700
Serial No. 947
Std. Gas Concentration (PPM) 55.88 Cylinder No. GN0227222
Cylinder Pressure (psf) 1800 Certified By Algas Inc.
Certified Date 9-Feb-22 Expired Date 9-Feb-30

CALIBRATION RESULTS							
Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	99.70	-0.30	-0.30	101.00	1.00	1.00
2	200.00	198.60	-1.40	-0.70	201.10	1.10	0.55
3	300.00	299.10	-0.90	-0.30	299.70	-0.30	-0.10
4	400.00	401.10	1.10	0.28	399.50	-0.50	-0.13
AVERAGE (%)				-0.18			0.28



Calibrated By

(Mr. Jirend Saliem)
Field Environmental Scientist (3)

Approved By

(Mr. Sarayuth Jitramont)
Assistant General Manager

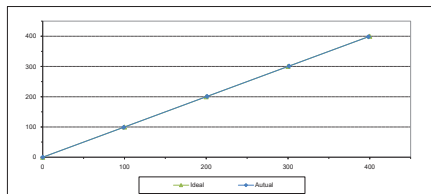
ALS Laboratory Group
FORM NO. F-08-056 REVISION NO. - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date 2-Jul-25 Equipment Name SO2 Analyzer
Manufacturer HORIBA Model APSA-370
Serial No. PAUYOTTA Equipment ID RYG_FS0458
Calibrator Manufacturer Teledyne API Model 700
Serial No. 947
Std. Gas Concentration (PPM) 59.3 Cylinder No. GN0227222
Cylinder Pressure (psf) 1800 Certified By Algas Inc.
Certified Date 9-Feb-22 Expired Date 9-Feb-30

CALIBRATION RESULTS				
Point	Ideal	Actual	Error	%Error
ZERO	0.00		0.10	
1	100.00	99.10	-0.90	-0.90
2	200.00	201.00	1.00	0.50
3	300.00	301.30	1.30	0.43
4	400.00	398.50	-1.50	-0.38
AVERAGE (%)				-0.08



Calibrated By

(Mr. Jirend Saliem)
Field Environmental Scientist (3)

Approved By

(Mr. Sarayuth Jitramont)
Assistant General Manager

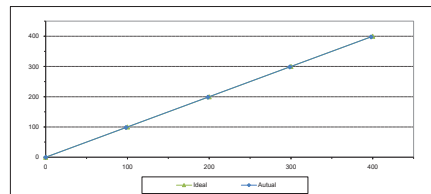
ALS Laboratory Group
FORM NO. F-08-056 REVISION NO. - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date 3-Jul-25 Equipment Name SO2 Analyzer
Manufacturer Teledyne API Model N100
Serial No. 115 Equipment ID RYG_FS0733
Calibrator Manufacturer Teledyne API Model 700
Serial No. 947
Std. Gas Concentration (PPM) 59.3 Cylinder No. GN0227222
Cylinder Pressure (psf) 1800 Certified By Algas Inc.
Certified Date 9-Feb-22 Expired Date 9-Feb-30

CALIBRATION RESULTS				
Point	Ideal	Actual	Error	%Error
ZERO	0.00	0.10		
1	100.00	98.30	-1.70	-1.70
2	200.00	198.50	-1.50	-0.75
3	300.00	298.50	-1.50	-0.50
4	400.00	398.00	-2.00	-0.50
AVERAGE (%)				-0.67



Calibrated By

(Mr. Jirend Saliem)
Field Environmental Scientist (3)

Approved By

(Mr. Sarayuth Jitramont)
Assistant General Manager

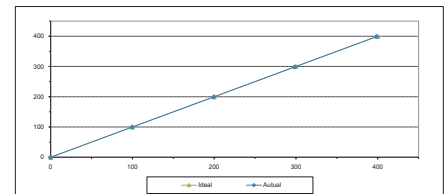
ALS Laboratory Group
FORM NO. F-08-056 REVISION NO. - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date 2-Jul-25 Equipment Name SO2 Analyzer
Manufacturer HORIBA Model APSA-370
Serial No. YPTQJ20 Equipment ID RYG_FS0283
Calibrator Manufacturer Teledyne API Model 700
Serial No. 947
Std. Gas Concentration (PPM) 59.3 Cylinder No. GN0227222
Cylinder Pressure (psf) 1800 Certified By Algas Inc.
Certified Date 9-Feb-22 Expired Date 9-Feb-30

CALIBRATION RESULTS				
Point	Ideal	Actual	Error	%Error
ZERO	0.00		0.10	
1	100.00	99.70	-0.30	-0.30
2	200.00	199.40	-0.60	-0.30
3	300.00	298.20	-1.80	-0.60
4	400.00	398.50	-1.50	-0.38
AVERAGE (%)				-0.30



Calibrated By

(Mr. Jirend Saliem)
Field Environmental Scientist (3)

Approved By

(Mr. Sarayuth Jitramont)
Assistant General Manager

ALS Laboratory Group
FORM NO. F-08-056 REVISION NO. - ISSUE DATE: 02/04/12

MULTIPOINT CALIBRATION REPORT

Calibration Date: 2-Jul-25, Equipment Name: BQZ Analyzer, Manufacturer: HORIBA, Model: APBA-370, Serial No.: VABFBLH, Equipment ID: RYQ_F80480, Calibrator Manufacturer: Teledyne API, Model: 700, Serial No.: 847, Std. Gas Concentration (PPM): 86.3, Cylinder No.: GN027222, Certified By: Alphas Inc., Cylinder Pressure (psi): 1800, Expired Date: 9-Feb-30, Certified Date: 9-Feb-22

Calibration Results Table with columns: Point, Ideal, Actual, Error, %Error. Points 1-4 show increasing values from 0.00 to 400.00.

Graph showing Actual vs Ideal calibration results.

Calibrated By: (Mr. Aravud Sakam), Field Environmental Scientist (S), Approved By: (Mr. Saravuth Jitranont), Assistant General Manager.

ALS Laboratory Group, FORM NO. F-06-056, REVISION NO.: ISSUE DATE: 02/04/12

MULTIPOINT CALIBRATION REPORT

Calibration Date: 1-Jul-25, Equipment Name: BQZ Analyzer, Manufacturer: HORIBA, Model: APBA-370, Serial No.: PFDWYU4, Equipment ID: BKC_F80788, Calibrator Manufacturer: Teledyne API, Model: 700, Serial No.: 847, Std. Gas Concentration (PPM): 86.3, Cylinder No.: GN027222, Certified By: Alphas Inc., Cylinder Pressure (psi): 1800, Expired Date: 9-Feb-30, Certified Date: 9-Feb-22

Calibration Results Table with columns: Point, Ideal, Actual, Error, %Error. Points 1-4 show increasing values from 0.00 to 400.00.

Graph showing Actual vs Ideal calibration results.

Calibrated By: (Mr. Aravud Sakam), Field Environmental Scientist (S), Approved By: (Mr. Saravuth Jitranont), Assistant General Manager.

ALS Laboratory Group, FORM NO. F-06-056, REVISION NO.: ISSUE DATE: 02/04/12

MULTIPOINT CALIBRATION REPORT

Calibration Date: 1-Jul-25, Equipment Name: BQZ Analyzer, Manufacturer: HORIBA, Model: APBA-370, Serial No.: G2CH436B, Equipment ID: BKC_F80788, Calibrator Manufacturer: Teledyne API, Model: 700, Serial No.: 847, Std. Gas Concentration (PPM): 86.3, Cylinder No.: GN027222, Certified By: Alphas Inc., Cylinder Pressure (psi): 1800, Expired Date: 9-Feb-30, Certified Date: 9-Feb-22

Calibration Results Table with columns: Point, Ideal, Actual, Error, %Error. Points 1-4 show increasing values from 0.00 to 400.00.

Graph showing Actual vs Ideal calibration results.

Calibrated By: (Mr. Aravud Sakam), Field Environmental Scientist (S), Approved By: (Mr. Saravuth Jitranont), Assistant General Manager.

ALS Laboratory Group, FORM NO. F-06-056, REVISION NO.: ISSUE DATE: 02/04/12

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Cup anemometer, Manufacturer: Novatek, Model/Type: Sensor: WS-027A, Data logger: 130 WS-250L-D, SERIAL NUMBER: Sensor: WS-027A, Data logger: 130 WS-250L-D, ID NUMBER: PMS, CONDITION AS RECEIVED: CUSTOMER

RECEIVED DATE: 17 Jan 2025, MEASUREMENT DATE: 07 Feb 2025, ISSUE DATE: 07 Feb 2025

ENVIRONMENTAL CONDITIONS: Ambient conditions in the laboratory are as follows: Temperature: 23.0 ± 0.5 °C, Relative Humidity: 55.0 ± 5.0 %RH, Atmospheric Pressure: 1010.0 ± 0.5 hPa

PLACE OF CALIBRATION: Effort type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITIONS: Wind tunnel cross section area: 900 cm², Wind direction type: Effort, Diameter of measuring pipe: 120 mm, Blockage ratio of test object: 0.111

Preconditioning: 24 hours at ambient conditions, Measurement Condition: The storage values during measurement are (24.0 °C, (55.0 %RH and 1010.0 hPa).

TABULATION OF RESULTS: The table on next page give the measured values.

Calibrated by: (Mr. Saravuth Jitranont), Approved signature: (Mr. Saravuth Jitranont), REVIEW BY: (Mr. Saravuth Jitranont), APPROVED BY: (Mr. Saravuth Jitranont), NEXT CAL DATE: 07/08/26

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

CERTIFICATE OF CALIBRATION

Page 2 of 2 Pages

MEASUREMENT RESULTS: The Cup anemometer, Wind Tunnel Calibration (BQZ) was exercise at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 6 m/s to 10 m/s was calibrated by a standard air velocity instrument which was installed 50 mm away from wind tunnel nozzle and installed 10 mm away from top of the test section and the standard air velocity 5 m/s to 10 m/s was calibrated by a pitot tube with positive differential pressure sensor which was installed 50 mm away from wind tunnel nozzle and installed 10 mm away from top of the test section. BQZ was mounted on a standard air velocity instrument of the test section 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 10 m/s at calibration range of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

Remarks: * Calibration results only count for the tested circumstances and environmental conditions during which calibration was performed. * Velocity of standard. * Velocity of standard 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 calibration set. Remarks: The proportion of the set-up is not true to scale due to image geometry.

End of Certificate of Calibration

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Wind Direction Sensor, Manufacturer: Novatek, Model/Type: Sensor: WS-027A, Data logger: 130 WS-250L-D, SERIAL NUMBER: Sensor: WS-027A, Data logger: 130 WS-250L-D, ID NUMBER: PMS, CONDITION AS RECEIVED: CUSTOMER

RECEIVED DATE: 17 Jan 2025, MEASUREMENT DATE: 07 Feb 2025, ISSUE DATE: 07 Feb 2025

ENVIRONMENTAL CONDITIONS: Ambient conditions in the laboratory are as follows: Temperature: 23.0 ± 0.5 °C, Relative Humidity: 55.0 ± 5.0 %RH, Atmospheric Pressure: 1010.0 ± 0.5 hPa

PLACE OF CALIBRATION: Effort type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITIONS: Wind tunnel cross section area: 900 cm², Wind direction type: Effort, Diameter of measuring pipe: 120 mm, Blockage ratio of test object: 0.111

Preconditioning: 24 hours at ambient conditions, Measurement Condition: The storage values during measurement are (24.0 °C, (55.0 %RH and 1010.0 hPa).

TABULATION OF RESULTS: The table on next page give the measured values.

Calibrated by: (Mr. Saravuth Jitranont), Approved signature: (Mr. Saravuth Jitranont), REVIEW BY: (Mr. Saravuth Jitranont), APPROVED BY: (Mr. Saravuth Jitranont), NEXT CAL DATE: 07/08/26

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

CERTIFICATE OF CALIBRATION

Page 2 of 2 Pages

MEASUREMENT RESULTS: 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 counter-clockwise direction after offset adjustment has been made. The force of wind tunnel (usually 5 m/s) is kept constant while the sensor is rotated around in vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below.

Calibration Results Table with columns: Air speed, 0° to 315°, Error, %Error. Points 1-4 show increasing values from 0.00 to 400.00.

Graph showing Actual vs Ideal calibration results.

Calibrated By: (Mr. Saravuth Jitranont), Approved signature: (Mr. Saravuth Jitranont), REVIEW BY: (Mr. Saravuth Jitranont), APPROVED BY: (Mr. Saravuth Jitranont), NEXT CAL DATE: 07/08/26

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

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Data logger with Temperature sensor, Manufacturer: Novatek, Model/Type: 130 WS-250L-D, SERIAL NUMBER: Sensor: WS-027A, Data logger: 130 WS-250L-D, ID NUMBER: PMS, CONDITION AS RECEIVED: CUSTOMER

RECEIVED DATE: 17 Jan 2025, MEASUREMENT DATE: 07 Feb 2025, ISSUE DATE: 07 Feb 2025

ENVIRONMENTAL CONDITIONS: Ambient condition in the laboratory are as follows: Temperature: 23.0 ± 0.5 °C, Relative Humidity: 55.0 ± 5.0 %RH

TABULATION OF RESULTS: The table on next page give the measured values.

Calibrated by: (Mr. Saravuth Jitranont), Approved signature: (Mr. Saravuth Jitranont), REVIEW BY: (Mr. Saravuth Jitranont), APPROVED BY: (Mr. Saravuth Jitranont), NEXT CAL DATE: 07/08/26

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

CERTIFICATE OF CALIBRATION

Page 2 of 2 Pages

MEASUREMENT RESULTS: The temperature calibration was carried out by a standard temperature probe which was installed 10 mm away from the test section and the standard temperature probe was installed 10 mm away from the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 10 m/s at calibration range of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

Remarks: * Calibration results only count for the tested circumstances and environmental conditions during which calibration was performed. * Velocity of standard. * Velocity of standard under Calibration.

PHOTO OF CALIBRATION SET-UP

Calibration set-up of the temperature calibration in the wind tunnel of Jiranatee Associates Co., Ltd. The temperature sensor shown may differ from the calibration set. Remarks: The proportion of the set-up is not true to scale due to image geometry.

End of Certificate of Calibration

Page 1 of 2 Pages

MEASUREMENT ITEM: Cup anemometer, Manufacturer: Novamex, Model: WS-029, Serial Number: 110-W5-2020-0, Data Logger: AS560, Sensor: WSD-A560, ID NUMBER: RVS_P2020, CONDITION AS-RECEIVED: Used item, CUSTOMER: A&S Laboratory group (Thailand) Co., Ltd., 104 Phatthanaburi 40, Phatthanaburi Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE: 08 Aug 2024, MEASUREMENT DATE: 21 Aug 2024, ISSUE DATE: 21 Aug 2024.

ENVIRONMENTAL CONDITIONS: Ambient condition in the laboratory is as follows: Temperature: 23.0 ± 1.0 °C, Relative Humidity: 55.0 ± 15.0 %RH, Atmospheric Pressure: 1020.0 ± 10 hPa.

PLACE OF CALIBRATION: Effort-type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITIONS: Wind tunnel cross-section area: 900 cm², Wind direction (upstream): 180°, Diameter of mounting pipe: 100 mm, Back-sight of test object: 0.111 f.

Preconditioning: 24 hours at ambient conditions. The average values during measurement are (23.4 °C, 41.8 %RH and 1002.0 hPa).

TABULATION OF RESULTS: The table on next page gives the measured values.

Calibrated by: M. Saran Thaisakul, M. Pany Banchanach, M. Mit Jiraprasit Lertphongthai, M. Mit Jiraprasit Lertphongthai.

REVIEW BY: Mr. Pany Banchanach, Calibration Department Manager.

APPROVED BY: Mr. Pany Banchanach, Calibration Department Manager.

NEXT CAL DATE: 21/8/26.

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 3 Pages

MEASUREMENT RESULTS 1:

Ref. (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	U _{ref} (m/s)	Error (%)	U (m/s)
0.995	23.70	23.50	0.8	-0.2	0.81
2.000	23.40	23.50	1.8	-0.2	1.81
2.997	23.64	23.50	2.9	-0.1	2.91
3.999	23.66	23.50	3.8	0.1	3.81
4.98	23.44	23.50	4.9	-0.1	4.91
5.96	23.44	23.50	6.0	0.0	6.01
7.04	23.50	23.50	7.0	0.0	7.01
7.97	23.34	23.50	8.0	0.0	8.01
8.99	23.24	23.50	9.1	0.1	9.11
10.00	23.24	23.50	10.2	0.2	10.21
10.96	23.40	23.50	11.1	0.1	11.11
12.03	23.20	23.50	12.3	0.3	12.31
12.95	23.40	23.50	13.3	0.2	13.31
14.00	23.20	23.50	14.3	0.3	14.31
15.02	23.40	23.50	15.3	0.3	15.31
15.97	23.30	23.50	16.6	0.4	16.61

Remark: 1. Calibration results only count for the tested circumstances and environmental conditions during which calibration took place. 2. Velocity of air 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 calibration set. Remark: The proportion of the set-up is not true to scale due to imaging geometry.

End of Certificate of Calibration

Page 1 of 2 Pages

MEASUREMENT ITEM: Wind Direction Sensor, Manufacturer: Novamex, Model: WS-029, Serial Number: 110-W5-2020-0, Data Logger: AS560, Sensor: WSD-A560, ID NUMBER: RVS_P2020, CONDITION AS-RECEIVED: Used item, CUSTOMER: A&S Laboratory group (Thailand) Co., Ltd., 104 Phatthanaburi 40, Phatthanaburi Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE: 08 Aug 2024, MEASUREMENT DATE: 21 Aug 2024, ISSUE DATE: 21 Aug 2024.

ENVIRONMENTAL CONDITIONS: Ambient condition in the laboratory is as follows: Temperature: 23.0 ± 1.0 °C, Relative Humidity: 55.0 ± 15.0 %RH, Atmospheric Pressure: 1020.0 ± 10 hPa.

PLACE OF CALIBRATION: Effort-type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITIONS: Wind tunnel cross-section area: 900 cm², Wind direction (upstream): 180°, Diameter of mounting pipe: 100 mm, Back-sight of test object: 0.111 f.

Preconditioning: 24 hours at ambient conditions. The average values during measurement are (23.7 °C, 46.3 %RH and 1007.5 hPa).

TABULATION OF RESULTS: The table on next page gives the measured values.

Calibrated by: M. Saran Thaisakul, M. Pany Banchanach, M. Mit Jiraprasit Lertphongthai, M. Mit Jiraprasit Lertphongthai.

REVIEW BY: Mr. Pany Banchanach, Calibration Department Manager.

APPROVED BY: Mr. Pany Banchanach, Calibration Department Manager.

NEXT CAL DATE: 21/8/26.

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 1:

Air speed (m/s)	D _{ref} (mm)	D _{ref} (mm)	Error (%)	U (m/s)
0.000	0	0	0	0.00
45.000	42	-2	-0.5	0.00
90.000	88	-2	-0.2	0.00
135.000	139	-2	-0.2	0.00
180.000	181	1	0.6	0.00
225.000	229	0	0.0	0.00
270.000	273	3	1.0	0.00
315.000	318	4	1.3	0.00

Remark: 1. Calibration results only count for the tested circumstances and environmental conditions during which calibration took place. 2. Direction of standard. 3. Direction of air under calibration.

