

ภาคผนวก ค

ใบรับรองผลการตรวจวิเคราะห์

ภาคผนวก ค-1

ผลการตรวจสอบความถูกต้องของ CEMs ประจำปี พ.ศ. 2563



Relative Accuracy Test Audit Report

Report to: Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Neangket, Muang
Chachoengsao, Chachoengsao Thailand 24000
Attn: Chokpisan Tongdeepsing
Phone: 0-3851-3911-13
Fax: -
Email: Chokpisan.gmk@gulf.co.th

Project Name: Monitoring EIA
Location: GNNK
P/O:
Lot ID: 2022919
Date Received: Jun 04, 2020
Date Reported: Jun 10, 2020
Report Number: 1600852-1

1 of 2

Reference Number	2022919-1
Sample Description	Emission from Stationary Source
Location	HRS6 11
RATA Test for	NOx
Sampling Date	Jun 03, 2020
Reference Method	US EPA Method 7E

Run No.	Date	Time		Load (MW)	Raw Data at Actual O2		Corrected Value at 7% O2		Difference
		Start	Stop		CEMs (ppm)	RM (ppm)	CEMs (ppm)	RM (ppm)	
1	03 Jun 20	10:00	10:20	24.13	6.66	6.37	14.56	13.39	-1.17
2	03 Jun 20	10:21	10:41	24.10	6.61	6.34	14.47	13.31	-1.16
3	03 Jun 20	10:42	11:02	23.96	6.75	6.44	14.83	13.51	-1.33
4*	03 Jun 20	11:03	11:23	23.88	6.81	6.47	14.99	13.56	-1.43
5	03 Jun 20	11:24	11:44	24.02	6.57	6.31	14.46	13.15	-1.30
6	03 Jun 20	11:45	12:05	24.24	6.24	6.15	13.73	12.78	-0.95
7	03 Jun 20	12:06	12:26	24.13	6.04	5.89	13.29	12.31	-0.98
8	03 Jun 20	12:27	12:47	24.01	6.37	5.94	14.02	12.61	-1.41
9*	03 Jun 20	12:48	13:08	24.07	7.69	7.31	16.89	15.47	-1.42
10*	03 Jun 20	13:09	13:29	24.11	9.63	9.18	21.01	19.14	-1.86
11	03 Jun 20	13:30	13:50	24.09	10.16	10.27	22.16	21.41	-0.75
12	03 Jun 20	13:51	14:11	23.99	9.96	9.87	21.73	21.03	-0.70
Average					Confidence Coefficient (CC)		15.92		-1.08
					Relative Accuracy (Compared with Emission Standard : 60 ppm) (%)				3.62
					Relative Accuracy Criteria 1/ (Compared with Emission Standard)				≤ 10%

Remark: * Sample with * is a rejected data
1/ Relative Accuracy Criteria of NOx is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 2 (PS-2) and compared with Emission Standard 60 ppm at 7%O2
RA Result is within Criteria

Technical Manager

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Attn: Chokpisan Tongdeepsing
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Email: Chokpisan.gmk@gulf.co.th

Project Name: Monitoring EIA
Location: GNNK
P/O:
Lot ID: 2022919
Date Received: Jun 04, 2020
Date Reported: Jun 10, 2020
Report Number: 1600852-1

2 of 2

Reference Number	2022919-1
Sample Description	Emission from Stationary Source
Location	HRS6 11
RATA Test for	O2
Sampling Date	Jun 03, 2020
Reference Method	US EPA Method 3A

Run No.	Date	Time		Load (MW)	Raw Data at Actual O2		Difference
		Start	Stop		CEMs (%)	RM (%)	
1	03 Jun 20	10:00	10:20	24.13	14.54	14.29	-0.26
2	03 Jun 20	10:21	10:41	24.10	14.55	14.28	-0.27
3	03 Jun 20	10:42	11:02	23.96	14.58	14.27	-0.31
4	03 Jun 20	11:03	11:23	23.88	14.58	14.27	-0.31
5*	03 Jun 20	11:24	11:44	24.02	14.58	14.24	-0.35
6*	03 Jun 20	11:45	12:05	24.24	14.58	14.21	-0.37
7*	03 Jun 20	12:06	12:26	24.13	14.58	14.24	-0.34
8	03 Jun 20	12:27	12:47	24.01	14.58	14.35	-0.23
9	03 Jun 20	12:48	13:08	24.07	14.57	14.33	-0.24
10	03 Jun 20	13:09	13:29	24.11	14.53	14.24	-0.29
11	03 Jun 20	13:30	13:50	24.09	14.53	14.23	-0.29
12	03 Jun 20	13:51	14:11	23.99	14.53	14.37	-0.15
Average					Confidence Coefficient (CC)		-0.26
					Relative Accuracy (Compared in Actual) (%)		0.26
					Relative Accuracy Criteria		≤ 1%

Remark: * Sample with * is a rejected data
1/ Relative Accuracy Criteria of O2 is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 3 (PS-3)
RA Result is within Criteria

Technical Manager

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Relative Accuracy Test Audit Report

Report to: Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Neangket, Muang
Chachoengsao, Chachoengsao Thailand 24000
Attn: Chokpisan Tongleeseng
Phone: 0-3851-3911-13
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Project Name: Monitoring EIA
Location: GNNK
P/O:
Lot ID: 2022922
Date Received: Jun 04, 2020
Date Reported: Jun 10, 2020
Report Number: 1600856-1

Page 1 of 2

Reference Number	2022922-1
Sample Description	Emission from Stationary Source
Location	HRSG 12
RATA Test for	NOx
Sampling Date	Jun 04, 2020
Reference Method	US EPA Method 7E

Run No.	Date	Time		Load (MW)	Raw Data at Actual O2		Corrected Value at 7% O2		Difference
		Start	Stop		CEMs (ppm)	RM (ppm)	CEMs (ppm)	RM (ppm)	
1*	04 Jun 20	10:00	10:20	40.32	4.17	5.64	9.17	11.85	2.68
2	04 Jun 20	10:21	10:41	40.29	4.63	5.59	10.19	11.77	1.59
3*	04 Jun 20	10:42	11:02	40.21	4.65	5.78	10.24	12.17	1.94
4	04 Jun 20	11:03	11:23	40.21	4.92	5.92	10.82	12.48	1.66
5	04 Jun 20	11:24	11:44	40.11	4.70	5.62	10.38	11.90	1.52
6	04 Jun 20	11:45	12:05	39.73	4.48	5.46	9.86	11.51	1.64
7	04 Jun 20	12:06	12:26	39.38	4.45	5.38	9.82	11.36	1.54
8	04 Jun 20	12:27	12:47	39.38	4.70	5.48	10.38	11.55	1.17
9	04 Jun 20	12:48	13:08	39.80	4.83	5.51	10.71	11.64	0.93
10*	04 Jun 20	13:09	13:29	40.07	4.28	5.28	9.50	11.17	1.67
11	04 Jun 20	13:30	13:50	40.26	5.75	6.31	12.75	13.35	0.60
12	04 Jun 20	13:51	14:11	40.31	4.74	5.72	10.52	12.15	1.63
Average							10.60	11.97	1.36
Confidence Coefficient (CC)									0.29
Relative Accuracy (Compared with Emission Standard : 60 ppm) (%)									2.76
Relative Accuracy Criteria 1/ (Compared with Emission Standard)									≤ 10%

Remark: * Sample with * is a rejected data
1/ Relative Accuracy Criteria of NOx is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 2 (PS-2) and compared with
Emission Standard 60 ppm at 7%O2
RA Result is within Criteria

Technical M:

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Relative Accuracy Test Audit Report

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Attn: Chokpisan Tongleeseng
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Project Name: Monitoring EIA
Location: GNNK
P/O:
Lot ID: 2022922
Date Received: Jun 04, 2020
Date Reported: Jun 10, 2020
Report Number: 1600856-1

Page 2 of 2

Reference Number	2022922-1
Sample Description	Emission from Stationary Source
Location	HRSG 12
RATA Test for	O2
Sampling Date	Jun 04, 2020
Reference Method	US EPA Method 3A