End of Certificate of Calibration

Page 1 of 2 Pages

MEASUREMENT ITEM: Data Logger with Temperature sensor, Manufacturer: Novamex, Model: WS-029, Serial Number: 110-W5-2020-0, Data Logger: AS560, Sensor: WSD-A560, ID NUMBER: RVS_P2020, CONDITION AS-RECEIVED: Used item, CUSTOMER: A&S Laboratory group (Thailand) Co., Ltd., 104 Phatthanaburi 40, Phatthanaburi Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE: 08 Aug 2024, MEASUREMENT DATE: 21 Aug 2024, ISSUE DATE: 21 Aug 2024.

ENVIRONMENTAL CONDITIONS: Ambient condition in the laboratory is as follows: Temperature: 23.0 ± 1.0 °C, Relative Humidity: 55.0 ± 15.0 %RH.

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

TABULATION OF RESULTS: The table on next page gives the measured values.

Calibrated by: M. Saran Thaisakul, M. Pany Banchanach, M. Mit Jiraprasit Lertphongthai, M. Mit Jiraprasit Lertphongthai.

REVIEW BY: Mr. Pany Banchanach, Calibration Department Manager.

APPROVED BY: Mr. Pany Banchanach, Calibration Department Manager.

NEXT CAL DATE: 21/8/26.

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-156-07

Result of Calibration: [X] Without Adjustment [] With Adjustment

Calibration Range: 20 °C to 40 °C

Function: Table 3: This equipment was connected with temperature sensor Model: HM60 5/6; 146302033. Dimension: Diameter 12 mm. Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	USC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.050	19.6	-0.4	0.099
80	25.053	24.6	-0.5	0.099
80	30.045	29.7	-0.3	0.099
80	35.026	34.5	-0.5	0.099
80	40.018	39.4	-0.6	0.099

USC*: Unit Under Calibration

End of Certificate of Calibration

Page 1 of 2 Pages

MEASUREMENT ITEM: Relative humidity with data logger, Manufacturer: Novamex, Model: WS-029, Serial Number: 110-W5-2020-0, Data Logger: AS560, Sensor: WSD-A560, ID NUMBER: RVS_P2020, CONDITION AS-RECEIVED: Used item, CUSTOMER: A&S Laboratory group (Thailand) Co., Ltd., 104 Phatthanaburi 40, Phatthanaburi Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE: 08 Aug 2024, MEASUREMENT DATE: 21 Aug 2024, ISSUE DATE: 21 Aug 2024.

ENVIRONMENTAL CONDITIONS: Ambient condition in the laboratory is as follows: Temperature: 23.0 ± 1.0 °C, Relative Humidity: 55.0 ± 15.0 %RH.

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

TABULATION OF RESULTS: The table on next page gives the measured values.

Calibrated by: M. Saran Thaisakul, M. Pany Banchanach, M. Mit Jiraprasit Lertphongthai, M. Mit Jiraprasit Lertphongthai.

REVIEW BY: Mr. Pany Banchanach, Calibration Department Manager.

APPROVED BY: Mr. Pany Banchanach, Calibration Department Manager.

NEXT CAL DATE: 21/8/26.

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

Page 2 of 3 Pages

MEASUREMENT RESULTS:

Air Temperature (°C)	Standard Reading (°C)	USC Reading (°C)	Error (°C)	Uncertainty (°C)
29.87	29.61	29.8	-0.1	0.01
29.89	30.72	30.0	-0.7	1.3
29.87	32.34	32.5	-0.2	2.3

USC: Unit Under Calibration

End of Certificate of Calibration

Page 1 of 2 Pages

MEASUREMENT ITEM: Cup anemometer, Manufacturer: Novamex, Model: WS-029, Serial Number: 110-W5-2020-0, Data Logger: AS560, Sensor: WSD-A560, ID NUMBER: RVS_P2020, CONDITION AS-RECEIVED: Used item, CUSTOMER: A&S Laboratory group (Thailand) Co., Ltd., 104 Phatthanaburi 40, Phatthanaburi Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE: 08 Aug 2024, MEASUREMENT DATE: 21 Aug 2024, ISSUE DATE: 21 Aug 2024.

ENVIRONMENTAL CONDITIONS: Ambient condition in the laboratory is as follows: Temperature: 23.0 ± 1.0 °C, Relative Humidity: 55.0 ± 15.0 %RH, Atmospheric Pressure: 1020.0 ± 10 hPa.

PLACE OF CALIBRATION: Effort-type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITIONS: Wind tunnel cross-section area: 900 cm², Wind direction (upstream): 180°, Diameter of mounting pipe: 100 mm, Back-sight of test object: 0.111 f.

Preconditioning: 24 hours at ambient conditions. The average values during measurement are (24.9 °C, 54.5 %RH and 1011.5 hPa).

TABULATION OF RESULTS: The table on next page gives the measured values.

Calibrated by: M. Saran Thaisakul, M. Pany Banchanach, M. Mit Jiraprasit Lertphongthai, M. Mit Jiraprasit Lertphongthai.

REVIEW BY: Mr. Pany Banchanach, Calibration Department Manager.

APPROVED BY: Mr. Pany Banchanach, Calibration Department Manager.

NEXT CAL DATE: 21/8/26.

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

Reference Method Data

Client Name

Gulf Hy. Co. Ltd

Location

400 Km. E

Plant Name

DGC

Date

March 1999 11

Run No. 7

Time Base = 21 min

Date	Time	WQV	WQV	WQV	WQV	WQV	WQV
03/03/99	06:01	0.19	0.21	0.47	0.49	0.87	0.89
03/03/99	06:02	0.19	0.21	0.48	0.49	0.87	0.89
03/03/99	06:03	0.19	0.21	0.48	0.49	0.87	0.89
03/03/99	06:04	0.19	0.21	0.47	0.47	0.86	0.88
03/03/99	06:05	0.19	0.21	0.47	0.47	0.86	0.88
03/03/99	06:06	0.19	0.21	0.47	0.47	0.86	0.88
03/03/99	06:07	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:08	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:09	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:10	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:11	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:12	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:13	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:14	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:15	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:16	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:17	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:18	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:19	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:20	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:21	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:22	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:23	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:24	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:25	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:26	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:27	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:28	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:29	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:30	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:31	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:32	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:33	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:34	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:35	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:36	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:37	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:38	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:39	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:40	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:41	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:42	0.19	0.21	0.46	0.46	0.85	0.87
03/03/99	06:43	0.19	0.21	0.46	0.46	0.8	

ANALYZER CALIBRATION DATA

Lot No. 2999920-1

Client
Date

Gulf NC Co., Ltd.
62 Rue 25

Location
Test Operator

Midea HSEB 11
Sakait P.

O₂ ANALYZER

Model

Span (%)

TELEDYNE API 300EH

Serial No.

774

	Cylinder Value (%)	Initial Analyzers Calibration Response (%)	Final Analyzers Calibration Response (%)	Difference (Percent of Span)
Zero Gas	0.00	-0.04	0.02	0.06
Low-Level Gas	9.36	9.35	9.32	0.02
Span Gas	16.02	15.93	15.97	0.16

NO₂ ANALYZER

Model

Span (ppm)

TELEDYNE API 300EH

Serial No.

774

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.07	0.03	0.04
Low-Level Gas	56.17	56.27	56.23	0.05
Span Gas	81.30	81.24	81.18	0.09

SO₂ ANALYZER

Model

Span (ppm)

TELEDYNE API 300EH

Serial No.

437

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	-0.03	0.01	0.04
Low-Level Gas	55.81	55.48	55.49	0.03
Span Gas	79.52	79.52	79.57	0.05

CO ANALYZER

Model

Span (ppm)

TELEDYNE API 300EH

Serial No.

425

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	-0.02	0.01	0.01
Low-Level Gas	54.24	54.20	54.23	0.02
Span Gas	55.48	55.41	55.45	0.04

Calibrated by

(Mr. Sakait Phaisanphout)

Environmental Field Scientist (4)

FORM NO. F-36-002 REVISION NO. 4 ISSUE DATE: 18/10/14

ALS Laboratory Group

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SYSTEM CALIBRATION BIAS AND DRIFT DATA

Lot No. 2599920-1

Client : Gulf NC Co., Ltd Location : Ulaeu HRSG 11
 Date : 03 Dec 25 Test Operator : Sakth P.

O₂ ANALYZER
 Cylinder Conc. (%) : 15.02

Span (%) : 25

	Initial Values		Final Values		Drift (% of Span)
	O ₂ Analyzer Calibration Response	System Calibration Response	System Cal Bias (% of Span)	System Cal Bias (% of Span)	
Zero Gas	-0.04	0.04	0.00	-0.02	0.08
Ulaeu Gas	15.93	15.93	0.00	0.00	0.18

NO_x ANALYZER
 Cylinder Conc. (ppm) : 85.09

Span (ppm) : 100

	Initial Values		Final Values		Drift (% of Span)
	NO _x Analyzer Calibration Response	System Calibration Response	System Cal Bias (% of Span)	System Cal Bias (% of Span)	
Zero Gas	0.07	0.07	0.00	0.04	0.04
Ulaeu Gas	81.04	81.24	0.00	0.00	0.00

SO₂ ANALYZER
 Cylinder Conc. (ppm) : 79.92

Span (ppm) : 100

	Initial Values		Final Values		Drift (% of Span)
	SO ₂ Analyzer Calibration Response	System Calibration Response	System Cal Bias (% of Span)	System Cal Bias (% of Span)	
Zero Gas	-0.03	0.03	0.00	-0.01	0.02
Ulaeu Gas	79.92	79.92	0.00	0.00	0.00

CO ANALYZER
 Cylinder Conc. (ppm) : 80.49

Span (ppm) : 100

	Initial Values		Final Values		Drift (% of Span)
	CO Analyzer Calibration Response	System Calibration Response	System Cal Bias (% of Span)	System Cal Bias (% of Span)	
Zero Gas	-0.04	0.00	0.00	0.01	0.01
Ulaeu Gas	80.41	80.41	0.00	0.04	0.04

Calibrated by

Sakth P

(Mr Sakth Phasamthirung)

Environmental Field Scientist (4)

FORM NO: 06-00 REVISION NO: 4 ISSUE DATE: 10/01/04

AL2 Laboratory Group

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EMISSION TEST RESULT

Client	Gulf NC Co., Ltd.	Run #	1
Date	03 Dec 25	Location	Ulaire HRSG 11
Start Time	13:49	Test Operator	Sakant P
SO ₂ Analyser Model	TELEDYNE AP1 100EH	Probe Type	14.00
NO _x Analyser Model	TELEDYNE AP1 100EH	Serial No.	437
CODS Analyser Model	TELEDYNE AP1 200EH	Serial No.	774
		Serial No.	425

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)	Remark
13:49	14.55	3.83	22.81	0.09	86.94	
13:51	14.54	3.85	22.84	0.10	87.23	
13:52	14.54	3.81	23.11	0.07	87.43	
13:53	14.55	3.82	23.37	0.10	87.15	
13:54	14.58	3.84	23.32	0.12	87.12	
13:55	14.58	3.84	23.46	0.10	87.26	
13:56	14.58	3.84	23.48	0.10	87.09	
13:57	14.55	3.88	23.69	0.09	87.40	
13:58	14.55	3.84	23.60	0.10	87.29	
13:59	14.58	3.85	23.67	0.09	87.14	
14:00	14.55	3.85	23.57	0.09	86.96	
13:51	14.54	3.83	23.31	0.08	86.76	
13:52	14.58	3.82	23.16	0.08	86.87	
13:53	14.59	3.81	22.99	0.07	86.54	
13:54	14.58	3.83	22.91	0.07	86.74	
13:55	14.55	3.88	22.98	0.08	86.61	
13:56	14.55	3.83	23.08	0.07	86.42	
13:57	14.54	3.84	23.35	0.08	86.34	
13:58	14.55	3.85	23.43	0.09	87.18	
13:59	14.55	3.85	23.79	0.10	87.03	
14:00	14.58	3.84	23.78	0.09	86.92	
Average	14.55	3.83	23.31	0.09	87.03	

Sakant P

(Mr. Sakant Phasapattana)

Environmental Field Scientist (4)

FORM NO. E-06-000 REVISION NO. 1 ISSUE DATE: 18/01/04

ALS Laboratory Group

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EMISSION TEST RESULT

Client	Gulf NC Co., Ltd.
Date	88 Dwt 25
Start Time	14:07
SO _x Analyzer Model	TELEDYNE API 100EH
NO _x /O ₂ Analyzer Model	TELEDYNE API 200EH
COCO ₂ Analyzer Model	TELEDYNE API 200EH

Run #	2
Location	Sluice HRSG 11
Test Operator	Sakata P.
Probe Time	14:21
Serial No.	437
Serial No.	774
Serial No.	425

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)	Remark
14:01	14.50	3.84	23.70	0.30	86.79	
14:02	14.50	3.83	23.61	0.11	86.48	
14:03	14.50	3.83	23.45	0.11	86.55	
14:04	14.50	3.84	23.42	0.12	86.54	
14:05	14.50	3.85	23.38	0.12	86.48	
14:06	14.50	3.85	23.35	0.13	86.50	
14:07	14.50	3.85	23.41	0.13	86.57	
14:08	14.50	3.79	23.53	0.13	86.80	
14:09	14.50	3.82	23.59	0.13	86.59	
14:10	14.55	3.83	23.49	0.07	86.84	
14:11	14.50	3.78	23.51	0.11	86.54	
14:12	14.55	3.80	23.70	0.11	86.54	
14:13	14.50	3.82	23.72	0.10	86.56	
14:14	14.50	3.84	23.76	0.10	86.48	
14:15	14.50	3.82	23.69	0.09	86.44	
14:16	14.50	3.85	23.57	0.09	86.56	
14:17	14.50	3.84	23.42	0.09	86.44	
14:18	14.50	3.86	23.38	0.08	86.22	
14:19	14.50	3.84	23.37	0.08	86.24	
14:20	14.50	3.82	23.43	0.09	86.02	
14:21	14.55	3.87	23.51	0.07	86.09	
Average	14.55	3.83	23.83	0.10	86.52	

Sakata P.

(Mr. Sakata Phasamphet)

Environmental Field Scientist (4)

FORM NO. F-06-060 REVISION NO. 1 ISSUE DATE: 16/01/04

ALS Laboratory Group

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EMISSION TEST RESULT

Client	Gulf NC Co., Ltd.
Date	03 Dec 28
Start Time	14:22
SO ₂ Analyzer Model	TELEDYNE API 100EH
NO _x /O ₂ Analyzer Model	TELEDYNE API 200EH
CO/CO ₂ Analyzer Model	TELEDYNE API 300EH

Run #	3
Location	Site HRS011
Test Operator	Sakul P
Finish Time	14:42
Serial No.	437
Serial No.	774
Serial No.	428

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)	Remark
14:22	14.54	3.86	23.52	0.07	86.20	
14:23	14.52	3.84	23.66	0.07	86.41	
14:24	14.53	3.87	23.70	0.08	86.32	
14:25	14.55	3.76	23.73	0.07	86.79	
14:26	14.55	3.86	23.59	0.08	85.97	
14:27	14.55	3.87	23.39	0.08	86.20	
14:28	14.55	3.85	24.11	0.08	86.28	
14:29	14.55	3.86	23.67	0.08	86.59	
14:30	14.55	3.82	23.69	0.10	86.33	
14:31	14.55	3.81	23.68	0.09	86.20	
14:32	14.53	3.78	23.59	0.10	86.41	
14:33	14.54	3.87	23.51	0.10	86.36	
14:34	14.54	3.88	23.47	0.10	86.33	
14:35	14.54	3.84	23.68	0.10	86.34	
14:36	14.55	3.83	23.81	0.11	86.24	
14:37	14.56	3.87	23.86	0.11	86.26	
14:38	14.56	3.87	23.76	0.11	86.29	
14:39	14.55	3.82	23.77	0.12	86.07	
14:40	14.55	3.85	23.87	0.10	86.04	
14:41	14.58	3.86	23.89	0.12	85.87	
14:42	14.58	3.86	23.77	0.12	85.97	
Average	14.54	3.83	23.66	0.10	86.23	

Sakul P

(Mr Sakul Phairatphat)

Environmental Field Scientist (A)

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FORM NO. F-08-008 REVISION NO. 1 ISSUE DATE: 16/01/14

ALS Laboratory Group

Client
Date

Gulf NC Co. Ltd.
03 Dec 25

Location
Test Operator

Lot No. 299952-1-1
M&M HRSO 12
Sathaporn T.

O₂ ANALYZER
Model
Span (%)

TELEDYNE API T200H
25

Serial No. 101

	Cylinder Value (%)	Initial Analyzers Calibration Response (%)	Final Analyzers Calibration Response (%)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.04	0.08
Low-Level Gas	9.19	9.22	9.21	0.00
Span Gas	18.07	18.11	18.16	0.16

NO_x ANALYZER
Model
Span (ppm)

TELEDYNE API T200H
100

Serial No. 101

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.01	0.00	0.00
Low-Level Gas	55.91	55.93	55.90	0.00
Span Gas	82.51	82.51	82.48	0.03

SO₂ ANALYZER
Model
Span (ppm)

TELEDYNE API T100H
100

Serial No. 68

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.01	0.01	0.00
Low-Level Gas	56.28	56.29	56.29	0.00
Span Gas	79.76	79.76	79.74	0.01

CO ANALYZER
Model
Span (ppm)

TELEDYNE API T100M
100

Serial No. 80

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.03	0.03	0.01
Low-Level Gas	79.74	79.73	79.73	0.00
Span Gas	79.74	79.72	79.72	0.01

Calibrated by

Sathaporn.T

(Mr. Sathaporn Thakwae)
Environmental Field Scientist (2)

FORM NO. F-08-002 REVISION NO. 4 / ISSUE DATE: 10/10/24

ALS Laboratory Group

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Lot No. 20090921.1

SYSTEM CALIBRATION BIAS AND DRIFT DATA

Client : Guf NC Co., Ltd. Location : Ultra HRSO 12
Date : 03 Dec 26 Test Operator : Sathaporn T.

O₂ ANALYZER
Cylinder Conc. (%) : 16.87

Span (%) : 25

	O ₂ Analyzer Calibration Response	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	
Zero Gas	0.02	0.02	0.12	0.02	0.12	0.00
Urethane Gas	16.11	16.22	0.44	16.22	0.44	0.00

NO_x ANALYZER
Cylinder Conc. (ppm) : 82.61

Span (ppm) : 150

	NO _x Analyzer Calibration Response	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	
Zero Gas	0.02	0.02	0.02	0.04	0.02	0.00
Urethane Gas	82.61	82.41	0.10	82.41	0.10	0.00

SO₂ ANALYZER
Cylinder Conc. (ppm) : 79.76

Span (ppm) : 150

	SO ₂ Analyzer Calibration Response	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	
Zero Gas	0.01	0.02	0.01	0.02	0.01	0.00
Urethane Gas	79.76	79.71	0.04	79.71	0.04	0.00

CO ANALYZER
Cylinder Conc. (ppm) : 79.74

Span (ppm) : 150

	CO Analyzer Calibration Response	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	
Zero Gas	0.02	0.02	0.03	0.02	0.03	0.00
Urethane Gas	79.74	79.76	0.02	79.76	0.02	0.00

Calibrated by

Sathaporn T.

(Mr. Sathaporn Thakuan)

Environmental Field Scientist (3)

FORM NC: F-06-02 REVISION NO: 4 ISSUE DATE: 16/01/04

ALS Laboratory Group

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EMISSION TEST RESULT

1

Run #

Client Guil Mot Co., Ltd.

Location Salas HRSO 12

Date 03 Dec 2012

Test Operator Enthamun T.

Start Time 11:00

Finish Time 11:28

SO_x Analyzer Model TELEDYNE API T100H

Serial No. 88

NO_x/CO₂ Analyzer Model TELEDYNE API T200H

Serial No. 161

CO/CO₂ Analyzer Model TELEDYNE API T300H

Serial No. 95

Time (min)	O ₂ (%)	CO ₂ (%)	NOx (ppm)	SO _x (ppm)	CO (ppm)	Remark
11:00	14.32	3.35	18.09	0.18	1.42	
11:01	14.32	3.54	18.20	0.18	1.41	
11:02	14.32	3.54	18.32	0.20	1.46	
11:03	14.31	3.54	18.10	0.22	1.38	
11:04	14.32	3.54	18.15	0.20	1.38	
11:05	14.31	3.55	18.43	0.21	1.38	
11:06	14.30	3.55	18.67	0.21	1.33	
11:07	14.31	3.55	18.67	0.23	1.31	
11:08	14.31	3.55	18.65	0.21	1.33	
11:09	14.31	3.55	18.65	0.22	1.34	
11:10	14.32	3.54	18.26	0.22	1.34	
11:11	14.32	3.55	18.39	0.22	1.38	
11:12	14.31	3.55	18.13	0.23	1.34	
11:13	14.31	3.54	18.15	0.22	1.32	
11:14	14.32	3.54	18.17	0.25	1.31	
11:15	14.31	3.54	18.10	0.22	1.30	
11:16	14.31	3.55	18.09	0.21	1.29	
11:17	14.31	3.55	18.20	0.24	1.30	
11:18	14.30	3.55	18.22	0.22	1.27	
11:19	14.30	3.54	18.24	0.24	1.26	
11:20	14.30	3.54	18.48	0.22	1.25	
Average	14.31	3.55	18.86	0.22	1.33	

Sithaporn T

(Mr. Sithaporn Thakue)

Environmental Field Scientist (3)

FORM NO. F-04-000 REVISION NO. 1 ISSUE DATE: 18/05/04

ALS Laboratory Group

Page 3 of 5.



Cert. No. : ACL25074
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)
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	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 94 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.

Cert. No. : ACL25074
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

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Cert. No. : ACL25074
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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	134.0	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
	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	128.0	0.0	±1.0

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Cert. No. : ACL25074
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Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (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. Petch.

Cert. No. : ACL25074
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	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
25.0	25.1	0.1	±1.1
20.0	20.1	0.1	±1.1
17.0	17.1	0.1	±1.1
16.0	16.2	0.2	±1.1
25.0	25.2	0.2	±1.1

T. Petch.

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	MY52502742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-BP 210267	15-FEB-25
Digital Multimeter	33461A	MY53220076	EEL-BP 200267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL-BP 220267	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-42KAJ	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. : 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

T. Petch.

Cert. No. : ACL25073
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)
13.4

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

Frequency Weighting (dB)	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 94 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

T. Petch.

Certificate No : 25-AC-014
Request No : Req-2025-0903

12. Overload indication

UCC Setting	Measured	UNCERTAINTY	Acceptance Limit	Result
FAST / A / 30-130	UCC	(± dB)	(± dB)	
STD Setting	(dB)			
Positive one-half cycle	130.5			
Negative one-half cycle	130.4			
Deviated	0.1	0.20	1.5	Pass

13. High Level Stability

UCC Setting	Measured	UNCERTAINTY	Acceptance Limit	Result
FAST / A / 30-130	UCC	(± dB)	(± dB)	
STD Setting	(dB)			
Initial	129.0			
Final	129.0			
Deviated	0.0	0.10	0.50	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 1 kHz	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	0.50 dB
10. Tone burst response	0.30 dB
11. Peak C sound level	0.35 dB
12. Overload indication	0.25 dB
13. High Level Stability	0.10 dB

Acceptance limit and Maximum-permitted Uncertainty was IEC 61672-1:2013

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

Certificate No : 25-AC-014
Request No : Req-2025-0903

Decision Rule for Statements of Conformity

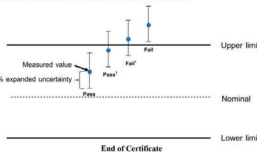
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019, Guidelines on the Reporting of Compliance with Specifications as following Fig. and statements

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

Fail - The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail - 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 was 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 Issuance/Instrument Co., Ltd.



Certificate of Calibration

Customer

Name : ALS Laboratory Group Thailand Co., Ltd.
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang,
Bangkok 10250Certificate No : 25-ACT-010
Request No : Req-2025-0909

Unit Under Calibration Details

Measurement item : Acoustic Calibrator
Manufacturer : RION
Model : NC-74
Serial Number : 34178121
ID : RYG_F50213
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 kPa)
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 : Mr. Noppadon Luangart
Service Calibration EngineerApproved By : Mr. Prachit Mathavon
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 Issuance/Instrument Co., Ltd.

Certificate No : 25-ACT-010
Request No : Req-2025-0909

Sound pressure level

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

Frequency of Sound pressure level

Calibration Range		Without Adjustment		Adjustment		Uncertainty	Acceptance limit	Result
(Hz)		Measured (Hz)	Deviated	Measured (Hz)	Deviated	(± %)	Class 1 (± %)	
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 IEC 60942:2017 Class 1

The calibration results include the calibration pressure correction

The calibration results include 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 Issuance/Instrument Co., Ltd.

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

Certificate No : 25-ACT-010
Request No : Req-2025-0909

Decision Rule for Statements of Conformity

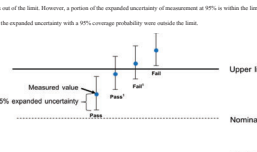
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019, Guidelines on the Reporting of Compliance with Specifications as following Fig. and statements

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

Fail - The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail - 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 was 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 Issuance/Instrument Co., Ltd.

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

SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

451-451/ Srinthorn Road, Bangjumnui, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email: calibration@sithiporn.comCert. No : ACL24304
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-02 / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00873057 / 171591 / 73333
ID No.: RYG_F50381

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KHWAENG PHATTANAKAN, 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 : 23 SEPTEMBER 2024
Calibration Date : 09 OCTOBER 2024
Date of Issue : 09 OCTOBER 2024

Calibrated by : Nathakorn Pritpaipaisan

Approved by : T. Petchu
(Thanakul Petchu)

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.

SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

451-451/ Srinthorn Road, Bangjumnui, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email: calibration@sithiporn.comCert. No. : ACL24304
Job No. : VC67ACB164
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 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	EP-0009-24	05-FEB-25
Waveform Generator	33511B	MY53202742	EP-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-BP 210267	12-FEB-25
Digital Multimeter	33461A	MY53220076	EEL-BP 202067	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL-BP 202067	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EP-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).

SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

451-451/ Srinthorn Road, Bangjumnui, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email: calibration@sithiporn.comCert. No. : ACL24304
Job No. : VC67ACB164
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		
Flat 10 Hz to 4 kHz	0.3	0.6
Flat > 4 kHz to 10 kHz	0.3	0.7
Flat > 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. Petchu

SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

451-451/ Srinthorn Road, Bangjumnui, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email: calibration@sithiporn.comCert. No. : ACL24304
Job No. : VC67ACB164
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)
16.7

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

Frequency Weighting (dB)	Weighting (dB)
A-weight	13.4
C-weight	19.3
Flat	25.0

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 94 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.4	0.4	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	1.1	1.2	1.2	± 5.0

T. Petchu

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Job No. : VC67ACB164
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	0.1	0.1	0.1	±1.5
250	0.1	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 weightings 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

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Job No. : VC67ACB164
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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	30.1	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	25.2	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	30.0	30.1	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
	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 _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	135.9	-0.5	±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	89.6	±1.5
Negative one-half cycle	89.5	±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

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Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NI-42 / Microphone UC-52 / Preamplifier NH-24
Serial No. : 00709746 / 187332 / 01297
ID No. : RYG.FS0491Condition As Found : GOOD
Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KHWAENG PHATTANAKAN, 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 : Nuthorn Pitsupaisan

Approved by : T. Petchu
(Thanakul Petchu)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.SITHIPORN ASSOCIATES
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Job No. : VC68AC064
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 item were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY53202742	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	MY6003272	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).SITHIPORN ASSOCIATES
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Job No. : VC68AC064
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	0.2
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)
14.8

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

Frequency Weighting	Weighting (dB)
A - weight	13.4
C - weight	20.0
Flat	25.5

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	±1.5
1000	0.2	0.2	0.2	±1.0
8000	2.1	2.1	2.1	±5.0

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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	-0.1	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	0.0	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	±0.2
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. : 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	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
25.0	25.0	0.0	±1.1
20.0	20.0	0.0	±1.1
15.0	15.0	0.0	±1.1
10.0	10.0	0.0	±1.1
5.0	5.0	0.0	±1.1

T. Petch.

Cert. No. : ACL25106
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

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

T. Petch.

Cert. No. : ACL25106
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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	131.0	131.0	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

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Job No. : VC67AC0164
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No. : 0887109 / 171842 / 73485
ID No. : RYG_FS0384

Condition As Found : GOOD

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

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

REVIEW BY : *[Signature]*
APPROVED BY : *[Signature]*
NEXT CAL. DATE : 9/16/25

Received Date : 23 SEPTEMBER 2024
Calibration Date : 09 OCTOBER 2024
Date of Issue : 09 OCTOBER 2024

Calibrated by : Nuthakorn Pisutpian

Approved by : *T. Petch.*
(Thanikul Petchurai)

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Job No. : VC67AC0164
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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	MY480	17076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY53202742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL_BP 210267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL_BP 202067	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL_BP 220267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	297980	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.

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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

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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)
16.1

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	19.8
Flat	25.1

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 94 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.4	0.5	0.5	±1.5
1000	0.0	0.0	0.0	±1.0
8000	-1.4	-1.3	-1.3	±5.0

T. Petch.

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4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.1	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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CALIBRATION LABORATORY459-459/1 Sirinthorn Road, Bangbunmu, Bangkok, 10700 Thailand
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Job No. : VC67AC0164
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	28.1	0.1	±1.1
27.0	27.2	0.2	±1.1
26.0	26.2	0.2	±1.1
25.0	25.2	0.2	±1.1

T. Petch.

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Cert. No. : ACL24305
Job No. : VC67AC0164
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	30.0	30.1	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
	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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Cert. No. : ACL24305
Job No. : VC67AC0164
Pages : 8 of 8

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	133.0	133.0	0.0	±3.0
One	136.4	136.2	-0.2	±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	89.6	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

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Cert. No. : ACL25109
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No. : 00900073 / 188466 / 01735
ID No. : RYG_FS0494

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.T.S.
APPROVED BY : S.T.S.
NEXT CAL DATE : 28/ 01/ 2026

Calibrated by : Nuthorn Pritpaitan

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.



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CALIBRATION LABORATORY

Cert. No. : ACL25109
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	HEL-BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	HEL-BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	HEL-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. Petch.



SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL25109
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

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SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL25109
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)
15.1

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

Frequency Weighting	Weighting (dB)
A - weight	12.0
C - weight	18.3
Flat	24.1

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 94 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.1	0.1	0.1	±1.5
1000	0.0	0.0	0.0	±1.0
8000	1.0	1.0	1.0	±5.0

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CALIBRATION LABORATORY

Cert. No. : ACL25109
Job No. : VC68AC0064
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.1	0.0	±2.0
125	0.0	0.1	0.1	±1.5
250	0.0	0.1	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.1	±1.0
2000	-0.1	0.1	0.0	±2.0
4000	-0.1	0.1	0.0	±3.0
8000	-0.1	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

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SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL25109
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)
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	29.1	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

T. Petch.



SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL25109
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	108.0	0.0	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
	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, Lepeak (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	135.1	-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	89.6	-0.1
Negative one-half cycle	89.5	-0.1

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.

Calibration Certificate

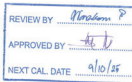
Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No. : 00597169 / 158770 / 34370
ID No. : RYO_FSD439

Condition As Found : GOOD

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

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

Received Date : 23 SEPTEMBER 2024
Calibration Date : 09 OCTOBER 2024
Date of Issue : 09 OCTOBER 2024



Calibrated by : Nuthakorn Pinprapaisam

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.

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 2140267	13-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-BP 220267	15-FEB-25
Programmable Attenuator	34461A	MY60024273	EEL-BP 220267	15-FEB-25
Condenser Microphone	MAT-1070	62100114	EF-0008-24	05-FEB-25
Measuring Amplifier	4180	2977900	AA-1001-24	12-FEB-25
	NA-42KAL	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 :

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

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.

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	16.8
C-weight	16.8
Flat	22.4

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 0.4 0.4 ±1.5
1000	0.0 0.0 0.0 ±1.0
8000	-1.9 -1.8 -1.8 ±5.0

T. Petch.

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 0.0 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.

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	-0.1	±1.1
34.0	34.0	0.0	±1.1
30.0	30.0	0.0	±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	25.3	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)
Continuous	131.0	131.0	0.0	±3.0
One	136.4	136.3	-0.1	±3.0

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	30.0	30.1	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
	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	128.0	0.0	±1.0

T. Petch.

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	131.0	131.0	0.0	±3.0
One	136.4	136.3	-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	89.6	0.0
Negative one-half cycle	89.6	0.0

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. : ACL25108
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No.: 09090072 / 188465 / 01734
ID No.: RYG_FS0493

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.T.S.*
APPROVED BY : *[Signature]*
NEXT CAL DATE : 26/ 01/ 2028

Calibrated by : Nathakorn Pitsupai

Approved by : *[Signature]*
Tharakul 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. : ACL25108
Job No. : VC88AC0064
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_210267	13-FEB-25
Digital Multimeter	34461A	MY53220076	EEL_BP_200267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL_BP_220267	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. : ACL25108
Job No. : VC88AC0064
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

Cert. No. : ACL25108
Job No. : VC88AC0064
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	118.8
C - weight	17.0
Flat	22.9

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	0.5	0.5	0.5	±1.5
1000	0.2	0.2	0.2	±1.0
8000	-0.4	-0.4	-0.4	±5.0

Cert. No. : ACL25108
Job No. : VC88AC0064
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

Cert. No. : ACL25108
Job No. : VC88AC0064
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	28.8	-0.2	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, T _B (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
	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	128.0	0.0	±1.0

Cert. No. : ACL25108
Job No. : VC88AC0064
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.1	-0.3	±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	89.5	±1.5
Negative one-half cycle	89.5	±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

Cert. No. : ACL25107
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No.: 09090071 / 188464 / 01733
ID No.: RYG_FS0492

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 Pitsupai

Approved by : *[Signature]*
Tharakul 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. : ACL25187
Job No. : VCS8AC0064
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	MY53202742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL_BP 210267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL_BP 200267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL_BP 220267	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-1001-24	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. Peth.

Cert. No. : ACL25187
Job No. : VCS8AC0064
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. Peth.

Cert. No. : ACL25187
Job No. : VCS8AC0064
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 Noise test

Measured Value (dB)
15.1

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

Frequency Weighting	Weighting (dB)
A-weight	12.0
C-weight	18.4
Flat	24.1

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	±1.5
1000	0.1	0.1	0.1	±1.0
8000	0.9	0.9	0.9	±5.0

T. Peth.

Cert. No. : ACL25187
Job No. : VCS8AC0064
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	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. Peth.

Cert. No. : ACL25187
Job No. : VCS8AC0064
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	43.9	-0.1	±1.1
39.0	38.9	-0.1	±1.1
34.0	33.9	-0.1	±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	26.1	0.1	±1.1
25.0	25.2	0.2	±1.1

T. Peth.

Cert. No. : ACL25187
Job No. : VCS8AC0064
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	29.2	0.2	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, T _b (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
	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	128.0	0.0	±1.0

T. Peth.

Cert. No. : ACL25187
Job No. : VCS8AC0064
Pages : 8 of 8

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	133.3	-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	89.5	±1.5
Negative one-half cycle	89.6	±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. Peth.

459/459/1 Sikebhorn Road, Bangbunmi, Bangkok, 10100 Thailand
Tel : +66 2432 8331 Email : calibration@sithiporn.comCert. No. : ACC25058
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No. : 34178123
ID No. : RYG_FS0215

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 : 22 SEPTEMBER 2025
Calibration Date : 08 OCTOBER 2025
Date of Issue : 10 OCTOBER 2025

Calibrated by : Nuthakorn Pitsupatun

Approved by : Nitinun Srihawan
(Nitinun Srihawan)

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Cert. No. : ACC25058
Job No. : VCS8AC0188
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

This equipment was calibrated by follow on IEC-60942-2003 Standard.

The sound pressure level, frequency and total distortion of the sound calibrator was measured using the reference microphone.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY53202742	EF-0012-25	11-FEB-26
Digital Multimeter	33461A	MY53220104	EEL_BP 240268	22-APR-26
Digital Multimeter	33461A	MY53220076	EEL_BP 230268	22-APR-26
Digital Multimeter	33461A	MY60024273	CAS025100EA	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-42KA1	34560495	AA-3002-25	19-FEB-26
Audio Analyzer	AVR-3360A	Y74486069	EF-0013-25	13-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).

Peth.

Cert. No. : ACCL25100
Job No. : VC68AC0064
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
94	94.11	0.11	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Acceptance limit (%)
1000	1001.5	0.1	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Acceptance limit (%)
1.83	0.10	3.0

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

40-46/1 Sathiporn Road, Bangkhuri, Bangkok, 10710 Thailand
Tel: +66 2433 8333 Email: calibration@sithiporn.comCert. No. : ACL25100
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No. : 00472126 / 158778 / 88180
ID No. : RYG_FS0001

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 Pinitpaiboon

Approved by :

T. Petchurai
(Thamkul 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. : ACL25100
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

Cert. No. : ACL25100
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)
13.6

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

Frequency Weighting	Weighting (dB)
A-weight	5.9
C-weight	16.4
Flat	22.2

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	0.8	0.9	±1.5
1000	0.1	0.1	0.1	±1.0
8000	-3.2	-3.2	-3.8	±5.0

Cert. No. : ACL25100
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 test 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_210267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL_BP_200267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL_BP_220267	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 :

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

Cert. No. : ACL25100
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	-0.1	0.0	0.0	±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	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. : VC68AC0064
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits
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	109.1	0.1	±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	30.0	0.0	±1.1
29.0	28.9	-0.1	±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

Cert. No. : ACL25100
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
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits
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
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
	0.25	1	99.0	98.8	-0.2	1.5 ; -5.0
SEL	2	8	108.0	107.9	-0.1	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

Cert. No. : ACL25100
Job No. : VC68AC0064
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Leqpeak (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

Cert. No. : ACL25099
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NI-42 / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00734225 / 179117 / 87524
ID No.: RYG_FS0030

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KIWAENG PHATTANAKAN, 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.T.S.*
APPROVED BY: *[Signature]*
NEXT CAL DATE: 26/ 01 /2026

Calibrated by : Nathakorn Pitsupaisan

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

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Cert. No. : ACL25099
Job No. : VC88AC0064
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-RP 21/0267	15-FEB-25
Digital Multimeter	33461A	MY53220076	EEL-RP 20/0267	15-FEB-25
Digital Multimeter	33461A	MY60024273	EEL-RP 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. : ACL25099
Job No. : VC88AC0064
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	12.0
C-weight	18.2
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 (dB)
125	0.3 0.3 0.3 ±1.5
1000	0.1 0.1 0.1 ±1.0
8000	2.2 2.2 2.2 ±5.0

T. Petch.

Cert. No. : ACL25099
Job No. : VC88AC0064
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 (dB)
63	-0.1 -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 0.1 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 0.1 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
Log	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. : ACL25099
Job No. : VC88AC0064
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	28.8	-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
	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

T. Petch.

Cert. No. : ACL25099
Job No. : VC88AC0064
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (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	89.5	-0.1 ±1.5
Negative one-half cycle	89.6	89.5

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. : ACL25315
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NI-42 / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00734218 / 146937 / 34368
ID No.: RYG_FS0031

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO. LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KIWAENG PHATTANAKAN, 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

REVIEW BY: *S.T.S.*
APPROVED BY: *[Signature]*
NEXT CAL DATE: 17/ 08 /2026

Calibrated by : Nathakorn Pitsupaisan

Approved by : *Wichok E.*
(Wichok Ekpongpradit)

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. : ACL25315
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	EP-0011-25	11-FEB-26
Waveform Generator	33511B	MY52302742	EP-0012-25	11-FEB-26
Digital Multimeter	33461A	MY53220104	EEL-BP 240268	22-APR-26
Digital Multimeter	33461A	MY53220076	EEL-BP 230268	22-APR-26
Digital Multimeter	34461A	MY60024273	CA025120EA	18-MAR-26
Programmable Attenuator	MA-T-1070	62100114	EP-6006-25	11-FEB-26
Condenser Microphone	4180	2977900	AA-1002-25	19-FEB-26
Measuring Amplifier	NA-42KA1	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).