Run No.	Date	Time		Load (MW)	Raw Data at Actual O2		Difference
		Start	Stop		CEMs (%)	RM (%)	
1	04 Jun 20	10:00	10:20	40.32	14.58	14.28	-0.30
2	04 Jun 20	10:21	10:41	40.29	14.58	14.30	-0.28
3	04 Jun 20	10:42	11:02	40.21	14.58	14.30	-0.28
4	04 Jun 20	11:03	11:23	40.21	14.59	14.31	-0.27
5	04 Jun 20	11:24	11:44	40.11	14.61	14.33	-0.28
6	04 Jun 20	11:45	12:05	39.73	14.59	14.31	-0.28
7	04 Jun 20	12:06	12:26	39.38	14.59	14.32	-0.28
8*	04 Jun 20	12:27	12:47	39.38	14.61	14.31	-0.30
9*	04 Jun 20	12:48	13:08	39.80	14.64	14.32	-0.32
10*	04 Jun 20	13:09	13:29	40.07	14.64	14.33	-0.31
11	04 Jun 20	13:30	13:50	40.26	14.62	14.33	-0.30
12	04 Jun 20	13:51	14:11	40.31	14.64	14.36	-0.28
Average					14.60	14.32	-0.28
Confidence Coefficient (CC)							0.28
Relative Accuracy (Compared in Actual) (%)							≤ 1%

Remark: * Sample with * is a rejected data
1/ Relative Accuracy Criteria of O2 is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 3 (PS-3)
RA Result is within Criteria

Technical Manager:

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ภาคผนวก ค-2

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Analysis / Test Report

Report to: Gulf JP NKK Co., Ltd.
99 Moo 17, Mong Nakorn Neangket,
Mueang Chiangsaeng,
Chiangsaeng Thailand 24000
Attn: Chokpisan Tongdeppeng
Phone: 0-3851-3911 - 13
Fax: -
Email: Chokpisan.gnkk@gulf.co.th

Project Name: Monitoring EIA
Location:
P/O:
Receipt No:

Lot ID: 2022913
Date Received: Jun 08, 2020
Date Reported: Jun 16, 2020
Report Number: 1696345-1

Sample Description	Air Quality	Lot ID	Sampling Date	Total Suspended Particulate (mg/m ³)	Particulate Matter (PM-10) (mg/m ³)	Barometric Pressure (mm Hg)	Atmospheric Temperature (°C)
Location	1111111111 (GPS: 47P-0721913, 1520772)	2022913-1	May 29 - May 30, 2020	0.034	0.013	758	34
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag	2022913-2	May 30 - May 31, 2020	0.031	0.012	758	32
Date of Analysis	Jun 10, 2020	2022913-3	May 31 - Jun 01, 2020	0.056	0.022	758	32
		2022913-4	Jun 01 - Jun 02, 2020	0.064	0.058	758	34
		2022913-5	Jun 02 - Jun 03, 2020	0.034	0.014	758	32
		2022913-6	Jun 03 - Jun 04, 2020	0.031	0.016	758	34
		2022913-7	Jun 04 - Jun 05, 2020	0.040	0.019	758	34
Guideline				0.33	0.12	-	-

Reference Method
Total Suspended Particulate : US EPA 40 CFR Part 50 Appendix B
Particulate Matter (PM-10) : US EPA 40 CFR Part 50 Appendix J

Guideline:
Notification of the National Environmental Board. No.24, 2004 (B.E.2547) dated September 22, 2004

Technical Mani

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Analysis / Test Report

Report to: Gulf JP NKK Co., Ltd.
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Chiangsaeng Thailand 24000
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Project Name: Monitoring EIA
Location:
P/O:
Receipt No:

Lot ID: 2022913
Date Received: Jun 08, 2020
Date Reported: Jun 16, 2020
Report Number: 1696346-1

Sample Description	Air Quality	Lot ID	Sampling Date	Total Suspended Particulate (mg/m ³)	Particulate Matter (PM-10) (mg/m ³)	Barometric Pressure (mm Hg)	Atmospheric Temperature (°C)
Location	1111111111 (GPS: 47P-0721466, 1518742)	2022913-8	May 29 - May 30, 2020	0.024	0.014	758	34
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag	2022913-9	May 30 - May 31, 2020	0.025	0.014	758	32
Date of Analysis	Jun 10, 2020	2022913-10	May 31 - Jun 01, 2020	0.035	0.022	758	32
		2022913-11	Jun 01 - Jun 02, 2020	0.012	0.009	758	34
		2022913-12	Jun 02 - Jun 03, 2020	0.022	0.011	758	32
		2022913-13	Jun 03 - Jun 04, 2020	0.021	0.015	758	34
		2022913-14	Jun 04 - Jun 05, 2020	0.021	0.017	758	34
Guideline				0.33	0.12	-	-

Reference Method
Total Suspended Particulate : US EPA 40 CFR Part 50 Appendix B
Particulate Matter (PM-10) : US EPA 40 CFR Part 50 Appendix J

Guideline:
Notification of the National Environmental Board. No.24, 2004 (B.E.2547) dated September 22, 2004

Technical Managemi

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Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.
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Chachoengsao Thailand 24000
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Phone : 0-3851-3911 - 13
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Project Name : Monitoring EIA
Location :
P/O :
Receipt No :
Report Number: 1696348-1

Lot ID: 2022913
Date Received: Jun 08, 2020
Date Reported: Jun 16, 2020
Report Number: 1696348-1

Page 1 of 1

Sample Description	Air Quality	Lot ID	Sampling Date	Total Suspended Particulate (mg/m3)	Particulate Matter (PM10) (mg/m3)	Barometric Pressure (mm Hg)	Atmospheric Temperature (°C)
Location	Phuvalanin (GPS 47P 0713923, 1517012)	2022913-15	May 29 - May 30, 2020	0.037	0.012	758	34
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag	2022913-16	May 30 - May 31, 2020	0.047	0.017	758	32
Date of Analysis	Jun 10, 2020	2022913-17	May 31 - Jun 01, 2020	0.051	0.022	758	32
		2022913-18	Jun 01 - Jun 02, 2020	0.036	0.017	758	34
		2022913-19	Jun 02 - Jun 03, 2020	0.041	0.018	758	32
		2022913-20	Jun 03 - Jun 04, 2020	0.047	0.027	758	34
		2022913-21	Jun 04 - Jun 05, 2020	0.090	0.021	758	34
Guideline				0.33	0.12	-	-

Reference Method
Total Suspended Particulate : US EPA 40 CFR Part 50 Appendix B
Particulate Matter (PM10) : US EPA 40 CFR Part 50 Appendix J

Guideline :
Notification of the National Environmental Board. No.24, 2004 (B.E.2547) dated September 22, 2004

Technical Manager

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1072-22 / DML

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Analysis / Test Report

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Project Name : Monitoring EIA
Location :
P/O :
Receipt No :
Report Number: 1696349-1

Lot ID: 2022913
Date Received: Jun 08, 2020
Date Reported: Jun 16, 2020
Report Number: 1696349-1

Page 1 of 1

Sample Description	Air Quality	Lot ID	Sampling Date	Total Suspended Particulate (mg/m3)	Particulate Matter (PM10) (mg/m3)	Barometric Pressure (mm Hg)	Atmospheric Temperature (°C)
Location	Phuvalanin (GPS 47P 0714336, 1518888)	2022913-22	May 29 - May 30, 2020	0.031	0.015	758	34
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag	2022913-23	May 30 - May 31, 2020	0.026	0.013	758	32
Date of Analysis	Jun 10, 2020	2022913-24	May 31 - Jun 01, 2020	0.038	0.020	758	32
		2022913-25	Jun 01 - Jun 02, 2020	0.039	0.019	758	34
		2022913-26	Jun 02 - Jun 03, 2020	0.024	0.014	758	32
		2022913-27	Jun 03 - Jun 04, 2020	0.027	0.018	758	34
		2022913-28	Jun 04 - Jun 05, 2020	0.034	0.020	758	34
Guideline				0.33	0.12	-	-

Reference Method
Total Suspended Particulate : US EPA 40 CFR Part 50 Appendix B
Particulate Matter (PM10) : US EPA 40 CFR Part 50 Appendix J

Guideline :
Notification of the National Environmental Board. No.24, 2004 (B.E.2547) dated September 22, 2004