Cert. No. : ACL25315
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	0.2
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

Cert. No. : ACL25315
Job No. : VC68AC0162
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)
21.6

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

Frequency Weighting	Weighting (dB)
A - weight	12.0
C - weight	18.0
Flat	23.7

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	0.8	0.8	0.8	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	-1.1	-1.1	-1.1	± 5.0

Cert. No. : ACL25315
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	0.1	0.0	±5.0
8000	0.1	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

Cert. No. : ACL25315
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	30.0	0.0	± 1.1
29.0	28.9	-0.1	± 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

Cert. No. : ACL25315
Job No. : VC68AC0162
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	1.0 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	99.9	-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

Cert. No. : ACL25315
Job No. : VC68AC0162
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (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	133.1	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	±1.5
89.5	89.6	0.1

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

INNOVATIVE INSTRUMENT CALIBRATION LAB

INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE

1100 MOO 11, BOE INTRONSTRUMENTS, 11 TAMBON, BANG KAO,

AMPHOR BANG PHU, SAMUT PRAKAN PROVINCE, 16040 THAILAND

TEL: 0660-2166-5801 FAX: 0660-2166-7140



Certificate of Calibration

Customer : : AIS Laboratory Group Thailand Co., Ltd.
Name : : AIS Laboratory Group Thailand Co., Ltd.
Address : : 104 Suk Phatthanakarn Rd, Phatthanakarn Road, Sam 1 mng, Bangkok 10250
Certificate No : 25-SE-M-116
Request No : Req-2025-0603

Unit Under Calibration Details

Measurement item : : Sound Level Meter

Manufacturer : : RION

Model : : NL-42

Serial Number : : 01222724

ID : : RYU, F90023

Resolution : : 0.1 dB

Microphone Class : : 2

Microphone Model : : UC-52

Microphone S/N : : 143486

Preamplifier Model : : NH-24

Preamplifier S/N : : 22620

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 : : 19 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	Riwal & Kjaer	4192	2294085	25 June 2025	NIMT
Audio Generator	Svankit	Sva401	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. Nopphon Uongnet
Service Calibration EngineerApproved By :
Mr. Patch Mahaveer
Calibration Engineer Supervisor
Issue Date : 19 March 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.

P0670-02340-01 Rev.04 Issue date: 2020

INNOVATIVE INSTRUMENT CALIBRATION LAB

INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE

1100 MOO 11, BOE INTRONSTRUMENTS, 11 TAMBON, BANG KAO,

AMPHOR BANG PHU, SAMUT PRAKAN PROVINCE, 16040 THAILAND

TEL: 0660-2166-5801 FAX: 0660-2166-7140

Certificate No : 25-SE-M-116
Request No : Req-2025-0603

5. Indication at the calibration check frequency

UNC Setting	Level	Before Adjust	After Adjust	UNCERTAINTY	Acceptance Limit	Result
FAST / A / 70-130	Level	UNC (dB)	ERR (dB)	UNC (dB)	ERR (dB)	Result
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:35080776.

2. Self-generated noise, Microphone installed

UNC Setting	Measured	UNCERTAINTY
FAST / 30-130	19.7	(± dB)
UNC Weighting	(dB)	(± dB)
A	19.7	0.10

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

UNC Setting	Measured	UNCERTAINTY
FAST / 30-130	14.7	(± dB)
UNC Weighting	(dB)	(± dB)
A	14.7	0.10
C	19.0	0.10
Z	23.4	0.10

4. Acoustic signal test of frequency weightings

UNC Setting	Measured	UNCERTAINTY	Acceptance Limit	Result
FAST / 30-130	Level	UNC (dB)	ERR (dB)	Result
125 Hz	0.0	0.1	0.1	0.60 1.5 Pass
1000 Hz	0.0	0.0	0.0	0.60 1.0 Pass
8000 Hz	1.0	1.0	1.0	0.60 3.0 Pass
1000 Hz	-0.4	-0.4	-0.5	0.70 5.0 Pass

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.

P0670-02340-01 Rev.04 Issue date: 2020

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

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UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED

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

IRANATEE ASSOCIATES CO., LTD. Accredited calibration laboratory ISO/IEC 17025:2018 CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No.: CDT-067-68 Page 1 of 2 Pages

MEASUREMENT ITEM: Heat Stress Monitor
MANUFACTURER: Delta OHM
MODEL/TYPE: H002.2
SERIAL NUMBER: 2003242
ID NUMBER: RYG-050232
CONDITION AS RECEIVED: Used Item
CUSTOMER: ALS Laboratory Group (Thailand) Co., Ltd.
154 Phatthanakorn 40, Phatthanakorn Rd.,
Khaeng San Luang, Khet San Luang,
Bangkok 10250 Thailand.

RECEIVED DATE: 03 Mar 2025
MEASUREMENT DATE: 17 Mar 2025
ISSUE DATE: 20 Mar 2025

ENVIRONMENTAL CONDITIONS:
Ambient conditions in the laboratory are as follows:
Temperature: 23.0 ± 1.0 °C
Relative Humidity: 55.0 ± 1.5 % 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 gives the measured values.

REVIEW BY: S.T.S.
APPROVED BY: [Signature]
NEXT CAL DATE: 16/03/2026

Calibrated by: [Signature]
Mr. Parnon Boonchanon
Calibration Department Manager

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

IRANATEE ASSOCIATES CO., LTD. Calibration 0367

Continuation of Certificate of Calibration Number CDT-067-68 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 wet bulb probe Model: HP30L2, 5/N: 21001206.
Dimension: Diameter 3.5 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.067	20.1	0.0	0.099
80	25.052	25.0	-0.1	0.099
80	30.046	30.1	0.1	0.099
80	35.025	35.1	0.1	0.099
80	40.011	40.0	0.0	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP327E, 5/N: 21001206.
Dimension: Diameter 3.5 mm, Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.067	20.1	0.0	0.099
110	25.052	25.1	0.0	0.14
110	30.046	30.1	0.1	0.099
110	35.025	35.1	0.1	0.099
110	40.011	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP327E, 5/N: 21001296.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.067	20.1	0.0	0.099
75	25.052	25.0	-0.1	0.099
75	30.046	30.0	0.0	0.099
75	35.025	34.9	-0.1	0.099
75	40.010	39.8	-0.2	0.099

UUC* Unit Under Calibration
Remark: The reported uncertainty of measurement is 0.14, based on standard uncertainty multiplied by a coverage factor k=2.14 providing a level of confidence of approximately 95%.

End of Certificate of Calibration

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN) CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES

Certificate of Calibration Certificate No.: 24PH471 Page: 1 of 2

Equipment: Lux Meter
Manufacturer: PEAK METER
Model: PM681L
Serial No.: H12A-016371
ID No.: RYG-050538
Condition As-Received: Used Item
Received Date: 04 September 2024
Calibration Date: 10 September 2024
Reference: 2409-0129VSC
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 1) %
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakorn 40, Phatthanakorn Rd.,
Khaeng Phatthanakorn, Khet San Luang,
Bangkok 10250 Thailand
Procedure used: Calibration was conducted using calibration procedure No. CP-PH01 based on inverse square law technique.

Condition of this result of calibration
1. Reference standards instruments:
Instrument Model Serial No. Certificate No. Due Date
1) Photometry & Encoder LMguide 5.6 m 129RC003 DL-0064-22 20 Jul 2025
2) High-accuracy Irradiance Standard CL-PFL-A1 F-1471 TP-1048-23 01 Oct 2024
3. Test Equipment: Programmable Voltage/Current Source (Model: OL83A, SN: 06220284)
4. Test Equipment: Illuminance Meter (Model: 51002, SN: 080129)
5. The certificate is valid only to the item calibrated on date and place of calibration.
6. This Certificate is traceable to the International System of Unit maintained through:-
National Institute of Metrology (Thailand) (NIMT)

Calibrated by: Nivet Nias
Issue Date: 11 September 2024
Approved Signatory: [Signature]
Phatthana Prapattapal
Chatchawan Khunphulak
Nontawat Khanchai

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN) CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES

Certificate of Calibration Cert. No.: 24PH471 Page: 2 of 2

Function: Illuminance Measurement
Range: Autorange

Standard Value (lx)	Before Adjust UUC* Reading (lx)	After Adjust UUC* Reading (lx)	Error (lx)	Uncertainty (± lx)
0	0.00	0.00	0.00	-
15	-	15.18	0.18	0.22
100	-	100.6	0.6	1.5
500	-	499	-1	7.1
1000	923	1000	0	15
2000	-	2008	8	29
3000	-	3030	30	44
4000	-	4060	60	58
5000	4710	5090	80	73

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 %

Before adjustment light source factor setting mode: L0 = 1.264
After adjustment light source factor setting mode: L0 = 1.369
UUC* = Unit Under Calibration.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN) CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES

Certificate of Calibration Certificate No.: 25PH133 Page: 1 of 2

Equipment: Lux Meter
Manufacturer: Timmers
Model: TML-201L
Serial No.: 19070490
ID No.: RYG-050471
Condition As-Received: Used Item
Received Date: 05 March 2025
Calibration Date: 13 March 2025
Reference: 2503-0189VSC
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 1) %
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakorn 40, Phatthanakorn Rd.,
Khaeng Phatthanakorn, Khet San Luang,
Bangkok 10250 Thailand
Procedure used: Calibration was conducted using calibration procedure No. CP-PH01 based on inverse square law technique.

Condition of this result of calibration
1. Reference standards instruments:
Instrument Model Serial No. Certificate No. Due Date
1) Photometry & Encoder LMguide 5.6 m 129RC003 DL-0064-22 20 Jul 2025
2) STANDARD LAMP CL-FELU F-1785 TP-1009-24 17 May 2025
3. Test Equipment: Programmable Voltage/Current Source (Model: OL83A, SN: 1622134)
4. Test Equipment: Illuminance Meter (Model: 51002, SN: 080129)
5. The certificate is valid only to the item calibrated on date and place of calibration.
6. This Certificate is traceable to the International System of Unit maintained through:-
National Institute of Metrology (Thailand) (NIMT)
National Institute of Metrology (Thailand), NIS-CHSG Accredited No. Calibration 0144

Calibrated by: Nivet Nias
Issue Date: 14 March 2025
Approved Signatory: [Signature]
Phatthana Prapattapal
Chatchawan Khunphulak
Nontawat Khanchai

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN) CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES

Certificate of Calibration Certificate No.: 25PH133 Page: 2 of 2

Function: Illuminance Measurement
Range: 200 lx

Standard Value (lx)	UUC* Reading (lx)	Error (lx)	Uncertainty (± lx)
0	0	0	1.6
20	21.2	1.2	0.26
50	50.8	0.8	0.65
100	100.0	0.0	1.3
150	149.4	-0.6	2.0
190	188.9	-1.1	2.5

Function: Illuminance Measurement
Range: 2000 lx

Standard Value (lx)	UUC* Reading (lx)	Error (lx)	Uncertainty (± lx)
200	214	14	2.6
500	509	9	6.5
1000	1000	0	13
1500	1496	-4	20
1900	1893	-7	25

Function: Illuminance Measurement
Range: 20000 lx

Standard Value (lx)	UUC* Reading (lx)	Error (lx)	Uncertainty (± lx)
2000	1990	-10	26
3000	2940	-60	39
4000	3890	-140	52
5000	4800	-200	65

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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN) CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES

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. Phukdaeng,
Rayong 21140 Thailand
Location: TPA On Site Calibration Laboratory
Received Order: 17 January 2025
Calibrated Date: 20 January 2025
Ambient Temperature: (26 ± 1) °C
Relative Humidity: (50 ± 30) %
AC Line Voltage: (220 ± 22) V
Submitted by: Warakorn Lemmagrakul
Approved Signatory: [Signature]
() Chakrit Waewanjua
() Suwit Injai
() Kanchit Promrat
Issue Date: 23 January 2025
The Uncertainties are for a confidence probability of approximately 95%
This certificate may not be reproduced other than in full, except with the prior written approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN) CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES

Certificate of Calibration Cert. No.: 25LM10 Page: 2 of 2

Reference: 2501-0600DSC-2
Calibration was 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. Traceability Due Date
1) Digital Thermometer 2188080 241022 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
20.00	80	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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN) CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES

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. Phukdaeng,
Rayong 21140, Thailand
Laboratory Condition: Temperature (25 ± 5) °C
Humidity (50 ± 20) %
In-house method: CP-CHD
By Comparison Technique with Azide Modification Method
Tested by: Walidk Sirthean
Approved Signatory: [Signature]
() Pongpan Pajim
() Sathip Meangmai
Issue Date: 21 January 2025



ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: WO-0064379
หมายเลขเครื่อง: 1627845

ชนิดเครื่องวัด: SPECTROPHOTOMETER รุ่น: DR8000		ตรวจสอบ (ผู้)	
18 Mar 2025		18 Mar 2025	
ผู้วัด	ไม่ผู้วัด	ผู้วัด	ไม่ผู้วัด
General			
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Spectrophotometer			
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pH Meter and Conductivity Meter			
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Turbidimeter			
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Automatic titrator			
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ผลการตรวจสอบ: * 656.1nm = 656.1nm
* 486.0nm = 485.7nm

M.Preecha Phooarsai
Service Engineer

SCG Metrology Center
SCI ECO Services Company Limited
51 Moo 8, Tubkang, Kaeng Khoi, Saraburi, Thailand 18200
Delivering Growth - In Asia and Beyond.

CAL-FM-R31-03; 20 Jul 2022



Metrology Center
SCI ECO Services Company Limited
51 Moo 8, Tubkang, Kaeng Khoi, Saraburi, Thailand 18200
Bangkok Tel : +66 8205 6851 / +669 81921 0059
Saraburi Tel : +66 8247 2380
Website : www.sceco.co.th E-Mail : cal@sci.eco.co.th

Certificate No. T251529 Page 1 of 3

Certificate of Calibration

Equipment : DIGESTION UNIT
Manufacturer : Gerhardt, Germany
Model : KT - 205
Serial No. : 572021009
Customer Code : RYG_EN0188
ID No. : T6452A5
Customer : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenamkoo,
A.Piukdaeng, Rayong 21140
Customer Location : ENVIRONMENT LABORATORY
Date of Receipt : 3 September 2025
Calibrated By : Sujjar Nahnakred (Site Calibration Manager)
Approved By : [Signature] / 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.

FM-TL04 10/27-43-68



Metrology Center
SCI ECO Services Company Limited
51 Moo 8, Tubkang, Kaeng Khoi, Saraburi, Thailand 18200

Certificate No. T251529 Page 2 of 3

Calibration Report

Equipment : DIGESTION UNIT
Date of Calibration : 10 September 2025
Environment : Temperature : 21.7 - 24.3 °C
Line Voltage : 226.9 - 232.1 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

- This equipment was calibrated by insert four standard thermocouples type S into its chamber , the other one thermocouple type T use for ambient temperature measurement. The calibration was done in according to WI-T10.
- Reference Standard Instrument :
Instrument Model Instrument No. Certificate No. Due Date
TC Type S M2041-CH1-CH4 T250750 14 May 2026
DATA LOGGER 34870A T261 T250750 14 May 2026
- This certificate is traceable to : National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)
- Condition of calibrated item : good
Equipment Description :
Time Constant 1 Hour 46 Minute At 380 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☒ Close ☐ Not Available
- Adjustment : (X) without adjustment () after adjustment

Approved By : [Signature]

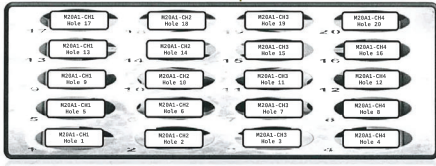
FM-TL05 10/27-43-68



Metrology Center
SCI ECO Services Company Limited
51 Moo 8, Tubkang, Kaeng Khoi, Saraburi, Thailand 18200

Certificate No. T251529 Page 3 of 3

Calibration Report



Cal.Point	Setting	Reading	STD.	Position of Standards at Block											
(°C)	(°C)	(°C)	Reading	K2041-CH1 Note 1	K2041-CH2 Note 2	K2041-CH3 Note 3	K2041-CH4 Note 4	K2041-CH5 Note 5	K2041-CH6 Note 6	K2041-CH7 Note 7	K2041-CH8 Note 8	K2041-CH9 Note 9	K2041-CH10 Note 10	K2041-CH11 Note 11	K2041-CH12 Note 12
300	300	300	Max °C	301.2	301.5	301.0	301.0	301.2	300.8	301.3	301.7	302.8	301.5		
			Min °C	300.7	300.0	300.4	300.5	301.6	300.1	300.9	301.2	301.5	300.9		
			Average °C	301.0	300.8	300.7	300.8	300.9	300.4	301.1	301.5	302.4	301.2		
			Stability ±%	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.5	0.3		

The expanded uncertainty of temperature measurement was : ± 0.8 °C
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=2, providing a level of confidence of approximately 95 % .

End of Certificate.

Approved By : [Signature]

FM-TL05 10/27-43-68



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUKULIANG, SUKULIANG BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Cert.No.: 25CH7091
Page: 1 of 3

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

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : SevenExcellence
Serial No. : B834291445
ID No. : RYG_EN0152
Condition As-Received: Used Item
Received Date : 12 June 2025
Calibration Date : 18 June 2025
Reference : 2506-0407DSC-2
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
Rayong Branch
616/10 Moo 5 T.Maenam Khu,
A.Piukdaeng, Rayong 21140, Thailand
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In-house method :
- CP-CH5 by direct measurement with DC voltage standard and direct measurement with certified reference material (CRM)
- CP-CH5 by comparison with temperature standard

Calibrated by : Walalak Sirithien
Approved by : [Signature]
Approved Signatory

() Chakrit Watanawong
() Porpan Papiem
(✓) Sathip Meangmai
Issue Date : 1 July 2025

The Uncertainties are for a confidence probability of approximately 95%
This certificate may not be reproduced other than in full, except with the prior written approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.