Technical Management :

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Analysis / Test Report

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Thailand 24000
Attn: Chokpisan Tongdeepseng
Phone: 0-3851-3911 - 13
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Project Name: Monitoring EIA
Location: GNNK
P/O:
Receipt No:

Lot ID: 2022915
Date Received: Jun 08, 2020
Date Reported: Jun 13, 2020
Report Number: 1600814-1

of 1

Sampling Date	May 29, 2020 - Jun 04, 2020
Sample Description	Air Quality
Location	Phuwananara (GPS 47P 0714336, 1518888)
Parameter	Nitrogen dioxide

Time	Nitrogen dioxide (ppb)				
	2022915-22 05/29/2020	2022915-23 05/30/2020	2022915-24 05/31/2020	2022915-25 06/01/2020	2022915-26 06/02/2020
10:00 AM - 11:00 AM	1.1	3.4	2.5	1.2	0.3
11:00 AM - 12:00 PM	1.3	2.5	1.2	1.7	0.6
12:00 PM - 01:00 PM	0.7	1.8	0.9	3.0	0.3
01:00 PM - 02:00 PM	0.6	1.3	0.7	2.1	0.8
02:00 PM - 03:00 PM	0.5	0.8	0.4	2.9	0.8
03:00 PM - 04:00 PM	0.5	0.5	0.2	3.5	0.8
04:00 PM - 05:00 PM	0.4	0.7	0.5	10.5	1.1
05:00 PM - 06:00 PM	0.7	0.6	0.8	0.2	1.6
06:00 PM - 07:00 PM	1.1	0.8	14.6	0.9	3.0
07:00 PM - 08:00 PM	1.7	1.2	10.4	1.8	3.0
08:00 PM - 09:00 PM	2.6	2.0	12.8	4.5	2.2
09:00 PM - 10:00 PM	2.2	2.3	13.6	3.8	1.2
10:00 PM - 11:00 PM	1.5	2.6	0.5	1.8	0.6
11:00 PM - 12:00 AM	1.7	2.8	1.4	1.8	0.2
12:00 AM - 01:00 AM	1.8	2.7	1.1	1.2	0.3
01:00 AM - 02:00 AM	2.7	2.0	0.8	0.8	0.1
02:00 AM - 03:00 AM	3.2	1.5	0.4	0.6	0.9
03:00 AM - 04:00 AM	3.7	1.5	0.5	0.7	1.4
04:00 AM - 05:00 AM	5.7	3.1	0.8	0.9	1.2
05:00 AM - 06:00 AM	4.7	3.8	0.9	0.9	0.7
06:00 AM - 07:00 AM	3.8	3.9	0.5	1.3	0.3
07:00 AM - 08:00 AM	4.1	4.5	1.6	2.7	0.3
08:00 AM - 09:00 AM	5.0	2.7	1.8	0.3	0.4
09:00 AM - 10:00 AM	4.1	1.7	1.6	0.1	0.7
Average (24 hrs)	2.3	2.1	2.9	2.1	1.0
1hr - Maximum	5.7	4.5	14.6	10.5	3.0
Standard - 1hr	170 ppb (320 ug/m3)				
Standard - 24 hrs					
Reference Method: US EPA					

Technical Management

Scientist (4)

Acting General Manager

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Analysis / Test Report

Report to: Gulf JP NNK Co., Ltd.
99 Moo 17, Klong Nakorn Naengket,
Mueang Chachoengsao, Chachoengsao
Thailand 24000
Attn: Chokpisan Tongdeepseng
Phone: 0-3851-3911 - 13
Fax: -
Email: Chokpisan.gmk@gulf.co.th

Project Name: Monitoring EIA
Location: GNNK
P/O:
Receipt No:

Lot ID: 2022915
Date Received: Jun 08, 2020
Date Reported: Jun 13, 2020
Report Number: 1694101-1
Examined by: A.H.H. Anonin

of 1

Sampling Date	May 29, 2020 - Jun 04, 2020
Sample Description	Air Quality
Location	Phuwananara (GPS 47P 0721913, 1520772)
Parameter	Nitrogen dioxide

Time	Nitrogen dioxide (ppb)				
	2022915-1 05/29/2020	2022915-2 05/30/2020	2022915-3 05/31/2020	2022915-4 06/01/2020	2022915-5 06/02/2020
02:00 PM - 03:00 PM	2.7	0.6	1.8	0.9	1.0
03:00 PM - 04:00 PM	2.5	0.8	0.0	0.9	0.5
04:00 PM - 05:00 PM	0.4	0.5	0.9	0.1	3.2
05:00 PM - 06:00 PM	3.4	0.7	1.4	0.1	0.2
06:00 PM - 07:00 PM	0.2	0.6	0.7	0.9	0.1
07:00 PM - 08:00 PM	0.2	2.0	0.6	2.7	0.8
08:00 PM - 09:00 PM	0.8	0.6	1.2	0.8	1.2
09:00 PM - 10:00 PM	1.7	2.4	1.2	1.7	1.5
10:00 PM - 11:00 PM	1.9	3.4	1.8	1.8	0.7
11:00 PM - 12:00 AM	1.3	3.0	1.9	1.4	0.3
12:00 AM - 01:00 AM	0.6	1.5	1.9	1.4	0.4
01:00 AM - 02:00 AM	0.3	0.0	2.0	1.8	1.0
02:00 AM - 03:00 AM	0.9	0.3	2.2	2.3	0.0
03:00 AM - 04:00 AM	0.8	0.6	2.6	2.0	0.3
04:00 AM - 05:00 AM	1.5	0.4	2.8	1.6	0.7
05:00 AM - 06:00 AM	1.7	0.4	2.4	1.4	1.3
06:00 AM - 07:00 AM	1.6	0.3	2.0	1.4	0.6
07:00 AM - 08:00 AM	2.3	1.1	1.9	1.2	1.1
08:00 AM - 09:00 AM	0.9	1.6	0.4	0.2	1.2
09:00 AM - 10:00 AM	0.3	0.4	0.9	1.6	0.6
10:00 AM - 11:00 AM	0.0	1.4	0.3	0.2	0.0
11:00 AM - 12:00 PM	0.0	1.1	0.2	0.7	1.5
12:00 PM - 01:00 PM	0.1	0.8	0.6	1.2	0.4
01:00 PM - 02:00 PM	0.0	0.4	0.7	0.1	0.2
Average (24 hrs)	1.2	1.1	1.4	1.2	1.0
1hr - Maximum	3.4	3.4	2.8	2.7	3.0
Standard - 1hr	170 ppb (320 ug/m3)				
Standard - 24 hrs					
Reference Method: US EPA					

Technical Management

Scientist (4)

Acting General Manager

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Analysis / Test Report

Report to: Gulf JP NKK Co., Ltd.
59 Moo 17, Klong Nakorn Nangket,
Mueang Chachoengsao, Chachoengsao
Thailand 24000
Attn: Chokpisan Tongdeepheng
Phone: 0-3851-3911 - 13
Fax: -
Email: Chokpisan.gmk@gulf.co.th

Lot ID: 2022915
Date Received: Jun 08, 2020
Date Reported: Jun 13, 2020
Report Number: 1694102-1

Project Name: Monitoring EIA
Location: GNNK
P/O:
Receipt No:
Attn: Chokpisan Tongdeepheng
Phone: 0-3851-3911 - 13
Fax: -
Email: Chokpisan.gmk@gulf.co.th

Sampling Date May 29, 2020 - Jun 04, 2020
Sample Description Air Quality
Location จันทบุรี (GPS 47P 071473, 1518740)
Parameter Nitrogen dioxide