Cert.No.: 25CH7091
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	Uncertainty of pH Measurement (k)	Coverage factor k
pH Electrode S/N: 5211504	4.007 7.000 10.010	4.008 7.000 10.007	181.1 4.9 -170.6	0.0044 0.0084 0.0086	2.00 2.00 2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;
- Model : InLabExpert Pro-ISM
- Serial No. : 5211504
- Dimension of probe
- Length : 120 mm.
- Diameter : 12 mm.
- Immersion Depth : 100 mm.

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

Remark : UUC* = Unit Under Calibration

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

-00-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUKULIANG, SUKULIANG BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No.: 25E19791
Page: 1 of 2

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : SevenExcellence
Serial No. : B834291445
ID No. : RYG_EN0152
Condition As-Received: Used Item
Received Date : 12 June 2025
Calibration Date : 16 June 2025
Reference : 2506-0407DSC
Ambient Temperature : (23 ± 2) °C
Relative Humidity : (50 ± 10) %
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. Rayong Branch
616/10 Moo 5, T.Maenam Khu, A.Piukdaeng,
Rayong 21140, Thailand

Procedure used: Calibration was conducted using calibration procedure No. CP-E17 According to EURAMET op-15.

Condition of this result of calibration

- Reference standards instruments :
Instrument Model Serial No. Certificate No. Due Date
1) Multi-Product Calibrator 5500A 6315011 25E1627 19 May 2026
- This result of calibration was made on requested at the point specified by customer.
- This certificate is valid only for the item calibrated on date and place of calibration.
- 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 : Wuthunee Pothong
Issue Date : 01 July 2025

Approved Signatory : [Signature]
() Phatthana Phatthana
(✓) Nantarat Khomai
() Pongiam Boonyaporn



Cert.No.: 25E19791
Page: 2 of 2

Result of calibration: (*) Without adjustment () After adjustment		Function: DC voltage measurement		Range: 2000 mV	
Standard Value (mV)		UUC* Reading (mV)		Error (mV)	
-200.0000		-199.9		0.1	
-150.0000		-150.0		0.0	
-100.0000		-100.0		0.0	
-50.0000		-50.0		0.0	
0.0000		0.0		0.0	
50.0000		50.0		0.0	
100.0000		100.0		0.0	
150.0000		149.9		-0.1	
200.0000		199.9		-0.1	

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.

-00-



Agilent Technologies (Thailand) Limited
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100 Rama 4 Road, Bangkok 10110
Bangkok 10100 Thailand
Tel: +662 637 6303
Fax: +662 637 6304
Email: info.thailand@agilent.com
Website: www.agilent.com/thai

Service Confirmation Number: 690505441
Service Confirmation Date: 08.10.2024

Service Confirmation Number: 690505441
Service Confirmation Date: 08.10.2024

Customer Contact:
ALS Laboratory Group (Thailand) Co.
Ltd Head Office
104 Phatthanakan 40 Phatthanakan Rd
Khuang Phatthanakan Khet Buan
TAX ID: 010504004899
charattagan.inchom@agilent.com
227150709

SERVICE REPORT

Customer Name:	Customer Number:
Order Number:	7037013
Service Request:	Service Request Date:
Service Order:	Service Confirmation:
690505441	

Invoice To:
ALS Laboratory Group (Thailand) Co.
Ltd Head Office
104 Phatthanakan 40 Phatthanakan Rd
Khuang Phatthanakan Khet Buan



Delivery Site:
ALS Laboratory Group (Thailand) Co.
Ltd Head Office
104 Phatthanakan 40 Phatthanakan Rd
Khuang Phatthanakan Khet Buan

Direct Inquiries to:
Contact Name: Customer Contact Center
Contact E-mail: ccc.sm@agilent.com
Contact Telephone: +662 637 6303
Contact Fax: +662 632 4336

Location:
Room
Bldg
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Bangkok 10100 Thailand
Tax ID: 010504004899

Customer N/A, Bangkok Branch
300 Intechange 21 Building, Sukhumvit Road, Klongtoey New
Sub-district, Western District, Bangkok 10110 Thailand
Attn: Mr. JITTAPORN C.
100 Kung Thae Bank PCL
Siam Square B1, 410/1-2 Rama 1 Rd, Pathumwan, BKK 10330
Thailand

ORIGINAL

**Metrological Center**

SCI ECO Services Company Limited

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Website : www.scieco.co.th E-Mail : calibrate@sci.co.th

Certificate No. T250355

Page 1 of 6

Certificate of Calibration

Equipment : HEATING BLOCK
Manufacturer : Environmental Express

Model : SC 196

Serial No. : 6974CEW3285

Customer Code : BKK_EL0054

ID No. : TS306A3

Customer : ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd.,
Khuang Phatthanakan, Khet Suan Luang, Bangkok 10250

Customer Location : Acid Digestion Lab

Date of Receipt : 26 February 2025

Calibrated By : Atiphong Rongrat (Technician)

Approved By : [Signature] / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 31 MAR 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.

FM-L13 08/30-05-57

**Metrological Center**

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Certificate No. T250355

Page 2 of 6

Calibration Report

Equipment : HEATING BLOCK
Date of Calibration : 4 March 2025
Environment : Temperature : 24.4-24.9 °C
Line Voltage : 221.6-226.3 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-720.

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
TC	TYPE T	TN231-TN240	T240712	19 April 2025
TC	TYPE T	TN241-TN250	T240401	16 March 2025
TC	TYPE T	TN251-TN260	T240401	16 March 2025
DATA LOGGER	34970A	T193	T240401	16 March 2025

3. This certificate is traceable to : National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TS 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

Equipment Description :

Time Constant : 2 Hour 40 Minute At 95 °C
Fresh Air Damper : ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment : () without adjustment (X) after adjustment

Approved By : [Signature]

FM-L13 08/30-05-57

**Metrological Center**

SCI ECO Services Company Limited

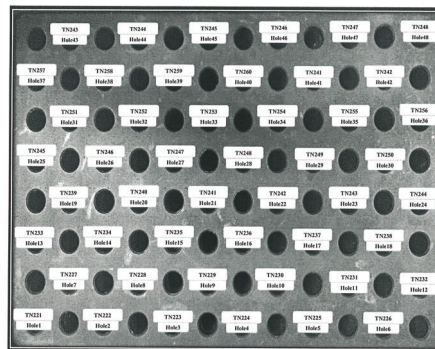
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Certificate No. T250355

Page 3 of 6

Calibration Report**FRONT CONTROL**

Approved By : [Signature]

FM-L13 08/30-05-57

**Metrological Center**

SCI ECO Services Company Limited

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Certificate No. T250355

Page 4 of 6

Calibration Report

Measurement Results	
Calibration Point	Average Standard Reading at each position (°C)
R1 Hole1-Hole6	TN221 TN222 TN223 TN224 TN225 TN226
CAL POINT	Max 94.85 95.37 95.03 95.25 95.52 94.75
95	Min 94.17 94.66 94.33 94.63 94.87 94.12
Average	94.51 95.02 94.70 94.94 95.20 94.43
R2 Hole7-Hole12	TN227 TN228 TN229 TN230 TN231 TN232
Max	94.71 94.56 94.79 95.32 95.44 95.06
Min	94.05 93.88 94.10 94.65 94.90 94.65
Average	94.38 94.22 94.44 94.99 95.17 94.85
R3 Hole13-Hole18	TN233 TN234 TN235 TN236 TN237 TN238
Max	95.26 95.43 95.60 95.71 95.41 95.06
Min	94.54 94.64 94.71 95.10 94.86 94.42
Average	94.90 95.03 95.16 95.41 95.13 94.74
R4 Hole19-Hole24	TN239 TN240 TN241 TN242 TN243 TN244
Max	95.13 95.06 95.68 96.16 95.35 95.80
Min	94.39 94.43 94.86 95.51 94.88 95.12
Average	94.76 94.75 95.27 95.83 95.12 95.46
R5 Hole25-Hole30	TN245 TN246 TN247 TN248 TN249 TN250
Max	94.95 95.81 95.39 95.82 95.66 95.66
Min	94.47 95.03 94.67 94.99 94.84 94.87
Average	94.71 95.42 95.03 95.41 95.25 95.27
R6 Hole31-Hole36	TN251 TN252 TN253 TN254 TN255 TN256
Max	96.07 95.34 96.28 95.39 94.95 95.12
Min	95.28 94.55 95.51 94.62 94.13 94.35
Average	95.67 94.95 95.90 95.00 94.54 94.73
R7 Hole37-Hole42	TN257 TN258 TN259 TN260 TN261 TN262
Max	95.13 95.63 96.11 95.09 95.34 95.51
Min	94.38 94.48 95.32 94.28 94.54 94.72
Average	94.76 95.25 95.71 94.69 94.94 95.11
R8 Hole43-Hole48	TN243 TN244 TN245 TN246 TN247 TN248
Max	95.84 95.87 95.44 95.72 95.65 95.75
Min	95.06 95.10 94.60 94.93 94.87 94.98
Average	95.45 95.48 95.02 95.34 95.26 95.36

Approved By : [Signature]

FM-L13 08/30-05-57

**Metrological Center**

SCI ECO Services Company Limited

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Certificate No. T250355

Page 5 of 6

Calibration Report

Measurement Results	
Calibration Point	Average Standard Reading at each position (°C)
R1 Hole1-Hole6	TN221 TN222 TN223 TN224 TN225 TN226
CAL POINT	Max 104.40 104.40 104.40 103.27 103.24 103.19
105	Min 104.15 104.02 104.25 103.90 103.91 104.93
Average	104.32 104.21 104.42 103.10 103.08 103.06
R2 Hole7-Hole12	TN227 TN228 TN229 TN230 TN231 TN232
Max	103.20 103.45 103.58 103.96 103.81 106.03
Min	104.92 105.14 105.29 105.64 105.53 105.79
Average	105.06 105.29 105.43 105.80 105.67 105.91
R3 Hole13-Hole18	TN233 TN234 TN235 TN236 TN237 TN238
Max	106.09 106.14 105.83 106.25 105.97 105.88
Min	105.80 105.89 105.57 106.00 105.69 105.65
Average	105.94 106.01 105.70 106.12 105.83 105.77
R4 Hole19-Hole24	TN239 TN240 TN241 TN242 TN243 TN244
Max	105.87 105.75 105.30 105.07 105.22 105.66
Min	105.62 105.52 105.13 104.90 105.05 105.49
Average	105.74 105.63 105.21 104.98 105.14 105.57
R5 Hole25-Hole30	TN245 TN246 TN247 TN248 TN249 TN250
Max	105.62 105.54 105.52 105.79 105.91 105.69
Min	105.45 105.35 105.31 105.57 105.81 105.49
Average	105.53 105.44 105.41 105.66 105.89 105.59
R6 Hole31-Hole36	TN251 TN252 TN253 TN254 TN255 TN256
Max	106.19 106.24 106.47 105.96 105.76 105.25
Min	106.02 106.16 106.31 105.77 105.58 105.18
Average	106.10 106.25 106.39 105.87 105.67 105.27
R7 Hole37-Hole42	TN257 TN258 TN259 TN260 TN261 TN262
Max	106.21 105.59 105.45 105.36 106.08 106.09
Min	106.04 105.82 105.23 105.20 105.90 105.92
Average	106.12 105.51 105.37 105.28 105.99 106.00
R8 Hole43-Hole48	TN243 TN244 TN245 TN246 TN247 TN248
Max	106.54 106.33 105.78 105.38 105.42 105.69
Min	106.38 106.16 105.60 105.30 105.25 105.32
Average	106.46 106.25 105.69 105.29 105.33 105.51

Approved By : [Signature]

FM-L13 08/30-05-57

**Metrological Center**

SCI ECO Services Company Limited

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Website : www.scieco.co.th E-Mail : calibrate@sci.co.th

Certificate No. T250355

Page 6 of 6

Calibration Report

Measurement Results	
HEATING BLOCK	
Temperature Distribution	
Setting (°C)	Reading (°C)
	Min, Max Average
102.0	102.0 0.43 0.83
107.0	107.0 0.20 0.70

* 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 % .

Approved By : [Signature]

FM-L13 08/30-05-57

Page 3 of 4

Calibration Report

Equipment	: Chamber (Cooling Room)
Date of Calibration	: 4 June 2025
Environment	: Temperature : 23.4-24.9 °C
	: Line Voltage : 230.4-230.2 °C
	: Relative Humidity : 55 -65 %RH

Condition of this results of calibration :

1. Thiequeupment was calibrated by insert 16 standard thermocouples type T into its chamber , the other one standard thermocouples type T for use ambient temperature measurement. The calibration was done in according to WI-720 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986).

All data 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
TC	TYPE T	TN51-TN100	T242036	3 December 2025
TC	TYPE T	TN101-TN110	T242036	3 December 2025
DATA LOGGER	34707A	T121	T242036	3 December 2025

3. This certificate is traceable to :
 National Institute of Metrology (Thailand) through Metrological Center / NSC-TISI-TS 17025 CALIBRATION 0

4. Condition of calibrated item : good

Equipment Description :

Time Constant	2	Min	20	Minute	At	3	°C
Fresh Air Damper	Open	Min	Medium	Max			
	Close						
	Not Available						

5. Adjustment :
 (X) without adjustment () after adjustment

C = Centre, F = Centre of Face, A = Corner, E = Centre of Edge

1C	= TN91
2A	= TN92
3A	= TN93
4F	= TN94
5A	= TN95
6A	= TN96
7E	= TN97
8F	= TN98
9A	= TN99
10A	= TN100
11F	= TN101

12F	= TN102
13A	= TN103
14A	= TN104
15F	= TN105
16E	= TN106

FM-TL07 102/27-03-68

FM-TL06 102/27-03-68

FM-TL07 102/27-03-68

Certificate No. T242075 Page 2 of 3

Calibration Report

Equipment	: Liquid Bath (Water)	
Manufacturer	: Memmert	
Model	: WNE29	
Serial No.	: L623.0105	
Customer Code	: RYG_EN0220	
ID No.	: T5650A5	

REVIEW BY Phanikak

APPROVED BY D. [Signature]

NEXT CAL DATE 19/12/25

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 :

1. This equipment was calibrated by insert five resistance thermometer detectors into its water bath , the other one thermocouple type T for ambient temperature measurement . The calibration was done in according to W-718 (based on ASTM E1734-80 (Revised 2007)) .

At all data shown below were final values and the initial data from customer request . The temperature scale used, was based on ITS - 90 .

2. Reference Standard Instrument :

ITS	Model	Instrument No.	Certificate No.	Due Date
RTD	100 OHM	MS3 (CH1-CH5)	T204040	16 March 2025
DATA LOGGER	34070A	T193	T204040	19 March 2025

3. This certificate is traceable to :
 National Institute of Metrology (Thailand) through Metrological Center / NSC-TISI-T15 17025 Calibration (0244) .

4. Condition of calibrated item : good
 Equipment Description :
 Time Constant 1 Hour 30 Minute At 63 °C

5. Adjustment :
 (X) without adjustment () after adjustment

FM-L15 118/18-08-66

FM-TL07 102/27-03-68

FM-L14 119/18-08-6

Certificate No. T252169 Page 2 of 3

Calibration Report

Equipment : Liquid Bath (Water)
 Manufacturer : Memmert
 Model : WNE29
 Serial No. : L623.0105
 Customer Code : PYG EN0220

REVIEW BY Tharoli
 APPROVED BY D. Jee
 NEXT CAL DATE 03/11/24

Equipment : Liquid Bath (Water)
Date of Calibration : 27 November 2025
Environment : Temperature : 25.5-25.7 °C
Line Voltage : 221.8-225.5 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration:

1. 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 W0-T36 (based on ASTM E71-80 (Reapproved 2023)).

All data above show were final values and the initial data from customer request. The temperature scale used was based on ITS - 90.

2. Reference Standard Instrument No. Certificate No. Due Date

Instrument	Model	Instrument No.	Certificate No.	Due Date
DATA LOGGER	100 OHM	M18 (CH1-CH5)	T251758	17 October 2026
RTD	59879A	T261	T251758	17 October 2026

3. This certificate is traceable to:
National Institute of Metrology (Thailand) /through Metrological Center (NSC-TISI-TS1 17025 Calibration 6244).

4. Condition of calibrated item: good

Equipment Description: _____

Time Constant 1 Hour 3 Minute At 63 °C

5. Adjustment: (X) without adjustment () after adjustment

Approved By: Drake

Liquid Bath (Water)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average	Stability	Uniformity	Uncertainty	Coverage
	Min, Max	Average	(°C)	(±°C)	(±°C)	(±°C)	Factor
63.0	-	63.0	62.99	0.07	0.25	0.23	2.00
85.0	-	85.0	85.00	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

FM-115118/18-08-66

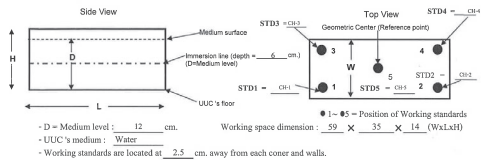
FM-TL06 102/27-03-68

FM-TL07 102/27-03-68

Certificate No. T252169

Calibration Report

Page 3 of 3



Measurement Results:

Calibration Point	Average Standard Reading at each position (°C)				
	CH-1	CH-2	CH-3	CH-4	CH-5
63	62.93	63.13	62.94	63.10	63.09
85	85.15	85.33	85.21	85.43	85.20

Setting (°C)	Temperature Distribution					
	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (±°C)	Uncertainty (±°C)
	Min	Max				
63.0	62.9	63.1	63.04	0.08	0.17	0.27
85.0	84.8	85.2	85.0	0.13	0.24	0.43

* 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:

FM-TL07 10227-01-68

REVIEW BY: Autcharon S.
APPROVED BY: Impran P.
NEXT CAL. DATE: 24/06/26

ARCHERMA

Certificate of Calibration

ICS-2100: Anion (ID#659)

This certificate is to verify that instrument below are calibrated
by Archerma Lab Co., Ltd.

ICS-2100 S/N: 11080010
AS-HV S/N: 5450A36659

For
ALS Laboratory Group (Thailand) Co., Ltd.