Time	Nitrogen dioxide (ppb)						
	2022915-8 05/29/2020	2022915-9 05/30/2020	2022915-10 05/31/2020	2022915-11 06/01/2020	2022915-12 06/02/2020	2022915-13 06/03/2020	2022915-14 06/04/2020
01:00 PM - 02:00 PM	0.1	0.3	0.3	0.6	0.5	0.3	0.4
02:00 PM - 03:00 PM	0.3	0.4	0.3	0.3	0.4	0.3	0.2
03:00 PM - 04:00 PM	0.3	0.4	0.2	0.4	0.5	0.5	0.3
04:00 PM - 05:00 PM	0.4	0.4	0.3	0.4	0.4	0.6	0.3
05:00 PM - 06:00 PM	0.4	0.4	0.3	0.5	0.5	0.5	0.3
06:00 PM - 07:00 PM	0.5	0.4	0.4	0.5	0.6	0.3	0.3
07:00 PM - 08:00 PM	0.4	0.6	0.6	0.7	0.7	0.3	0.4
08:00 PM - 09:00 PM	0.5	0.8	0.6	0.5	0.8	0.2	0.5
09:00 PM - 10:00 PM	0.6	0.7	0.5	0.5	0.3	0.3	0.4
10:00 PM - 11:00 PM	0.6	0.6	0.6	0.6	0.4	0.2	0.4
11:00 PM - 12:00 AM	0.4	0.5	0.7	0.6	0.5	0.2	0.6
12:00 AM - 01:00 AM	0.5	0.6	1.1	0.9	0.4	0.3	0.4
01:00 AM - 02:00 AM	0.5	0.6	1.2	1.0	0.5	0.3	0.5
02:00 AM - 03:00 AM	0.6	0.5	3.9	0.8	0.6	0.2	0.3
03:00 AM - 04:00 AM	0.7	0.5	5.7	1.1	0.6	0.5	0.3
04:00 AM - 05:00 AM	0.8	0.6	2.2	1.6	0.8	0.6	0.4
05:00 AM - 06:00 AM	0.9	0.7	1.6	1.2	0.9	1.0	0.4
06:00 AM - 07:00 AM	0.8	0.8	1.4	1.7	0.9	1.1	0.4
07:00 AM - 08:00 AM	0.7	0.7	1.5	1.7	1.3	1.2	0.7
08:00 AM - 09:00 AM	0.8	0.6	1.7	1.4	1.1	0.9	0.7
09:00 AM - 10:00 AM	1.2	0.5	1.3	1.9	1.0	0.5	0.6
10:00 AM - 11:00 AM	0.9	0.5	0.8	2.1	1.2	0.3	0.4
11:00 AM - 12:00 PM	0.7	0.3	0.4	1.0	1.2	0.2	0.5
12:00 PM - 01:00 PM	0.5	0.4	0.5	0.7	0.6	0.1	0.5
Average (24 hrs)	0.6	0.5	1.2	0.9	0.7	0.5	0.4
1hr - Maximum	1.2	0.8	5.7	2.1	1.3	1.2	0.7
Standard - 1hr	170 ppb (320 ug/m3)						
Standard - 24 hrs							
Reference Method: US 1							

Technical Management

Scientist (4)

Acting General Manager

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Analysis / Test Report

Report to: Gulf JP NKK Co., Ltd.
59 Moo 17, Klong Nakorn Nangket,
Mueang Chachoengsao, Chachoengsao
Thailand 24000
Attn: Chokpisan Tongdeepheng
Phone: 0-3851-3911 - 13
Fax: -
Email: Chokpisan.gmk@gulf.co.th

Lot ID: 2022915
Date Received: Jun 08, 2020
Date Reported: Jun 13, 2020
Report Number: 1694104-1

Sampling Date May 29, 2020 - Jun 04, 2020
Sample Description Air Quality
Location จันทบุรี (GPS 47P 0713923, 1517012)
Parameter Nitrogen dioxide

Time	Nitrogen dioxide (ppb)						
	2022915-15 05/29/2020	2022915-16 05/30/2020	2022915-17 05/31/2020	2022915-18 06/01/2020	2022915-19 06/02/2020	2022915-20 06/03/2020	2022915-21 06/04/2020
11:00 AM - 12:00 PM	0.9	1.2	0.3	0.9	0.1	0.3	4.0
12:00 PM - 01:00 PM	3.4	1.8	0.1	1.4	1.6	0.0	3.3
01:00 PM - 02:00 PM	3.0	1.2	0.4	1.0	2.3	0.4	0.9
02:00 PM - 03:00 PM	1.5	0.8	0.3	1.7	0.2	0.3	0.5
03:00 PM - 04:00 PM	0.0	0.6	0.4	0.9	0.3	0.4	0.6
04:00 PM - 05:00 PM	3.2	0.7	0.5	1.6	0.2	0.1	0.6
05:00 PM - 06:00 PM	0.5	1.3	0.4	0.5	0.2	1.5	0.8
06:00 PM - 07:00 PM	0.5	2.3	0.5	0.6	0.3	0.0	1.3
07:00 PM - 08:00 PM	0.5	2.0	0.6	0.6	0.0	0.3	0.6
08:00 PM - 09:00 PM	0.5	1.6	0.6	0.5	1.8	0.6	0.6
09:00 PM - 10:00 PM	0.5	1.4	2.1	0.6	1.3	0.4	0.8
10:00 PM - 11:00 PM	1.4	1.4	2.4	0.7	0.8	0.0	0.2
11:00 AM - 12:00 AM	1.1	1.2	2.4	1.1	0.5	0.0	0.9
12:00 AM - 01:00 AM	0.8	1.4	1.3	1.2	0.7	0.1	0.3
01:00 AM - 02:00 AM	0.4	0.4	1.3	3.9	0.6	0.2	0.3
02:00 AM - 03:00 AM	0.0	0.6	9.2	0.9	0.6	0.7	0.2
03:00 AM - 04:00 AM	0.2	0.4	0.6	2.7	1.0	0.6	0.9
04:00 AM - 05:00 AM	0.8	0.5	0.5	2.2	1.1	4.3	1.2
05:00 AM - 06:00 AM	0.7	2.6	0.4	1.0	2.2	14.2	4.7
06:00 AM - 07:00 AM	0.8	3.7	4.3	0.8	1.6	7.3	3.8
07:00 AM - 08:00 AM	1.8	3.2	3.7	1.1	1.2	3.9	3.0
08:00 AM - 09:00 AM	1.3	1.4	1.0	3.6	1.2	2.6	0.8
09:00 AM - 10:00 AM	0.3	0.7	0.8	2.0	0.5	1.6	0.1
10:00 AM - 11:00 AM	0.4	0.8	0.2	0.3	0.0	0.3	0.1
Average (24 hrs)	1.1	1.3	1.4	1.3	0.9	2.0	1.3
1hr - Maximum	3.4	3.7	9.2	3.9	2.3	14.2	4.7
Standard - 1hr	170 ppb (320 ug/m3)						
Standard - 24 hrs							
Reference Method: US EPA/Net							

Technical Management

Scientist (4)

Acting General Manager

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Analysis / Test Report

Report to: Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Neangket,
Mueang Chachoengsao, Chachoengsao
Thailand 24000
Attn: Chokpisan Tongdeepseng
Phone: 0-3851-3911 - 13
Fax: -
Email: Chokpisan.gmk@gulf.co.th

Project Name: Monitoring EIA
Location: GNKK
P/O:
Receipt No:

Lot ID: 2022917
Date Received: Jun 08, 2020
Date Reported: Jun 13, 2020
Report Number: 1600824-1

Page 1 of 1

Sampling Date May 29, 2020 - Jun 04, 2020

Sample Description Air Quality
Location หมู่บ้านนา (GPS 47P 0714336, 1518888)
Parameter Sulfur Dioxide