Operator Signature: Impran P. Date: June 17-24, 2025
(Mr.Sorant Thongnop)
Application Chemist

Customer Contact:
ALS Laboratory Group (Thailand) Co
Ltd Head Office
104 Phatthanakan 40 Phatthanakan Rd
Khwaeng Phatthanakan Khet Suan
TAX ID: 0105540004859
Chanattagan.linhom@agilent.com
2783086

Invoice To:
ALS Laboratory Group (Thailand) Co
Ltd Head Office
104 Phatthanakan 40 Phatthanakan Rd
Khwaeng Phatthanakan Khet Suan

Delivery Site:
ALS Laboratory Group (Thailand) Co
Ltd Head Office
104 Phatthanakan 40 Phatthanakan Rd
Khwaeng Phatthanakan Khet Suan

Location:
Room
Bldg
Lab
Dept

Product / Application / Software / Service

Agilent Technologies (Thailand) Limited: Head Office
10/100 Long Road, 22/F Unit A-2
908 Rama 4 Road, Sukhumvit, Bangkok 10250
Bangkok 10250 Thailand
Tel: 02-05540004859

SERVICE REPORT

Customer Purchase Order Number:	Customer Number:
Service Request:	Service Request Date:
Service Order:	Service Confirmation:

REVIEW BY: Impran P.
APPROVED BY: Impran P.
NEXT CAL. DATE: 24/06/26

Direct Inquiries to:
Contact Name: Customer Contact Center
Contact E-mail: ccs@agilent.com
Contact Telephone: +662 637 6383
Contact Fax: +662 637 6334

Page 1 of 3

Service Confirmation Number: 0905876103
Service Confirmation Date: 23.09.2024

Service Confirmation Number: 0905876103
Service Confirmation Date: 23.09.2024

Service Instrument:

Model Number	Model Description	Serial Number	System Handle	Parent Asset
510-10-5100	ICP-OES 5100/5110 System			
68010A	Agilent 5100 SVDV ICP-OES Spectrometer	MY18010005	ICP OES 5100	SYS-ID-5100
68101A	SPS 4 Autosampler	AM15440794	ICP OES 5100	SYS-ID-5100

Service Items:

Item	Service/Part #	Description	Qty	Entitlement	Service Start	Service End
1000	EQO	Enterprise Operational Qualification	1.00	Agreement Entitlement 100 % covered	22.09.2024	23.09.2024
1010	461030100	Bottle ICP-OES Wavescan 500ml, 5 ppm	1.00	Agreement Entitlement 100 % covered		
1020	5100-7001	Calibration blank solution Spect HPC2	1.00	Agreement Entitlement 100 % covered		

Additional Information:

Page 2 of 3

Service Information:

Problem Description: VUO-DQ-ID-5100-50123065		
Service Provided: Complete OICW 5100/CPES Equipment ID: BOK_EL0037, all test passed		
Service Overview Code: Reason Code: Scheduled Service Diagnosis Code: Scheduled Service Resolution Code: Scheduled Service		
Reported Hours: 4.0	Travel Hours: 2.0	
Customer Field Service Representative Name: Sorant Thongnop	Customer Field Service Representative Signature: <u>Sorant O.</u>	Date: 23 Sep 2024
Customer Name: CHANATTAGARN INCHOM	Customer Signature: <u>Impran P.</u>	Date: 23 Sep 2024
Additional Comments:		

Page 3 of 3

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 2: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL: 02-0715-3006-29 FAX: 02-0715-9484

Certificate of Calibration

Cert.No.: 25CH579
Page: 1 of 3

Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: SevenGo S2
Serial No.: B851952376
RYG_FS042S
Condition As-Received:
Received Date: 19 May 2025
Calibration Date: 20 May 2025
Reference: 2505-0527DSC-1
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5, T.Maenam Khu, A.Phuakdeang, Rayong 21140, Thailand

Ambient Temperature: (25 ± 2.5) °C
Relative Humidity: (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: Wanakorn Lemngtrakul
Approved by: Sathap
Approved Signatory

() Chakrit Waeuwunjan
() Porpan Paipin
(✓) Sathap Meangmai
Issue Date: 22 May 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 2: Equipment Calibration and Testing Services.

Condition of this calibration result

- 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 4862054 110RC044 24I757 14 July 2025
- This measurement result is traceable to SI through Technology Promotion Association (Thailand - Japan)
- Certified Reference Materials
- The measurement results are traceable to SI through Hach Lange GmbH Ltd., Deutsche Akkreditierungsstelle, Accredited No.D-IRM-15184-01-00
- The measurement results are traceable to SI through CPA chem Ltd., ANSIS-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 7.000	Hach Lange GmbH	C03232	02 Dec 2026
pH 10.010	CPA chem	1066669	18 Jan 2026

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

Calibration Results

Function: mV Measurement

Performing standard curve by Document Process Calibrator at pH (4.7,10)

Unit Under Calibration	Nominal Value		Standard Voltage Input	Actual Reading	Uncertainty of Measurement (mV)	Coverage factor k
	pH	mV		mV		
pH Meter S/N: B851952376	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	-178	-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: 3293238	4.007	4.01	164	0.0071	2.00
	7.000	7.00	-10	0.0095	2.00
	10.010	10.01	-182	0.0095	2.00

Function: Temperature Measurement

(*) Adjust adjustment

This equipment was connected with Temperature Probe:

- Model: INLabExpert Go-ISM

- Serial No.: 3293238

Dimension of probe

- Length: 120 mm.

- Diameter: 12 mm.

- Immersion Depth: 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC Reading (°C)	Error (°C)	Uncertainty of measurement (±°C)	Coverage factor k
25.0	25.002	25.2	0.198	0.13	2.00
45.0	45.005	45.2	0.195	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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Cert.No.: 25CH579
Page: 3 of 3

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 2: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL: 02-0715-3006-29 FAX: 02-0715-9484

Certificate of Calibration

Cert.No.: 25CH487
Page: 1 of 3

Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: SevenComp4220
Serial No.: C104059480
ID No.: RYG_EN0193
Condition As-Received:
Received Date: 17 July 2025
Calibration Date: 18 July 2025
Reference: 2507-0581DSC-3
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
Rayong Branch
616/10 Moo 5, T.Maenam Khu, A.Phuakdeang, Rayong 21140, Thailand

Ambient Temperature: (25 ± 2.5) °C
Relative Humidity: (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: Walakorn Sirinthean
Approved by: Sathap
Approved Signatory

() Chakrit Waeuwunjan
() Porpan Paipin
(✓) Sathap Meangmai
Issue Date: 21 July 2025

The Uncertainties are for a confidence probability of approximately 95%
This certificate may not be reproduced other than in full, except with the prior written Approval of the Head of Corporate Services 2: Equipment Calibration and Testing Services.



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	32403076	60RC033	250304	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., ANS-ASQ National Accreditation Board, Accredited No. AN-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.007	CPA chem	1088955	18 Jan 2027
pH 6.965	CPA chem	1069657	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 (mV)	Coverage factor k
pH Meter	4.000	177.48 mV	177.3	0.058	2.00
SN.: C104059490	7.000	0.00	-0.2	0.058	2.00
	10.000	-177.48	-177.6	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 (pH)	Coverage factor k
pH Electrode	4.007	4.008	184.5	0.0044	2.00
SN.: 5240006	6.965	6.966	10.2	0.0084	2.00
	10.010	10.009	-164.9	0.0085	2.00

Function: Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLabExpert Pro-ISM
- Serial No. : 5240006
- 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	25.0	-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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD 501 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL: 0-2717-3880-24 FAX: 0-2719-8484



Certificate of Calibration

Certificate No. : 25E2372
Page : 1 of 2

Equipment :	pH Meter
Manufacturer :	Mettler Toledo
Model :	SevenCompact 3220
Serial No. :	C104059490
ID No. :	RYG_EN0163
Condition As-Received:	Used Item
Received Date :	17 July 2025
Calibration Date :	22 July 2025
Reference :	2507-0591DSC
Ambient Temperature :	(23 ± 2) °C
Relative Humidity :	(50 ± 2) %
Submitted by :	ALS Laboratory Group (Thailand) Co., Ltd. Rayong Branch
	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 cp-15.

Condition of this result of calibration

- Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Multi-Product Calibrator	9250A	6310311	25E1627	19 May 2026
- This result of calibration was made on request at the point specified by customer.
- The certificate is valid only to the item calibrated on date and place of calibration.
- 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 : Nopachonk Prasomsost
Issue Date : 23 July 2025

Approved Signatory :
[] Phatree Phatphak
[] Nuntawat Khanchai
[x] Pongsakorn Boonyaporn



Cert. No.: 25E2372
Page: 2 of 2

Result of calibration: (*) Without adjustment () After adjustment

Function: DC voltage measurement		Range: 2000 mV	
Standard Value (mV)	UUC* Reading (mV)	Error (mV)	Uncertainty (± μV)
-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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SARTORIUS



Accredited by
NSC-TISI-TIS 17025
Calibration 0426

Calibration certificate

Calibration Certificate No. 25BKL0002

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	MCE2245-2500-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)	
	616/10 Moo 5 T Maenam Khu, A.Pluak Daeng, Rayong 21140, Thailand.	
Order no.	2230	
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	08 Mar 2025	Approval of the Calibration Certificate	Person in charge
		Mr. Chondai Inthana	Kachen Lalae

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang
10310 Bangkok

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Version 6.5

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Calibration certificate No.: 25BKL0002
Calibration Certificate

Calibration object

Single range instrument

Model	MCE2245-2500-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.M23081975_E2(Traceable to SI unit through TCS)	23 Aug 2025

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10310 Bangkok

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Calibration certificate No.: 25BKL0002

Calibration Certificate

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
Twisting - Tilting	The installation site is suitable. The device was levelled. Balance was loaded up to Max before test.
Measuring conditions	Humidity 58.0 %RH.

Measurement results | Measurement uncertainties

Repeatability	Centricity
Test load (nominal): 10 g 200 g	Test load (nominal): 100 g
1 10.0000 g 200.0000 g	1 100.0000 g 200.0000 g
2 10.0000 g 200.0000 g	2 100.0000 g 200.0000 g
3 10.0000 g 200.0001 g	3 100.0000 g 200.0000 g
4 9.9999 g 200.0000 g	4 100.0000 g 200.0000 g
5 9.9999 g 200.0000 g	5 100.0000 g 200.0000 g
6 10.0000 g 200.0001 g	6 100.0000 g 200.0001 g
7 10.0000 g 200.0000 g	7 100.0000 g 200.0000 g
8 10.0000 g 200.0000 g	8 100.0000 g 200.0000 g
9 9.9999 g 200.0001 g	9 100.0000 g 200.0001 g
10 10.0000 g 200.0000 g	10 100.0000 g 200.0000 g
s = 0.00005 g s = 0.00005 g	

Error of indication	Testload	Indication	Error	Expansion factor	Uncertainty	Uncertainty relative
	L	F	E	K	(ME)	U _{rel} /B
	0.0100 g	0.0100 g	0.0000 g	2.00	0.00013 g	0.13 %
	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	0.00014 g	0.014 %
	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	0.00016 g	0.00023 %
	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 B _{max} = 0.0001 g						

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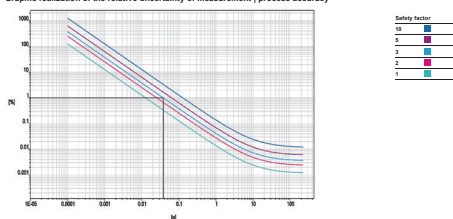
Interpretation of measurement results | Appendix to the calibration certificate

Uncertainty of measurement in use

Device adjusted before measurement	Yes
Temperature deviation considered	1.5 K (No/CAL active)
Temperature coefficient considered	1 - 10 °K
Uncertainty of the weighing result U _{rel} (W)	U _{rel} (W) = 0.00013 g + 1.16 · 10 ⁻⁶ · R

Indication in % from max load	Net indication	Uncertainty U _{rel} (W)	Uncertainty relative U _{rel} (W)/W
1 %	2.0000 g	0.00019 g	0.0071 %
25 %	50.0000 g	0.00017 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

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10310 Bangkok

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Metrology Center

SCI ECO Services Company Limited

51 Moo 8, Tubkwang, Kaeng Khoi, Saraburi, Thailand 18000

Bangkok Tel : +669 9205 6851 ; +669 81924 0059

Saraburi Tel : +669 8247 2360

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Certificate No. T251350

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 :	Sutjar Nakkarned (Site Calibration Manager)
Approved By :	Bonchai 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.

FM-TL06 0027-03-08

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 (Resapproved 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 39-(CHI)-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

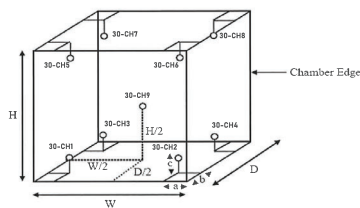
Approved By: *[Signature]*

FM-TL07 0027-03-68

Certificate No. T251530

Page 3 of 3

Calibration Report



Remark : Internal Dimensions of Chamber : W (Width) = 56 cm . H (Height) = 48 cm . D (Depth) = 40 cm .
Size of installed Standard sensor number 30-CH1 to number 30-CH9 : a = 5 cm , b = 5 cm , and c = 5 cm .
Size of installed Standard sensor number 30-CH10 : W/2 = 56 cm / 2 , H/2 = 48 cm / 2 and D/2 = 40 cm / 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	179.78	180.30	179.89	179.16	180.27	180.88	181.04	179.49

Chamber (Oven)					Temperature Distribution				
Reading (°C)					Average (°C)				
Setting (°C)					Stability (°C)				
Min , Max , Average					Uncertainty (a %)				
104.0	103.9	104.1	104.0	104.0	0.08	0.01	0.42	2.00	
180.0	179.9	180.1	180.0	180.0	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: *[Signature]*

FM-TL07 0027-03-68

Certificate No. T241120

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cold Room)
Manufacturer : MODULAR
Model : IREVC0HCOO
Serial No. : C00351459
Customer Code : RYG_EN0184
ID No. : T1939A5
Customer : ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenam Khu,
A.Phuakdaeng, Rayong 21140

Customer Location : Laboratory

Date of Receipt : 5 June 2024

Calibrated By : Sujjar Nakkakred (Site Calibration Manager)

Approved By : *[Signature]* Preecha Phissattuthkul (Temperature Calibration Manager)

Date of Issue : 12 JUN 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. T241120

Page 2 of 4

Calibration Report

Equipment : Chamber (Cold Room)
Date of Calibration : 11 June 2024
Environment : Temperature : 23.1-24.1 °C
Line Voltage : 222.3-226.3 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Resapproved 2001) 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
TC TN161-TN170 T240713 19 April 2025
TC TYPE T TN171-TN180 T240713 19 April 2025
DATA LOGGER 34970A T149 T240713 19 April 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 30 Minute At 3 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☒ Close
☐ Not Available

5. Adjustment :
() without adjustment (X) after adjustment

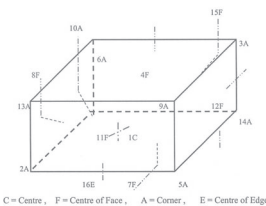
Approved By: *[Signature]*

FM-L13 11018-08-66

Certificate No. T241120

Page 3 of 4

Calibration Report



C = Centre , F = Centre of Face , A = Corner , E = Centre of Edge

1C = TN161	11F = TN171
2A = TN162	12F = TN172
3A = TN163	13A = TN173
4F = TN164	14A = TN174
5A = TN165	15F = TN175
6A = TN166	16E = TN176
7F = TN167	
8F = TN168	
9A = TN169	
10A = TN170	

Approved By: *[Signature]*

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Certificate No. T241120

Page 4 of 4

Calibration Report

Measurement Results:

Average Standard Reading at each position (°C)									
Calibration Point	TN161	TN162	TN163	TN164	TN165	TN166	TN167	TN168	TN169
3	2.73	2.70	2.77	2.78	2.99	2.35	3.09	3.21	3.08
	TN171	TN172	TN173	TN174	TN175	TN176			
	3.39	3.01	2.92	2.81	3.42	3.42			

Chamber (Cold Room)					Temperature Distribution				
Reading (°C)					Average (°C)				
Setting (°C)					Stability (°C)				
Min , Max , Average					Uniformity (°C)				
3.0	2.9	4.4	3.7	2.97	1.32	1.13	2.02	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 % .

Approved By: *[Signature]*

FM-L13 11018-08-66

Certificate No. T252167

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cold Room)
Manufacturer : MODULAR
Model : IREVC0HCOO
Serial No. : C00351459
Customer Code : RYG_EN0184
ID No. : T1939A5
Customer : ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenamkoo,
A.Phuakdaeng, Rayong 21140
Customer Location : ENVIRONMENT LABORATORY
Date of Receipt : 19 November 2025
Calibrated By : Sujjar Nakkakred (Site Calibration Manager)
Approved By : *[Signature]* / Boonchal Suriyawong (Site Calibration Manager)
Date of Issue : 01 DEC 2025

REVIEW BY: *[Signature]*
APPROVED BY: *[Signature]*
NEXT CAL DATE: 23/05/27

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.

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Certificate No. T252167

Page 2 of 4

Calibration Report

Equipment : Chamber (Cold Room)
Date of Calibration : 27 November 2025
Environment : Temperature : 24.7-25.6 °C
Line Voltage : 222.3-226.3 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Resapproved 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
TC TYPE T TN161-TN170 T251760 17 October 2026
TC TYPE T TN171-TN180 T251760 17 October 2026
DATA LOGGER 34970A T261 T251760 17 October 2026

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 1 Hour 12 Minute At 3 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☒ Close
☐ Not Available

5. Adjustment :
() without adjustment (X) after adjustment

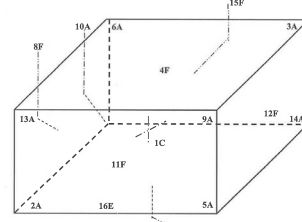
Approved By: *[Signature]*

FM-TL07 0027-03-68

Certificate No. T252167

Page 3 of 4

Calibration Report



C = Centre , F = Centre of Face , A = Corner , E = Centre of Edge

1C = TN161	11F = TN171
2A = TN162	12F = TN172
3A = TN163	13A = TN173
4F = TN164	14A = TN174
5A = TN165	15F = TN175
6A = TN166	16E = TN176
7F = TN167	
8F = TN168	
9A = TN169	
10A = TN170	

Approved By: *[Signature]*

FM-TL07 0027-03-68

ภาคผนวก จ

สำเนาหนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

ที่อก ๐๓๑๐(๑)/ ๑ ๖ ๑ ๖ ๘



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒ ๐ พฤศจิกายน ๒๕๖๖

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอลเอส แลบริทอรี่ กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๔ สิงหาคม ๒๕๖๖

- สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ แผ่น
๓. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอลเอส แลบริทอรี่ กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔-๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐
ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ต่อมารับใบอนุญาตฯ กรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ความเห็นชอบต่ออายุห้องปฏิบัติการวิเคราะห์เอกชน โดยยังคงประกอบดังนี้

- ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ ๑๔๑ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนไว้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูล
หรือวัสดุที่ไม่ใช่แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กันยายน ๒๕๖๘ หากประสงค์จะต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อ
กรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายศิระ จันทะโร)

นักวิทยาศาสตร์เชี่ยวชาญ วิชาการความปลอดภัย
ผู้อำนวยการกองวิจัยและประเมินผลสัมฤทธิ์
ปฏิบัติการตามแผนปฏิบัติการกรมโรงงานอุตสาหกรรม

กองวิจัยและประเมินผลสัมฤทธิ์โรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๔

ไปรษณีย์อิเล็กทรอนิกส์ sarabang@diw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



สิ่งที่ส่งมาด้วย ๑

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอลเอส แลบริทอรี่ กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๒๐๔

ที่อก ๐๓๑๐(๑)/ ๑ ๖ ๑ ๖ ๘ ลงวันที่ ๒ ๐ พฤศจิกายน ๒๕๖๖

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย

- ๑) นางสาวยุพพร จันทร์ปลั่ง
๒) นางสาวชัชชัย โฉมกรกุล ณ นคร
๓) นายศรยุทธ จิตราพันธ์
๔) นางสาวกนกกร เอนก
๕) นายสุริยา สอนแก้ว
๖) นายวิชาญ ชุมทรัพย์

- ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๐๑
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๐๒
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๐๓
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๐๔
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๐๕
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๐๖

สิ่งที่ส่งมาด้วย ๒

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอลเอส แลบริทอรี่ กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๒๐๔

ที่อก ๐๓๑๐(๑)/ ๑ ๖ ๑ ๖ ๘ ลงวันที่ ๒ ๐ พฤศจิกายน ๒๕๖๖

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๔๑ ราย

- ๑) นายเกษมสันต์ กิตติคุณวัฒน์
๒) นายภัทรพล สว่างใจธรรม
๓) นายธนวิทย์ เทือกชัยคำ
๔) นายศิริโชค พงษ์ประสม
๕) นายณัฐวัฒน์ ตั้งแพง
๖) นางสาวจินดา ไชยธรรม
๗) นางสาวสวดี น้อยเสียม
๘) นางสาวสุวิภาภรณ์ อัมม
๙) นางสาวนรินทร์ สายแสง
๑๐) นางสาวนันทวี สมบูรณ์
๑๑) นางสาวศรีนยา เลิศอึ้งวงศ์
๑๒) นางสาวอุบลอร มงคลจิราวัฒน์
๑๓) นางสาวศิริลักษณ์ บุณนาค
๑๔) นายบพพงศ์ จันทร์พันธุ์
๑๕) นายนครเศรษฐ์ โกมลาลัย
๑๖) นายธีรวิทย์ จันทะโร
๑๗) นางสาวกนิษฐา แก้วมัน
๑๘) นางสาวสุวิมล ชัยเรืองวุฒิ
๑๙) นางสาวสุชาดา ธรรมถาวร
๒๐) นางสาวเมธิกา ชัยเดชพจนกุล
๒๑) นางสาวศศิธร พูลสวัสดิ์
๒๒) นางสาวเสาวลักษณ์ ภูมิกำพร
๒๓) นายอภิสิทธิ์ สิงหา
๒๔) นายศักดิ์สิทธิ์ ไพศาลพิสุทธิ
๒๕) ว่าที่ร้อยตรีหญิง พรรณิกา ขำเจริญ
๒๖) นางจิตตา คำแก้ว
๒๗) นางสาววรรณ ภัย
๒๘) นางสาวพรรัตน์ แยมกรานต์
๒๙) นายจุลเดช วารินทร์
๓๐) นางสาวดาญรัตน์ ร้องคำ
๓๑) นายพรมิ ศรีปิตเนตร
๓๒) นายอุทิศ อยู่สืบ
๓๓) ว่าที่ร้อยตรี เลียมเกียรติ อมรศรีเสริม
๓๔) นางสาววิภา สร้างนา
๓๕) นายอนุพงษ์ รัตนศรีประเสริฐ

- ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๐๑
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๐๒
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๐๓
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๐๔
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๐๕
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๐๖
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๐๗
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ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๑๒
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๑๓
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๑๔
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๑๕
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๑๖
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๑๗
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๑๘
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๑๙
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๒๐
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๒๑
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๒๒
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๒๓
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๒๔
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๒๕
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๒๖
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๒๗
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๒๘
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๒๙
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๓๐
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๓๑
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๓๒
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๓๓
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๓๔
ทะเบียนเลขที่ ๖-๒๐๔-๕-๐๐๓๕

๒๖) นางสาวจุฑารัตน์...