Time	Sulfur Dioxide (ppb)				
	2022917-22 05/29/2020	2022917-23 05/30/2020	2022917-24 05/31/2020	2022917-25 06/01/2020	2022917-26 06/02/2020
10:00 AM - 11:00 AM	0.1	0.2	0.3	0.3	0.4
11:00 AM - 12:00 PM	0.4	0.2	0.3	0.3	0.3
12:00 PM - 01:00 PM	0.2	0.3	0.3	0.3	0.2
01:00 PM - 02:00 PM	0.0	0.3	0.3	0.3	0.2
02:00 PM - 03:00 PM	0.0	0.3	0.3	0.3	0.2
03:00 PM - 04:00 PM	0.1	0.3	0.3	0.2	0.3
04:00 PM - 05:00 PM	0.2	0.3	0.3	0.3	0.3
05:00 PM - 06:00 PM	0.2	0.3	0.3	0.2	0.3
06:00 PM - 07:00 PM	0.2	0.3	0.3	0.3	0.2
07:00 PM - 08:00 PM	0.2	0.3	0.1	0.3	0.2
08:00 PM - 09:00 PM	0.2	0.3	0.3	0.3	0.2
09:00 PM - 10:00 PM	0.1	0.2	0.3	0.3	0.4
10:00 PM - 11:00 PM	0.2	0.2	0.1	0.4	0.4
11:00 PM - 12:00 AM	0.1	0.2	0.1	0.4	0.4
12:00 AM - 01:00 AM	0.2	0.3	0.3	0.4	0.4
01:00 AM - 02:00 AM	0.2	0.2	0.3	0.3	0.4
02:00 AM - 03:00 AM	0.2	0.2	0.3	0.4	0.4
03:00 AM - 04:00 AM	0.2	0.2	0.3	0.4	0.3
04:00 AM - 05:00 AM	0.2	0.2	0.3	0.4	0.3
05:00 AM - 06:00 AM	0.2	0.2	0.3	0.3	0.3
06:00 AM - 07:00 AM	0.2	0.2	0.3	0.3	0.3
07:00 AM - 08:00 AM	0.2	0.2	0.3	0.3	0.2
08:00 AM - 09:00 AM	0.2	0.2	0.3	0.3	0.3
09:00 AM - 10:00 AM	0.3	0.3	0.3	0.3	0.3
Average (24 hrs)	0.2	0.2	0.3	0.3	0.3
1hr - Maximum	0.4	0.3	0.4	0.4	0.4
Standard - 1hr	300 ppb (780 ug/m3)				
Standard - 24 hrs	120 msh (300 ug/m3)				
Reference Method:					

Technical Manager

Signature (V)

Signature (V)

Signature (V)

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Mueang Chachoengsao, Chachoengsao
Thailand 24000
Attn: Chokpisan Tongdeepseng
Phone: 0-3851-3911 - 13
Fax: -
Email: Chokpisan.gmk@gulf.co.th

Project Name: Monitoring EIA
Location: GNKK
P/O:
Receipt No:

Lot ID: 2022917
Date Received: Jun 08, 2020
Date Reported: Jun 13, 2020
Report Number: 1694106-1

Page 1 of 1

Sampling Date May 29, 2020 - Jun 04, 2020

Sample Description Air Quality
Location หมู่บ้านนา (GPS 47P 0721913, 1520772)
Parameter Sulfur Dioxide

Time	Sulfur Dioxide (ppb)				
	2022917-1 05/29/2020	2022917-2 05/30/2020	2022917-3 05/31/2020	2022917-4 06/01/2020	2022917-5 06/02/2020
02:00 PM - 03:00 PM	3.5	1.6	1.8	1.7	1.3
03:00 PM - 04:00 PM	5.0	1.4	1.3	1.2	1.4
04:00 PM - 05:00 PM	1.4	2.5	1.4	2.1	1.3
05:00 PM - 06:00 PM	2.4	1.6	1.4	1.6	1.6
06:00 PM - 07:00 PM	2.2	3.1	0.6	1.1	1.1
07:00 PM - 08:00 PM	0.6	1.5	0.3	1.4	0.2
08:00 PM - 09:00 PM	0.6	1.5	1.2	1.6	0.8
09:00 PM - 10:00 PM	0.9	2.6	1.1	0.6	0.9
10:00 PM - 11:00 PM	1.0	1.5	1.2	1.7	1.1
11:00 PM - 12:00 AM	0.9	1.6	1.3	1.7	1.1
12:00 AM - 01:00 AM	1.1	1.6	1.6	1.7	1.2
01:00 AM - 02:00 AM	0.9	1.8	1.7	1.2	1.1
02:00 AM - 03:00 AM	1.4	1.9	1.6	0.9	1.2
03:00 AM - 04:00 AM	0.9	1.3	1.6	1.3	1.1
04:00 AM - 05:00 AM	1.1	1.6	1.6	1.3	1.2
05:00 AM - 06:00 AM	1.0	1.7	1.5	1.3	1.5
06:00 AM - 07:00 AM	1.0	1.4	1.5	1.4	1.2
07:00 AM - 08:00 AM	1.2	1.1	1.2	1.8	1.9
08:00 AM - 09:00 AM	1.2	1.7	1.5	1.5	2.3
09:00 AM - 10:00 AM	0.9	2.9	2.7	1.7	2.9
10:00 AM - 11:00 AM	1.4	1.4	1.6	3.0	2.3
11:00 AM - 12:00 PM	1.3	1.1	1.3	1.9	1.1
12:00 PM - 01:00 PM	3.5	1.9	1.7	1.4	2.8
01:00 PM - 02:00 PM	3.2	1.6	1.8	1.0	0.9
Average (24 hrs)	1.6	1.8	1.4	1.5	1.4
1hr - Maximum	5.0	3.1	2.7	3.0	2.9
Standard - 1hr	300 ppb (780 ug/m3)				
Standard - 24 hrs					
Reference Method:	US EPA				

Technical Manager

Signature (V)

Signature (V)

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99 Moo 17, Klong Nakorn Neangket,
Mueang Chachoengsao, Chachoengsao
Thailand 24000
Attn: Chokpisan Tongdeepheng
Phone: 0-3851-3911 - 13
Fax: -
Email: Chokpisan.gmk@gulf.co.th

Lot ID: 2022917
Date Received: Jun 08, 2020
Date Reported: Jun 13, 2020
Report Number: 1694108-1

1 of 1

Sampling Date	May 29, 2020 - Jun 04, 2020
Sample Description	Air Quality
Location	พื้นที่วัด (GPS 47P 0721466, 1518742)
Parameter	Sulfur Dioxide

Time	Sulfur Dioxide (ppb)						
	2022917-8 05/29/2020	2022917-9 05/30/2020	2022917-10 05/31/2020	2022917-11 06/01/2020	2022917-12 06/02/2020	2022917-13 06/03/2020	2022917-14 06/04/2020
01:00 PM - 02:00 PM	0.4	0.3	0.3	0.5	0.3	2.0	0.2
02:00 PM - 03:00 PM	0.7	0.2	0.4	0.4	0.3	0.4	0.3
03:00 PM - 04:00 PM	0.6	0.3	0.5	0.3	0.3	0.4	0.4
04:00 PM - 05:00 PM	0.7	0.3	0.4	0.2	0.2	0.4	0.4
05:00 PM - 06:00 PM	0.6	0.5	0.2	0.2	0.5	0.4	0.4
06:00 PM - 07:00 PM	0.2	0.9	0.3	0.4	1.0	0.4	0.4
07:00 PM - 08:00 PM	0.3	1.2	0.4	0.5	1.4	0.3	0.3
08:00 PM - 09:00 PM	0.7	1.0	0.5	0.3	1.5	0.3	0.3
09:00 PM - 10:00 PM	0.5	1.3	0.3	0.2	1.3	0.4	0.3
10:00 PM - 11:00 PM	0.3	1.0	0.3	0.2	1.0	0.3	0.3
11:00 PM - 12:00 AM	0.0	0.4	0.2	0.2	0.7	0.3	0.3
12:00 AM - 01:00 AM	0.1	0.2	0.2	0.3	0.6	0.3	0.3
01:00 AM - 02:00 AM	0.1	0.2	0.2	0.2	0.8	0.3	0.2
02:00 AM - 03:00 AM	0.1	0.2	0.3	0.2	1.0	0.3	0.1
03:00 AM - 04:00 AM	0.0	0.1	0.4	0.2	1.0	0.3	0.4
04:00 AM - 05:00 AM	0.1	0.1	0.3	0.2	1.1	0.0	0.3
05:00 AM - 06:00 AM	0.0	0.1	0.2	0.2	1.0	0.3	0.1
06:00 AM - 07:00 AM	0.1	0.1	0.2	0.1	1.0	0.3	0.1
07:00 AM - 08:00 AM	0.0	0.1	0.2	0.1	1.5	0.3	0.1
08:00 AM - 09:00 AM	0.0	0.3	0.2	0.2	1.4	0.4	0.1
09:00 AM - 10:00 AM	0.1	0.8	0.9	0.4	1.7	0.3	0.1
10:00 AM - 11:00 AM	0.1	0.7	0.6	0.8	2.4	0.4	0.2
11:00 AM - 12:00 PM	0.0	0.4	0.5	0.5	2.6	0.4	0.3
12:00 PM - 01:00 PM	0.2	0.3	0.6	0.4	0.8	0.3	0.2
Average (24 hrs)	0.3	0.5	0.4	0.3	1.1	0.4	0.3
1hr - Maximum	0.7	1.3	0.9	0.8	2.6	2.0	0.4
Standard - 1hr	300 ppb (780 ug/m3)						
Standard - 24 hrs	120 ppb (300 ug/m3)						
Reference Method: U							