- ๒ -

- ๒๖) นางสาวจุฑารัตน์ โอนสันเพียร
๒๗) นางสาวจุฑารัตน์ พิมพ์ภักดี
๒๘) นางสาวปรารถนา พิทยะกุล
๒๙) นางสาวเดือนใจ ทางกลาง
๓๐) นางสาวจิราพร ศรีเว
๓๑) นายวรกร ภูกริช
๓๒) นายพนม วิริยะสกิจ
๓๓) นายณัฐ เชนจบ
๓๔) นายณัฏฐ์ พงษ์เทพ
๓๕) นายภูวิช พรหมสะอาด
๓๖) นายณเดช โกศาพิพัฒน์
๓๗) นายวราวุธ วงษ์จันทร์
๓๘) นายอาทิตย์ ศรีเสน
๓๙) นายเจตตินันท์ คงศักดิ์ไทย
๔๐) นายจรัส บุญย
๔๑) นายธนิต เอนก
๔๒) นายอภิวัฒน์ พุ่มพวง
๔๓) นางสาวสุภาวดี มาก
๔๔) นางสาวกัญญา ขวาลสมบุญ
๔๕) นางสาวธิดา บุญเพ็ง
๔๖) นางสาวกานดา นามวัฒน์
๔๗) นางสาวอุไรรัตน์ ทิพย์รุ่งเป็น
๔๘) นายธีรวัฒน์ ปางสุข
๔๙) นายอภิสิทธิ์ อยโส
๕๐) นายประพนธ์ วรรณชูชัย
๕๑) นายชยพร พงษ์ชัย
๕๒) นางสาวนภาพร จันทะโร
๕๓) นายสิทธิโชค เองเงิน
๕๔) นางศศิธร ใจบุญ
๕๕) นางสาวพรหมธิศา พุ่มคง
๕๖) นายณัฏฐ์ ศรีวิริยะ
๕๗) นายสุวิภา หออ่อน
๕๘) นายวิญญู บุญตะนัย
๕๙) นายสมบุญ บุตรจันทร์
๖๐) นายวิรัตน์ โยชนะรา
๖๑) นายณณพคน คุ้มพูน
๖๒) นายธีรวิทย์ ขวาลอ
๖๓) นายธีรวิทย์ นามบุรี
๖๔) นายธีรวิทย์ จ่อสา

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๕๕) นายประเสริฐ...

๑๑๔) นายอนันต์ชัย...

๑๕๓) นางสาวอบล...

2000

19 Copper...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Copper	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
20	Cyanide	Distillation, Colorimetric Method ⁽⁴⁾
21	2,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
22	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
23	2,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
24	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
25	2,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
26	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
27	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
28	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
29	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
30	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
31	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
32	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
33	Formaldehyde	Distillation, Colorimetric Method ⁽³⁾
34	Free Chlorine	1) DPD Ferrous Titrimetric Method ⁽⁴⁾ 2) DPD Colorimetric Method ⁽⁴⁾
35	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
36	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
37	Hexavalent Chromium	Colorimetric Method ⁽⁴⁾
38	3-Hydroxycarbofuran	High-Performance Liquid Chromatographic Method ⁽⁴⁾
39	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾

40 Manganese...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
40	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
41	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass spectrometric Method ⁽⁴⁾
42	Methiocarb	High-Performance Liquid Chromatographic Method ⁽⁴⁾
43	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
44	Methomyl	High-Performance Liquid Chromatographic Method ⁽⁴⁾
45	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
46	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ⁽⁴⁾ 2) Soxhlet Extraction Method ⁽⁴⁾
47	Oxamyl	High-Performance Liquid Chromatographic Method ⁽⁴⁾
48	Propoxur	High-Performance Liquid Chromatographic Method ⁽⁴⁾
49	pH	Electrometric Method ⁽⁴⁾
50	Phenols	1) Distillation, Chloroform Extraction Method ⁽⁴⁾ 2) Distillation, Direct Photometric Method ⁽⁴⁾
51	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
52	Sulfide	Iodometric Method ⁽⁴⁾
53	Temperature	Laboratory and Field Methods ⁽⁴⁾
54	Total Dissolved Solids	Dried at 180 °C ⁽⁴⁾
55	Total Kjeldahl Nitrogen	Semi-Micro Kjeldahl Method ⁽⁴⁾
56	Total Phosphorous	Digestion, Colorimetric Method ⁽⁴⁾
57	Total Suspended Solids	Dried from 103-105 °C ⁽⁴⁾
58	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
59	Trivalent Chromium	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ⁽⁴⁾
60	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾

น้ำได้ดิน...

น้ำได้ดิน จำนวน 126 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
8	Barium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
9	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
13	Benzoic Acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
15	Benzo(g,h,i)perylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
17	Bis(2-chloroethoxy)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

18 Bis(2-ethylhexyl)phthalate...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
22	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
27	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ⁽⁴⁾
35	Chromium (VI)	Colorimetric Method ⁽⁴⁾

36 Chrysene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
36	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
37	Cyanide	Distillation, Colorimetric Method ⁽⁴⁾
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
39	DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
40	DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
41	DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
42	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
43	Di-n-Butyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
47	3,3-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

56 1,3-Dichloropropene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
57	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
58	Diethyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
63	Di-n-octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
64	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
65	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
67	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
68	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
69	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
70	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
74	α-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
75	β-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

76 γ-HCH...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
76	γ-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
81	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
83	Mercury	1) Digestion, Cold Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
84	Methanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
86	Methyl bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
87	Methylene chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
89	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
90	Methyl tert-butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
91	Naphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

94 N-Nitrosodiphenylamine...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
95	N-Nitrosodi-n-Propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
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 ⁽⁴⁾
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
98	pH	Electrometric Method ⁽⁴⁾
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
100	Phenol	1) Distillation, Chloroform Extraction Method ⁽⁴⁾ 2) Distillation, Direct Photometric Method ⁽⁴⁾ 3) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
102	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
103	Silver	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
104	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
105	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
106	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
107	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
108	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
109	TPH (C ₈ -C ₁₆)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(4,25)

110 TPH (C₈-C₁₆)...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
110	TPH (C ₈ -C ₁₆)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^{9,22}
111	TPH (C ₁₆ -C ₃₅)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^{9,22}
112	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶
113	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶
114	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶
115	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁶
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁶
118	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶
119	Vanadium	1) Digestion, Inductively Coupled Plasma Method ⁵ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶
120	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶
121	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶
122	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶
123	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶
124	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶
125	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶
126	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁵ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶

อากาศเสีย...

อากาศเสีย (ปล่องระบาย) จำนวน 28 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵
2	Arsenic	2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁵ 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵
3	Beryllium	2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁵ 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵
4	Cadmium	2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁵ 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵
5	Carbon Monoxide	1) Instrumental Analyzer Method ⁵ 2) Sampling Bag Non-Dispersive Infrared Method ⁵
6	Chlorine	1) Absorption Sampling, Ion Chromatographic Method ⁵ 2) Isokinetic Sampling, Ion Chromatographic Method ⁵
7	Chromium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁵
8	Cobalt	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁵
9	Copper	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁵
10	Cresol	Adsorption Sampling, Gas Chromatographic Method ⁵
11	Dioxins	Isokinetic Sampling ⁵
12	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method ⁵ 2) Isokinetic Sampling, Ion Chromatographic Method ⁵
13	Hydrogen Fluoride	1) Absorption Sampling, Ion Chromatographic Method ⁵ 2) Isokinetic Sampling, Ion Chromatographic Method ⁵
14	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ⁵

15 Lead...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	Lead	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁵
16	Manganese	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁵
17	Mercury	1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁵ 2) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁵
18	Nickel	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁵
19	Opacity	Ringelmann's Method ²
20	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method ⁵ 2) Absorption Sampling, Alkaline Permanganate/Colorimetric Method ⁵ 3) Instrumental Analyzer Method ⁵
21	Selenium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁵
22	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method ⁵ 2) Instrumental Analyzer Method ⁵
23	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method ⁵
24	Tellurium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁵
25	Tin	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁵
26	Total Suspended Particulate	1) Isokinetic Sampling, Gravimetric Method ⁵ 2) Paired Train, Isokinetic Sampling, Gravimetric Method ⁵

27 Vanadium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Vanadium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁵ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁵
28	Xylene	Adsorption Sampling, Gas Chromatographic Method ⁵

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^{1,9,26} 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^{10,26} 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^{1,26}
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^{1,6,16} 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^{1,6,17} 3) Digestion, Inductively Coupled Plasma Method ^{7,16} 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^{7,17}
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^{1,6,16} 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^{1,6,17} 3) Digestion, Inductively Coupled Plasma Method ^{7,16} 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^{7,17}
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^{1,6,16} 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^{1,6,17} 3) Digestion, Inductively Coupled Plasma Method ^{7,16} 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^{7,17}

5 Beryllium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11.26)
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
9	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method ^(1.6.16,19) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method ^(1.6.17,19) 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.8,16,19) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.8,17,19)

10 Chromium (VI)...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^(1.6.19) 2) Alkaline Digestion, Colorimetric Method ^(8.19)
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11.26)
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11.26)
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11.26)
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24)

2) Soxhlet...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Dieldrin	2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11.26) 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11.26)
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11.26)
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11.26)
20	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
21	Lindane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11.26)

22 Mercury...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1.6.20) 2) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^(1.6.30) 3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽²⁰⁾ 4) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽²⁰⁾ 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ⁽²¹⁾
23	Methoxychlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.28) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11.26)
24	Mirex	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.28) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11.26)
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
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 ^(1.9.28) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11.26)

- 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 ^(1.9,24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26) Electrometric Method ^(23,24)
29	pH	
30	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)

31 Silver...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9,24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
35	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)

ดิน...

ดิน จำนวน 125 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
2	Acetone	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(15,25) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ⁽¹³⁾
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
4	Anthracene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
8	Barium	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
9	Benz(a)anthracene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(15,25)

11 Benzo(b)fluoranthene

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
11	Benzo(b)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
12	Benzo(k)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
13	Benzoic acid	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
14	Benzo(a)pyrene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
15	Benzo(g,h,i)perylene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
17	Bis(2-chloroethyl)ether	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
18	Bis(2-ethylhexyl)phthalate	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(15,25)
20	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(15,25)
21	Butanol	Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(13,25)
22	Butyl Benzyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)

23 Cadmium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
24	Carbazole	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
28	p-Chloroaniline	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
32	2-Chlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7,8,14,19) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7,8,17,19)
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^(8,19)

36 Chrysene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
36	Chrysene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
37	Cyanide	Extraction, Distillation, Colorimetric Method ^(27,28,29)
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
39	DDD	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
40	DDE	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
41	DDT	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
42	Dibenz(a,h)anthracene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
43	Di-n-Butyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
47	3,3-Dichlorobenzidine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)

49 1,2-Dichloroethane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
53	2,4-Dichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
58	Diethyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
59	2,4-Dimethylphenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
60	2,4-Dinitrophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
61	2,4-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
62	2,6-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)

63 Di-n-Octyl Phthalate...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
63	Di-n-Octyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
67	Fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
68	Fluorene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
70	Heptachlor epoxide	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
73	n-Hexane	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25) 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ⁽¹³⁾

73 n-Hexane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
74	α -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
75	β -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
76	γ -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
77	Hexachlorocyclopentadiene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
78	Hexachloroethane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
79	Indeno(1,2,3-cd)pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
80	Isophorone	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
81	Lead	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽²⁰⁾ 2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry ⁽²¹⁾ 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽²⁰⁾

84 Methanol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25) 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(13,25)
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
88	2-methylphenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
89	2-Methylnaphthalene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
91	Naphthalene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
93	Nitrobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
94	N-Nitrosodiphenylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
95	N-Nitrosodi-n-propylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)

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 - 2,3',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',3,3',4,4',5,5',6-Nonachlorobiphenyl Pentachlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
97	Phenanthrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)

99 Phenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
99	Phenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
100	Pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
101	Selenium	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
102	Silver	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
103	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
106	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
108	TPH (C ₅ -C ₆)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
109	TPH (C ₈ -C ₁₆)	1) Automate Extraction, Gas Chromatographic Method ^(11,22) 2) Solvent Extraction, Gas Chromatographic Method ^(12,22) 3) Ultrasonic Extraction, Gas Chromatographic Method ^(22,31)
110	TPH (C ₁₆ -C ₃₅)	1) Automate Extraction, Gas Chromatographic Method ^(11,22) 2) Solvent Extraction, Gas Chromatographic Method ^(12,22) 3) Ultrasonic Extraction, Gas Chromatographic Method ^(22,31)
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)

115 2,4,5-Trichlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
115	2,4,5-Trichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
116	2,4,6-Trichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
118	Vanadium	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
119	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
120	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
121	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
122	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
123	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
125	Zinc	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)

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กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒๕ เมษายน ๒๕๖๗

ที่ อก ๐๓๑๐(๑)/๔๑๒๑

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท แอลแอล แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๙ มีนาคม ๒๕๖๗

ตามคำขอที่อ้างถึง บริษัท แอลแอล แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๕ ขอพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้อยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓ ราย

๑) นางสาวพรณิศา พุ่มคง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๖๕

๒) นายกำชัย สุทธิยะ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๒๑

๓) นางสาวศุภรดา ปิ่นมูรา ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๔๘

๒. ให้เพิ่มเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๒ ราย

๑) นางสาวฐานิดา กลิ่นเขียว ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๔๐

๒) นางสาวกัญญ์ณิสร์ สายคำ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๔๑

๓) นางสาวณัฐนันท์ กันทะวงศ์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๔๒

๔) นายอำนาจ วงษาเคน ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๔๓

๕) นายฤกษ์พล ปัญญาวรค์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๔๔

๖) นายณชากร พรราชา ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๔๕

๗) นายวิวัฒน์ ผ่องสามสวน ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๔๖

๘) นายณัฐพงศ์ โสภา ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๔๗

๙) นายศรินทร์พร ปานเพ็ง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๔๘

๑๐) นายณัฐพล ชุ่มชื่น ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๔๙

๑๑) นายธน สุภาพันธุ์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๕๐

๑๒) นายนราธร แก้วพงษ์ชา ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๕๑

อนึ่ง หนังสือฉบับนี้...