Technical Management

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Analysis / Test Report

Report to: Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Neangket,
Mueang Chachoengsao, Chachoengsao
Thailand 24000
Attn: Chokpisan Tongdeepheng
Phone: 0-3851-3911 - 13
Fax: -
Email: Chokpisan.gmk@gulf.co.th

Lot ID: 2022917
Date Received: Jun 08, 2020
Date Reported: Jun 13, 2020
Report Number: 1694109-1
Cancelled for Audit Extension

1 of 1

Sampling Date	May 29, 2020 - Jun 04, 2020
Sample Description	Air Quality
Location	พื้นที่วัด (GPS 47P 0713923, 1517012)
Parameter	Sulfur Dioxide

Time	Sulfur Dioxide (ppb)						
	2022917-15 05/29/2020	2022917-16 05/30/2020	2022917-17 05/31/2020	2022917-18 06/01/2020	2022917-19 06/02/2020	2022917-20 06/03/2020	2022917-21 06/04/2020
11:00 AM - 12:00 PM	0.1	1.6	1.8	1.8	1.7	1.9	1.9
12:00 PM - 01:00 PM	1.8	1.5	2.0	1.9	1.7	1.9	2.0
01:00 PM - 02:00 PM	2.0	1.6	2.2	2.0	1.7	1.8	2.1
02:00 PM - 03:00 PM	2.1	1.7	2.2	1.9	1.8	1.8	1.9
03:00 PM - 04:00 PM	2.0	1.7	2.4	1.8	1.8	1.8	1.7
04:00 PM - 05:00 PM	2.0	4.6	2.1	1.9	1.9	1.8	1.9
05:00 PM - 06:00 PM	1.8	6.8	1.9	1.7	1.9	1.8	1.8
06:00 PM - 07:00 PM	1.7	3.5	2.1	1.8	1.8	1.9	2.2
07:00 PM - 08:00 PM	1.8	3.6	2.3	1.9	1.8	1.8	2.6
08:00 PM - 09:00 PM	1.6	2.1	2.1	1.9	1.6	1.6	2.2
09:00 PM - 10:00 PM	1.6	2.2	2.0	1.9	1.5	1.6	2.0
10:00 PM - 11:00 PM	1.5	1.6	1.9	1.9	1.5	1.7	1.9
11:00 PM - 12:00 AM	1.5	1.6	1.9	1.8	1.5	1.6	1.9
12:00 AM - 01:00 AM	1.4	1.5	1.8	1.7	1.5	1.5	1.8
01:00 AM - 02:00 AM	1.5	1.5	2.0	1.8	1.5	1.6	1.9
02:00 AM - 03:00 AM	1.4	1.6	1.8	1.9	1.5	1.5	1.8
03:00 AM - 04:00 AM	1.4	1.4	2.0	1.8	1.6	1.6	1.7
04:00 AM - 05:00 AM	1.5	1.4	1.8	2.0	1.5	1.6	1.8
05:00 AM - 06:00 AM	1.6	1.5	1.8	1.8	1.5	1.9	1.9
06:00 AM - 07:00 AM	1.6	2.5	1.5	1.5	1.7	2.4	2.2
07:00 AM - 08:00 AM	1.7	1.6	1.7	1.6	1.8	1.8	2.0
08:00 AM - 09:00 AM	1.7	1.6	1.6	1.6	1.6	1.8	1.9
09:00 AM - 10:00 AM	1.6	1.7	1.6	1.7	1.7	1.8	1.8
10:00 AM - 11:00 AM	1.4	1.7	1.7	1.7	1.9	1.9	1.9
Average (24 hrs)	1.6	2.2	1.9	1.8	1.7	1.8	2.0
1hr - Maximum	2.1	6.8	2.4	2.0	1.9	2.4	2.6
Standard - 1hr	300 ppb (780 ug/m3)						
Standard - 24 hrs	120 ppb (300 ug/m3)						
Reference Method: US EPA							

Technical Management

Scientist (4)

Acting General Manager

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Analysis / Test Report

Page 1 of 2

Report to	: Gulf JP NKK Co., Ltd.	Lot ID	: 2022918-1 to -7
Project Name	: Monitoring EIA	Date Received	: Jun 08, 2020
Location	: GNNK	Date Reported	: Jun 16, 2020
Address	: 99 Moo 17, Klong Nakorn Neangket, Mueang Chachoengsao, Chachoengsao Thailand 24000	Report Number	: 1600829-1
Attn	: Chokpisan Tongdeeping	Parameter	: Wind Speed / Wind Direction
Phone	: 0-3851-3911 - 13	Location	: Huftinsans 4th 1
Fax	:	Sampling Date	: May 29-Jun 05, 2020
Email	: Chokpisan.gnnk@gulf.co.th	Sampling by	:



Analysis / Test Report

Page 2 of 2

Report to	: Gulf JP NKK Co., Ltd.	Lot ID	: 2022918-1 to -7
Project Name	: Monitoring EIA	Date Received	: Jun 08, 2020
Location	: GNNK	Date Reported	: Jun 16, 2020
Address	: 99 Moo 17, Klong Nakorn Neangket, Mueang Chachoengsao, Chachoengsao Thailand 24000	Report Number	: 1600829-1
Attn	: Chokpisan Tongdeeping	Parameter	: Wind Speed / Wind Direction
Phone	: 0-3851-3911 - 13	Location	: Huftinsans 4th 1
Fax	:	Sampling Date	: May 29-Jun 05, 2020
Email	: Chokpisan.gnnk@gulf.co.th	Sampling by	:

Time	Date : May 29-30, 2020		Date : May 30-31, 2020		Date : Jun 01-02, 2020		Date : Jun 02-03, 2020		Date : Jun 03-04, 2020		Date : Jun 04-05, 2020	
	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)
10:00 AM-11:00 AM	0.8	260.0 W	1.8	250.0 WSW	0.4	180.0 S	1.8	260.0 WSW	1.1	150.0 SSE	3.1	170.0 S
11:00 AM-12:00 PM	0.3	240.0 WSW	3.9	251.0 WSW	1.1	200.0 SW	1.5	167.0 SSE	3.3	260.0 WNW	1.5	270.0 WNW
00:00 PM-01:00 PM	1.2	220.0 SW	1.9	140.0 SE	1.5	200.0 SW	1.0	190.0 SSE	0.5	99.0 E	3.6	167.0 SSE
01:00 PM-02:00 PM	1.4	260.0 W	0.3	251.0 WSW	2.7	130.0 SE	2.9	190.0 SSW	1.3	80.0 E	0.3	180.0 S
02:00 PM-03:00 PM	4.4	140.0 SE	3.5	211.0 SSW	1.0	90.0 E	4.7	177.0 S	1.8	140.0 SSE	1.6	190.0 SSE
03:00 PM-04:00 PM	3.7	260.0 W	5.6	190.0 SSW	5.3	100.0 SE	4.1	190.0 SSE	3.3	80.0 E	1.1	197.0 SSW
04:00 PM-05:00 PM	4.2	170.0 S	3.0	180.0 S	2.2	90.0 E	2.2	140.0 SE	2.3	70.0 ENE	1.3	211.0 SSW
05:00 PM-06:00 PM	3.0	180.0 S	3.9	140.0 SE	0.5	120.0 SE	4.6	207.0 SSW	2.7	220.0 SW	1.9	170.0 S
06:00 PM-07:00 PM	0.6	200.0 SSW	2.2	210.0 SSW	0.9	190.0 S	2.4	320.0 WNW	1.8	210.0 SW	0.7	130.0 SE
07:00 PM-08:00 PM	1.1	180.0 S	2.0	180.0 S	0.3	290.0 WSW	1.2	260.0 W	0.9	180.0 S	1.7	227.0 SW
08:00 PM-09:00 PM	1.5	100.0 SSW	1.2	200.0 SW	0.8	210.0 W	2.4	260.0 W	0.3	190.0 SE	1.3	220.0 SW
09:00 PM-10:00 PM	2.9	190.0 SSW	0.9	237.0 WSW	0.4	260.0 SW	1.2	260.0 W	4.0	140.0 SSE	0.3	190.0 SSW
10:00 PM-11:00 PM	4.6	210.0 SW	2.8	270.0 W	0.3	210.0 SSW	0.3	120.0 ESE	0.8	170.0 S	0.3	190.0 SSW
11:00 PM-00:00 AM	3.2	250.0 WSW	1.1	250.0 SW	0.3	200.0 SSW	1.4	90.0 E	1.6	167.0 SSE	0.3	130.0 SSE
00:00 AM-01:00 AM	2.3	210.0 SW	0.8	211.0 SSW	0.3	170.0 S	0.3	710.0 ENE	2.4	190.0 SSW	0.8	190.0 SE
01:00 AM-02:00 AM	0.3	170.0 S	0.3	270.0 W	0.6	170.0 S	0.3	80.0 E	0.7	170.0 S	0.3	180.0 S
02:00 AM-03:00 AM	0.3	160.0 SSE	1.7	270.0 W	0.3	160.0 SE	0.4	80.0 E	1.3	160.0 S	0.3	190.0 S
03:00 AM-04:00 AM	0.3	280.0 WNW	0.7	110.0 ESE	0.3	170.0 S	0.5	187.0 S	0.9	210.0 SW	0.3	220.0 SW
04:00 AM-05:00 AM	0.3	240.0 N	0.7	117.0 ESE	3.8	180.0 S	5.0	310.0 WNE	0.6	177.0 S	0.3	210.0 SW
05:00 AM-06:00 AM	0.3	180.0 S	0.4	160.0 ESE	0.9	207.0 SSW	1.5	36.0 NE	0.5	260.0 SSW	0.3	190.0 SSE
06:00 AM-07:00 AM	0.3	180.0 SSE	0.6	217.0 SW	0.9	190.0 SE	0.3	290.0 WNW	0.7	200.0 SSW	1.5	270.0 W
07:00 AM-08:00 AM	0.3	210.0 SW	1.3	210.0 SW	1.7	280.0 WNW	1.3	170.0 S	3.3	260.0 SSW	2.4	230.0 SW
08:00 AM-09:00 AM	1.1	230.0 SW	0.7	180.0 S	1.3	270.0 W	2.3	250.0 WNW	0.6	250.0 WSW	1.1	240.0 WSW

Reference Method : Cup Anemometer & Anodized Aluminum Vane Method

Technical Manager

The above results are in Laboratory / ALS Laboratory

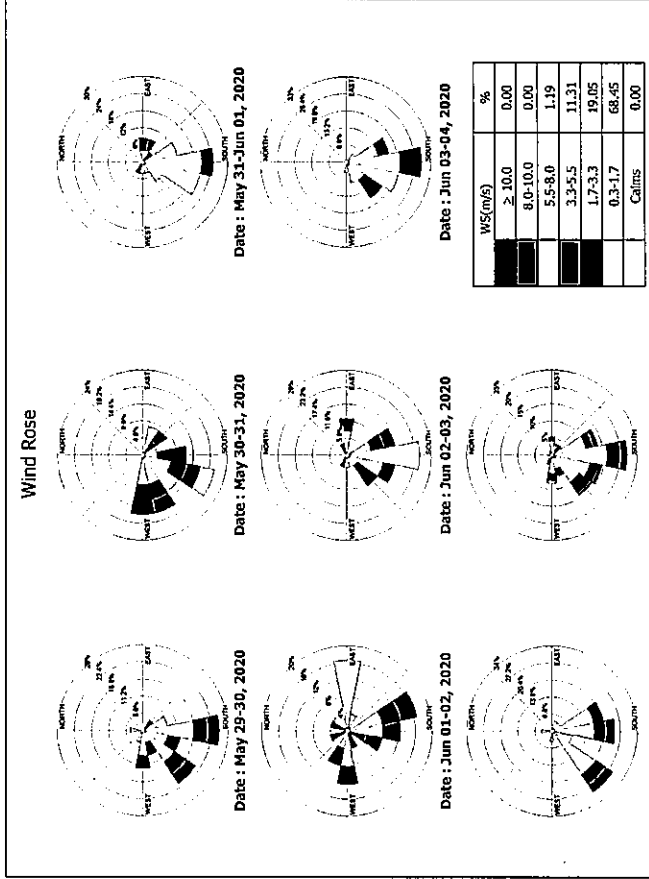
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Reference Method : Cup Anemometer & Anodized Aluminum Vane Method

Technical Manager

The above results are in Laboratory / ALS Laboratory

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ภาคผนวก ค-3

คุณภาพอากาศจากปล่องระบายอากาศ



Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.

99 Moo 17, King Nakorn Neangket,
Mueang, Chachoengsao, Chachoengsao
Thailand 24000

Project Name : Monitoring EIA

Location : GNKK
P/O :
Receipt No :

Lot ID: 2022924

Date Received: Jun 04, 2020
Date Reported: Jun 10, 2020
Report No.: 1600859-1

Attn : Chokpisan Tongdeepsing

Phone : 0-3851-3911 - 13

Fax : -

Email : Chokpisan.gnkk@gulf.co.th

Attn : Chokpisan Tongdeepsing

Phone : 0-3851-3911 - 13

Fax : -

Email : Chokpisan.gnkk@gulf.co.th

Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.

99 Moo 17, King Nakorn Neangket,
Mueang, Chachoengsao, Chachoengsao
Thailand 24000

Project Name : Monitoring EIA

Location : GNKK
P/O :
Receipt No :

Lot ID: 2022924

Date Received: Jun 04, 2020
Date Reported: Jun 10, 2020
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Attn : Chokpisan Tongdeepsing

Phone : 0-3851-3911 - 13

Fax : -

Email : Chokpisan.gnkk@gulf.co.th

Page 1 of 1

Reference No.	2022924-1
Sample Description	Emission from Stationary Source
Location	HRSG 11 (GPS 47P 718029, 1519427)
Sampling Date	June 3, 2020
Date of Analysis	June 8, 2020

Stack Description									
Ambient Temperature	32	°C	Diameter	3.00	m	Oxygen	14.19	%	
Ambient Pressure	758	mmHg	Shape	Circle		Carbon dioxide	3.88	%	
Type of Process	Combustion		Stack Temperature	93	°C	Gas Velocity	13.66	m/s	
Type of Fuel	Natural Gas		Moisture	8.45	%	Flow Rate	258478	Nm ³ /hr	

Run No.	Sampling Time	Oxygen (%)	Carbon Dioxide (%)	Sulfur Dioxide (ppm)			Oxides of Nitrogen (ppm)		
				at Actual O ₂	at 7% O ₂	at 7% O ₂	at Actual O ₂	at 7% O ₂	at 7% O ₂
1	10:00 AM - 10:20 AM	14.20	3.89	0.16	0.33	6.44	6.44	13.35	
2	10:21 AM - 10:41 AM	14.19	3.88	0.14	0.29	6.39	6.39	13.23	
3	10:42 AM - 11:02 AM	14.18	3.87	0.12	0.24	6.44	6.44	13.33	
Average		14.19	3.88	0.14	0.28	6.42	6.42	13.30	
Guideline ^{1/} (ppm)				-	6	-	-	60	
Guideline ^{2/} (ppm)				-	20	-	-	120	
Guideline ^{3/} (ppm)				-	20	-	-	120	
Result (mg/m ³)				0.36	0.76	12.08	12.08	25.03	
Emission Rate at Actual O ₂ (g/s)				0.0262				0.6674	
Guideline ^{4/} (g/s)				0.86				6.18	
Method				US EPA Method 6C			US EPA Method 7E		

Guideline : ^{1/} Environmental Impact Assessment Report of Gulf JP NKK Co., Ltd.