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ในวันที่ ๒ กันยายน ๒๕๖๔

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ


(นายพรศ กัณกรอง)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๑๔
ไปรษณีย์อิเล็กทรอนิกส์ saraban@dlw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่ อก ๐๓๑๐(๑)/ ๑๒๓๖ ๘ /

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๔ ธันวาคม ๒๕๖๓

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒ ธันวาคม ๒๕๖๓


ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๕๐ ถนนพัฒนาการ แขวงพัฒนาการ
เขตสวนหลวง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์
จำนวน ๘ ราย ได้แก่

- | | |
|-------------------------------|----------------------------|
| ๑) นายประจักษ์ วรรณชัย | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๐๖๐ |
| ๒) นายจิรณัฐ ขาวละออ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๐๗๒ |
| ๓) นายพิพัฒน์ กำคำ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๐๘ |
| ๔) นางสาวอรุษา คำคล่อง | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๓๔ |
| ๕) นายกิตติพงศ์ แซ่สี | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๔๔ |
| ๖) นายจิรเมธ ประเสริฐศิริพงศ์ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๖๐ |
| ๗) นายภัทรพงษ์ มณฑาทอง | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๖๗ |
| ๘) นางสาวจางุวรรณ กระจำพันธุ์ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๘๑ |

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ


(นายธีรทัศน์ อิศรางกูร ณ อยุธยา)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๑๔
ไปรษณีย์อิเล็กทรอนิกส์ saraban@dlw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่ อก ๐๓๑๐(๑)/ ๓๑๔๐

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๐ เมษายน ๒๕๖๔

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒ เมษายน ๒๕๖๔

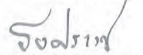
ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๕๐ ถนนพัฒนาการ แขวงพัฒนาการ
เขตสวนหลวง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์
จำนวน ๒ ราย ได้แก่

- | | |
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| ๑) นายธิพงษ์ บัวแดง | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๐๒ |
| ๒) นายมงคล ผลาพิชัย | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๑๐ |

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ


(นายธีรทัศน์ อิศรางกูร ณ อยุธยา)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๑๔
ไปรษณีย์อิเล็กทรอนิกส์ saraban@dlw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่ อก ๐๓๑๐(๑)/ ๔๖๗๓

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๐๕ มิถุนายน ๒๕๖๔

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๗ พฤษภาคม ๒๕๖๔

ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๕๐ ถนนพัฒนาการ แขวงพัฒนาการ
เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากร ความละเอียดแจ้งแล้ว นั้น

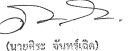
กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้เพิ่มเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน
จำนวน ๑๑ ราย ได้แก่

- | | |
|-----------------------------------|----------------------------|
| ๑) นายอุดมกร มั่นชื่น | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๓๔ |
| ๒) นายชัชวาล แสนมาตร | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๓๕ |
| ๓) นายเอกรินทร์ บุตสิทธิ์ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๓๖ |
| ๔) นายพิชานนท์ อินทริก | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๓๗ |
| ๕) นายศตวรรษ แก้วกันหา | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๓๘ |
| ๖) นายวิกรม มีศิริ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๓๙ |
| ๗) นายคณินท์ คำจันทร์พร | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๔๐ |
| ๘) นายศิริวิทย์ มีไพฑูรย์ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๔๑ |
| ๙) นายธีรพงษ์ ศรีคำแหง | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๔๒ |
| ๑๐) นายอภิสิทธิ์ ศรีคิดแก้ว | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๔๓ |
| ๑๑) ว่าที่ร้อยตรี ภาณุพงศ์ แสนศรี | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๔๔ |

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ในวันที่ ๒ กันยายน ๒๕๖๔

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ


(นายพิษ ขัมภังเลิศ)
อธิบดีกรมโรงงานอุตสาหกรรม
ผู้บัญชาการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๑๔
ไปรษณีย์อิเล็กทรอนิกส์ saraban@dlw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่ อก ๐๓๐๐(๑)/ ๖ ๕ ๐ ๘



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒๑ สิงหาคม ๒๕๖๘

เรื่อง เปลี่ยนแปลงสารมลพิษที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท แอลแอล แลอบราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒๗ มิถุนายน ๒๕๖๘

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์

บริษัท แอลแอล แลอบราทอรี กรุ๊ป (ประเทศไทย) จำกัด จำนวน ๖ แผ่น

ตามคำขอที่อ้างถึง บริษัท แอลแอล แลอบราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๕ สถานที่ตั้งเลขที่ ๑๐๕ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ
เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงสารมลพิษที่วิเคราะห์ ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท แอลแอล แลอบราทอรี กรุ๊ป (ประเทศไทย) จำกัด
เพิ่มขอขานชนิดสารมลพิษที่วิเคราะห์ในน้ำได้ดิน สิ่งปฏิกูลและวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือฉบับนี้จะสิ้นสุดอายุพร้อมหนังสือต่ออายุวันขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ในวันที่ ๒ กันยายน ๒๕๖๙

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นางสาวปัทมวรรณ คุณประเสริฐ)
ผู้อำนวยการกองขึ้นทะเบียน/เปลี่ยนแปลง
ปฏิบัติการของห้องปฏิบัติการวิเคราะห์เอกชน

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๕๔

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์

บริษัท แอลแอล แลอบราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ๖-๒๐๕

ที่ อก ๐๓๐๐(๑)/ ๖ ๕ ๐ ๘

ลงวันที่ ๒๑ สิงหาคม ๒๕๖๘

ขอขานสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๔๐ รายการ

น้ำได้ดิน จำนวน ๔ รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aluminum	Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[2]
2	Copper	Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[2]
3	Iron	Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[2]
4	Molybdenum	Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[2]

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 17 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,3,6] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,3,7] 3) Digestion, Inductively Coupled Plasma Method ^[4,6] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4,7]
2	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,3,6] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,3,7] 3) Digestion, Inductively Coupled Plasma Method ^[4,6] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4,7]
3	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,3,6] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,3,7] 3) Digestion, Inductively Coupled Plasma Method ^[4,6] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4,7]

Beryllium

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
4	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,3,6] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,3,7] 3) Digestion, Inductively Coupled Plasma Method ^[4,6] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4,7]
5	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,3,6] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,3,7] 3) Digestion, Inductively Coupled Plasma Method ^[4,6] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4,7]
6	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,3,6] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,3,7] 3) Digestion, Inductively Coupled Plasma Method ^[4,6] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4,7]
7	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method ^[1,3,6,8] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method ^[1,3,7,8] 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[4,5,6,8] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[4,5,7,8]
8	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,3,6] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,3,7]

3) Digestion...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Copper	3) Digestion, Inductively Coupled Plasma Method ^[4,6] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4,7] 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,3,6] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,3,7] 3) Digestion, Inductively Coupled Plasma Method ^[4,6] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4,7]
10	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,3,6] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,3,7] 3) Digestion, Inductively Coupled Plasma Method ^[4,6] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4,7]
11	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,3,6] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,3,7] 3) Digestion, Inductively Coupled Plasma Method ^[4,6] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4,7]
12	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,3,6] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,3,7] 3) Digestion, Inductively Coupled Plasma Method ^[4,6] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4,7]
13	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,3,6] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,3,7] 3) Digestion, Inductively Coupled Plasma Method ^[4,6] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4,7]

14 Silver...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
14	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,3,6) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,3,7) 3) Digestion, Inductively Coupled Plasma Method ^(4,6) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
15	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,3,6) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,3,7) 3) Digestion, Inductively Coupled Plasma Method ^(4,6) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
16	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,3,6) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,3,7) 3) Digestion, Inductively Coupled Plasma Method ^(4,6) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
17	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,3,6) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,3,7) 3) Digestion, Inductively Coupled Plasma Method ^(4,6) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)

คืน จำนวน 19 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aluminum	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
2	Antimony	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)

3 Arsenic...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
4	Barium	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
5	Beryllium	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
6	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
7	Chromium	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
8	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(4,5,6,8) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(4,5,7,8)
9	Copper	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
10	Iron	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
11	Lead	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
12	Manganese	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
13	Molybdenum	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
14	Nickel	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)

15 pH...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	pH	Electrometric Method ⁽⁹⁾
16	Selenium	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
17	Silver	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
18	Vanadium	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)
19	Zinc	1) Digestion, Inductively Coupled Plasma Method ^(4,6) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(4,7)

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ที่ อก ๐๓๑๐(๑)๕๐ ๑๑

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 และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๑ สิงหาคม ๒๕๖๔

ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัดห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สลวันที่ ๑๐๔ ขอพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากร ชื่อตัวและชื่อสกุลของบุคลากร ต่อกรมโรงงานอุตสาหกรรม นับ

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย

๑) นางสาวพาดิ คุณน่าน ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๓๔๔

๒) นางสาวอรณิช เทียนคำ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๓๔๔

๒. ให้เปลี่ยนชื่อตัวและชื่อสกุลของเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จากเดิม นายอาทิตย์ ศรีเสน เป็น นายรัฐธีร์ ทรัพย์เจริญ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๔๔

อนึ่ง หนังสือฉบับนี้จะสิ้นสุดอายุพร้อมหนังสือต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ในวันที่ ๒ กันยายน ๒๕๖๔

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

๒

(นางสาวปัทมาวรรณ คุณประเสริฐ)

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติการทางเคมีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบและประเมินผลปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๒๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๒๒ ต่อ ๒๑๐๔

ไปรษณีย์อิเล็กทรอนิกส์ saraban@dw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"





๐๘ สิงหาคม ๒๕๖๗

เรื่อง ค่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ค่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๗ พฤษภาคม ๒๕๖๗

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือค่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด จำนวน ๓ แผ่นตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอค่ออายุ
หนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๒๓ สถานที่ตั้งเลขที่ ๖๒๖/๑๐ หมู่ที่ ๕
ตำบลแม่ไม้ อำเภอลำปาง จังหวัดพะเยา ต่อกรมโรงงานอุตสาหกรรม นั้นกรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย)
จำกัด ค่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน

๑) นายเดช ช่างชน

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๑

๒) นางสาววิมลย์ บริรักษ์

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๒

๓) นายสุพจน์ สลามเต๊ะ

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๓

ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน

๑) นายณัฐพงษ์ เพ็งขาวนา

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๑

๒) นางสาวกัญจนาพรณ์ รักดี

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๒

๓) นางสาวจุฑาทิพย์ สีทองกลาง

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๓

๔) นางสาวจิตสุภา ประเทืองสุข

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๔

๕) นายสรณธรณ์ ก่อกลอย

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๕

๖) นายณัฐภูมิ ออมพรมราช

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๖

๗) นายจิตรกร สีวะสา

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๗

๘) นายสิทธิพรณ์ สุวรรณรัตน์

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๘

๙) นายสิทธิพรณ์ เสนาชีวะ

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๐๙

๑๐) นายอนุวัฒน์ เฒ่า

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๐

๑๑) นายสุวิทย์ นาราชพงษ์

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๑

๑๒) นายณัฐพล เขียววิจิตร

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๒

๑๓) นายชานนท์ บุญชื่น

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๓

๑๔) นายณัฐกานต์ วงศ์อินทร์อยู่

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๔

๑๕) นายอานนท์ โพธิ์พระทอง

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๖

๑๖) นายณัฐพล...

๑๖) นายณัฐพล ถักกลาง
๑๗) นายศุภณัฐ พิสัยพันธ์
๑๘) นายสันต์ คินันต์
๑๙) นายวรัญญู ฉิมพาลี
๒๐) นายศุภณัฐ สกฤตคิตมศักดิ์
๒๑) นายเอกชัย ถิ่นทอง
๒๒) นายพงษ์เทพ สิทธิเสนา
๒๓) นายพิกร ภูมิภา
๒๔) นางสาวนันทยา บุญจันทร์
๒๕) นายสิทธิชัย อันพัฒน์
๒๖) นางสาวภาณิน หลอดทอง
๒๗) นางสาวพจนา สีดา
๒๘) นางสาวอนิศา กุลศิริวงศ์
๒๙) นายพิทยา ทองแดง
๓๐) นางสาวธิดา สุขภง
๓๑) วาที่ร้อยตรี รณชัย ม่วงมา
๓๒) นายวรวิทย์ พันพา
๓๓) นายศักดิ์รินทร์ จรัสกาย
๓๔) นายสุรศักดิ์ สาขิน
๓๕) นายสถาวร ถาแก้ว
๓๖) นายสุทธิดำรง โชคดีนันท์
๓๗) นายวิมล ทนโชติ
๓๘) นางสาวนาลี เจริญตระกูล
๓๙) นายธนสิทธิ์ วงศ์ไชย
๔๐) นายชัยสุนทร เลิศนันท์กุลชัย
๔๑) นายสุจิตา เพ็ชรแสง
๔๒) นายกมลภณ มณีสัมพันธ์
๔๓) นายอริณทร อธิจินดา
๔๔) นายศุภชัย วงศ์สุริยา
๔๕) นายโสภณ ดันท์
๔๖) นางสาวกิตติยา สัตยธำธิกุล
๔๗) นางสาวอริณทรณ์ ศิริมงคล
๔๘) นายพิพัฒน์ นิกิทธิเศรษฐ์
๔๙) นายศิริพงษ์ เรืองสม
๕๐) นายปารณศ สัตยกุล
๕๑) นายณณพ ธรรมเสโร
๕๒) นางสาวศุภกานต์ โลจันท์

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๑๗
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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
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ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๒
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๓

๕๒) นายพชรกร...

๕๒) นายพชรกร เจริญ
๕๓) นายทิวากร เขื่อนมาก
๕๔) นายอนุวัช ทองขจรศักดิ์
๕๕) นายอภิชาติ วิลาศ
๕๖) นายจักรวรรดิ ศรีวิภา
๕๗) นายประสาธมิตร เขื่อนเพชร
๕๘) นายภาณุวัฒน์ วังง
๖๐) นายสันติ ชัยชนะ
๖๑) นายทิม กุลชาติ

ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๔
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๕
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ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๗
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๕๘
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ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๖๑
ทะเบียนเลขที่ ๖-๒๒๓-๙-๐๐๖๒

ค. ขอบข่ายชนิดสารเคมีที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย
ตามสิ่งที่ส่งมาด้วยหนังสือฉบับนี้จะหมดอายุในวันที่ ๒๘ มิถุนายน ๒๕๗๑ หากประสงค์จะต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงาน
อุตสาหกรรมภายใน ๖๐ วัน ก่อนวันสิ้นสุดของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายพชรก ภูมิภกร)
รองเลขาธิการ
อธิบดีกรมโรงงานอุตสาหกรรม



เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๒๒๓

ที่ อก ๐๓๒๐/ 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 ^[2]
2	Chemical Oxygen Demand	2) 5-Day BOD Test, Azide Modification Method ^[2] 1) Open Reflux, Titrimetric Method ^[2] 2) Closed Reflux, Colorimetric Method ^[2] 3) Closed Reflux, Titrimetric Method ^[2]
3	Color	ADMI Weighted-Ordinate Spectrophotometric Method ^[2]
4	Cyanide	Distillation, Colorimetric Method ^[2]
5	Formaldehyde	Distillation, Colorimetric Method ^[1]
6	Free Chlorine	DPD Ferrous Titrimetric Method ^[2]
7	Oil and Grease	Liquid-Liquid, Partition-Gravimetric Method ^[2]
8	pH	Electrometric Method ^[2]
9	Phenols	1) Distillation, Chloroform Extraction Method ^[2] 2) Distillation, Direct Photometric Method ^[2]
10	Sulfide	ZnS Precipitation, Iodometric Method ^[2]
11	Temperature	Field Method ^[2]
12	Total Dissolved Solids	Dried at 180 °C ^[2]
13	Total Kjeldahl Nitrogen	Semi-Macro Kjeldahl Method ^[2]
14	Total Suspended Solids	Dried at 103-105 °C ^[2]

น้ำใต้ดิน จำนวน 3 รายการ

ลำดับ ที่	สารเคมี	วิธีวิเคราะห์
1	Cyanide	Distillation, Colorimetric Method ^[2]
2	pH	Electrometric Method ^[2]
3	Phenols	Distillation, Direct Photometric Method ^[2]

อากาศเสีย...

อากาศเสีย (ปล่อยระบาย) จำนวน 7 รายการ

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
1	Carbon Monoxide	1) Sampling Bag, Non-Dispersive Infrared Method ^[5] 2) Instrumental Analyzer Method ^[9]
2	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ^[5]
3	Opacity	Ringelmann's Method ^[5,4]
4	Oxide of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method ^[8] 2) Instrumental Analyzer Method ^[10]
5	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Acid Method ^[5] 2) Instrumental Analyzer Method ^[11]
6	Sulfuric Acid	Isokinetic Sampling, Barium – Titrimetric Method ^[6]
7	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ^[7]

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7. United States...

7. United States Environmental Protection Agency. Standards of Performance for New Stationary Sources. 40 CFR 60. Appendix A, 2020.
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9. United States Environmental Protection Agency. Determination of Carbon Monoxide Emission from Stationary Sources; Instrumental Analyzer Procedure. 40 CFR 60. Appendix A Method 10, 2017.
10. United States Environmental Protection Agency. Determination of Oxide of Nitrogen Emission from Stationary Sources; Instrumental Analyzer Procedure. 40 CFR 60. Appendix A Method 7E, 2023.
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.



ที่ อก ๐๓๑๐/ ๑๐๐๕๕



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๕ ตุลาคม ๒๕๖๗

เรื่อง แก้อำนาจเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอนแอล แลบริทอรี่ กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง หนังสือ บริษัท เอนแอล แลบริทอรี่ กรุ๊ป (ประเทศไทย) จำกัด เลขที่ EnV 2024/005

ลงวันที่ ๓๐ สิงหาคม ๒๕๖๗

ตามที่หนังสืออ้างถึง บริษัท เอนแอล แลบริทอรี่ กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๓๒๓ สถานที่ตั้งเลขที่ ๖๑๖/๑๐ หมู่ที่ ๕ ตำบลแม่ไม้คู อำเภอลำปาง จังหวัดพะเยา ขอแก้ไขเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน เนื่องจากมีความคลาดเคลื่อน ความละเอียด

แจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรม ได้รับทราบและดำเนินการแก้ไขรายชื่อเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๕ ราย ตามที่แจ้งเรียบร้อยแล้ว เป็นดังนี้

ลำดับที่ ๒๗ นางพจนา สีดา
ลำดับที่ ๒๘ นางสาวอนิศา กุลสุริวงศ์
ลำดับที่ ๓๐ นางชลธิชา สุขเกษ
ลำดับที่ ๓๖ นายสุทธิดำรงค์ โชติปัญโญ
ลำดับที่ ๔๒ นายกณดลภณ มณีสัมพันธ์

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ


(นายพรศักดิ์ กลิ่นกรอง)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

โทร. ๐ ๓๓๑๓ ๖๐๕๕ ต่อ ๕๐๐๑-๒
ไปรษณีย์อิเล็กทรอนิกส์ eirw@diw.mail.go.th

 "อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่ อก ๐๓๑๐(๓)/ ๔๒๔๖



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒๐ พฤษภาคม ๒๕๖๘

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอนแอล แลบริทอรี่ กรุ๊ป (ประเทศไทย) จำกัด


อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๑๐ เมษายน ๒๕๖๘

ตามที่คำขออ้างถึง บริษัท เอนแอล แลบริทอรี่ กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๓๒๓ สถานที่ตั้งเลขที่ ๖๑๖/๑๐ หมู่ที่ ๕ ตำบลแม่ไม้คู อำเภอลำปาง จังหวัดพะเยา ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว โดยยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑ ราย ได้แก่ นายปารณศ สัตยาคุณ ทะเบียนเลขที่ ๖-๓๒๓-๖-๐๐๕๑๑

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ


(นายประสม ดำรงพงษ์)
ผู้อำนวยการศูนย์วิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติการตามแผนปฏิบัติการกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

โทร. ๐ ๓๓๑๓ ๖๐๕๕ ต่อ ๕๐๐๑-๒
ไปรษณีย์อิเล็กทรอนิกส์ eirw@diw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่ อก ๐๓๑๐(๓)/ ๕๕๐ ๕



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒๗ พฤษภาคม ๒๕๖๔

เรื่อง เปลี่ยนแปลงชื่อ-สกุลบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑๕ พฤษภาคม ๒๕๖๔

ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๓๒๓ สถานที่ตั้งเลขที่ ๖๑๖/๑๐ หมู่ที่ ๕ ตำบลแม่ไม้คู อำเภอลำปางหลวง
จังหวัดพะเยา ขอเปลี่ยนแปลงชื่อ-สกุลบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้เปลี่ยนแปลงชื่อ-สกุลบุคลากร จำนวน ๑ ราย
จากนายธนสิทธิ์ วงศ์ไชย เป็น นายอมลวิทย์ วงศ์ไชย

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายประสม ดำรงพงษ์)
ผู้อำนวยการกองวิจัยและเฝ้าระวังมลพิษโรงงาน
ปฏิบัติการตามหนังสือกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเฝ้าระวังมลพิษโรงงานภาคตะวันออก
โทร. ๐ ๓๓๑๓๓ ๖๐๕๕ ต่อ ๕๐๐๑-๒
ไปรษณีย์อิเล็กทรอนิกส์ einw@diw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่ อก ๐๓๑๐(๓)/ ๕๗๖ ๔



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๐๒ ธันวาคม ๒๕๖๔

เรื่อง เปลี่ยนแปลงสารมลพิษที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๓๑ ตุลาคม ๒๕๖๔

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด จำนวน ๒ แผ่น

ตามคำขอที่อ้างถึง 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 หนังสือฉบับนี้จะส่งอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ในวันที่ ๒๘ มิถุนายน ๒๕๖๕

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นางสาวปัทมวรรณ คุณประเสริฐ)
ผู้อำนวยการกองวิจัยและเฝ้าระวังมลพิษโรงงาน
ปฏิบัติการตามหนังสือกรมโรงงานอุตสาหกรรม

กองวิจัยและเฝ้าระวังมลพิษโรงงาน
ศูนย์วิจัยและเฝ้าระวังมลพิษโรงงานภาคตะวันออก
โทร. ๐ ๓๓๑๓๓ ๖๐๕๕ 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 ๒๕๖๔

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

APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 24th ed. Washington, DC: APHA, 2023.