^{2/} Notification of the Ministry of Industry on determining pollutant contents in air emitted from electric power generation, transmission and distribution plant, 2004 (B.E. 2547), dated September, 2004 (B.E. 2547).

^{3/} Notification of the Ministry of Natural Resources and Environment, 2010 (B.E. 2553) on Emission Standard from New Power Plants.

Technical Manage

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Guideline : Notification of the Ministry of Industry 2006 (B.E. 2549) Published in the Royal Government Gazette, Vol.123 Special Part 125 D,
dated December 4, 2006 (B.E. 2549)



Analysis / Test Report

Report to: Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Neangket,
Muang Chachoengsao, Chachoengsao
Thailand 24000
Attn: Chokpisan Tongdespeng
Phone: 0-3851-3911 - 1Ext.
Fax: -
Email: Chokpisan.gnnk@gulf.co.th

Lot ID: 2022927
Date Received: Jun 04, 2020
Date Reported: Jun 12, 2020
Report Number: 1600862-1

Project Name: Monitoring EIA
Location: GNNK
P/O:
Receipt No:

Page 1 of 2

Reference Number	2022927-1
Sample Description	Emission from Stationary Source
Location	11kiao HRSG 11
Condition of Sample	Extracted into one filter paper placed in plastic petri dish
Sampling Date	Jun 03, 2020
Date of Analysis	Jun 05, 2020

Stack Description					
Ambient Pressure	758	mmHg	Diameter	3.00	m
Ambient Temperature	32.0	°C	Shape	Circle	
Type of Process	Combustion		Stack Temperature	93.0	°C
Type of Fuel	Natural Gas		% Gas Velocity	13.7	m/s
			% Flow Rate (Actual O2)	258748	Nm3/hr

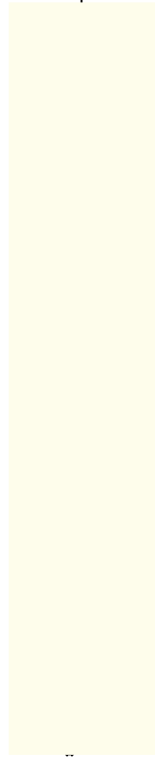
Analyte	Sampling Time	Result	Guideline (1)	Guideline (2)	Unit	Method
Total Suspended Particulate	10.00 AM - 10.48 AM	1.3	at 7 % O ₂	60	mg/m3	US EPA, Method 5

Guideline (1) Notification of the Ministry of Industry on determining pollutant contents in air emitted from electric power generation, transmission and distribution plant, 2004 (B.E. 2547), dated September, 2004 (B.E. 2547).

Guideline (2) Notification of the Ministry of Natural Resources and Environment, 2010 (B.E. 2553) on Emission Standard from New Power Plants.

Guideline (2) Environmental Impact Assessment Report of Gulf JP NKK Co., Ltd.

Technical Ma:



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Analysis / Test Report

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Muang Chachoengsao, Chachoengsao
Thailand 24000
Attn: Chokpisan Tongdespeng
Phone: 0-3851-3911 - 1Ext.
Fax: -
Email: Chokpisan.gnnk@gulf.co.th

Lot ID: 2022927
Date Received: Jun 04, 2020
Date Reported: Jun 12, 2020
Report Number: 1600862-1

Project Name: Monitoring EIA
Location: GNNK
P/O:
Receipt No:

Page 2 of 2

Reference Number	2022927-1
Sample Description	Emission from Stationary Source
Location	11kiao HRSG 11
Condition of Sample	Extracted into one filter paper placed in plastic petri dish
Sampling Date	Jun 03, 2020
Date of Analysis	Jun 05, 2020

Stack Description					
Ambient Pressure	758	mmHg	Diameter	3.00	m
Ambient Temperature	32.0	°C	Shape	Circle	
Type of Process	Combustion		Stack Temperature	93.0	°C
Type of Fuel	Natural Gas		% Gas Velocity	13.7	m/s
			% Flow Rate (Actual O2)	258748	Nm3/hr

Analyte	Sampling Time	Result (s)	Guideline (1)	Guideline (2)	Unit	Method
Total Suspended Particulate	10.00 AM - 10.48 AM	0.05	-	-	g/s	Calculated

Technical Managen



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Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.
99 Moo 17, Kong Nakorn Neangket,
Mueang, Chachoengsao, Chachoengsao
Thailand 24000

Project Name : Monitoring EIA
Location : GNNK
P/O :
Receipt No. :

Lot ID: 2022925
Date Received: Jun 04, 2020
Date Reported: Jun 10, 2020
Report No.: 1600860-1

Attn : Chokpisan Tongdeengeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnnk@gulf.co.th

Page 1 of 1

Reference No.	2022925-1
Sample Description	Emission from Stationary Source
Location	HRSG 12 (GPS 47P 717974, 1519419)
Sampling Date	June 4, 2020
Date of Analysis	June 8, 2020

Stack Description									
Ambient Temperature	32	°C	Diameter	3.00	m	Oxygen	14.21	%	
Ambient Pressure	758	mmHg	Shape	Circle		Carbon dioxide	3.87	%	
Type of Process	Combustion		Stack Temperature	102	°C	Gas Velocity	19.36	m/s	
Type of Fuel	Natural Gas		Moisture	9.02	%	Flow Rate	355387	Nm ³ /hr	

Run No.	Sampling Time	Oxygen (%)	Carbon Dioxide (%)	Sulfur Dioxide (ppm)		Oxides of Nitrogen (ppm)	
				at Actual O ₂	at 7% O ₂	at Actual O ₂	at 7% O ₂
1	10:00 AM - 10:20 AM	14.20	3.88	0.17	0.35	5.70	11.84
2	10:21 AM - 10:41 AM	14.22	3.86	0.07	0.14	5.63	11.72
3	10:42 AM - 11:02 AM	14.22	3.87	0.02	0.04	5.78	12.03
Average		14.21	3.87	0.08	0.17	5.71	11.87
Guideline ¹ (ppm)				-	6	-	60
Guideline ² (ppm)				-	20	-	120
Guideline ³ (ppm)				-	20	-	120
Result (mg/m ³)				0.22	0.45	10.74	22.32
Emission Rate at Actual O ₂ (g/s)				0.0215		1.0599	
Guideline ⁴ (g/s)				0.86		6.18	
Method				US EPA Method 6C		US EPA Method 7E	

Guideline : ¹ Environmental Impact Assessment Report of Gulf JP NKK Co., Ltd.

² Notification of the Ministry of Industry on determining pollutant contents in air emitted from electric power generation, transmission and distribution plant, 2004 (B.E. 2547), dated September, 2004 (B.E. 2547).

³ Notification of the Ministry of Natural Resources and Environment, 2010 (B.E. 2553) on Emission Standard from New Power Plants.

Technical Manag

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Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.
99 Moo 17, Kong Nakorn Neangket,
Mueang, Chachoengsao, Chachoengsao
Thailand 24000

Project Name : Monitoring EIA
Location : GNNK
P/O :
Receipt No. :

Lot ID: 2022925
Date Received: Jun 04, 2020
Date Reported: Jun 10, 2020
Report No.: 1600860-1

Attn : Chokpisan Tongdeengeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnnk@gulf.co.th

Page 1 of 1

Reference No.	2022925-1
Sample Description	Emission from Stationary Source
Location	HRSG 12 (GPS 47P 717974, 1519419)
Sampling Date	June 4, 2020
Date of Analysis	June 8, 2020

Stack Description									
Ambient Temperature	32	°C	Diameter	3.00	m	Oxygen	14.21	%	
Ambient Pressure	758	mmHg	Shape	Circle		Carbon dioxide	3.87	%	
Type of Process	Combustion		Stack Temperature	102	°C	Gas Velocity	19.36	m/s	
Type of Fuel	Natural Gas		Moisture	9.02	%	Flow Rate	355387	Nm ³ /hr	

Run No.	Sampling Time	Oxygen (%)	Carbon Dioxide (%)	Carbon Monoxide (ppm)	
				at Actual O ₂	at 7% O ₂
1	10:00 AM - 10:20 AM	14.20	3.88	2.52	5.22
2	10:21 AM - 10:41 AM	14.22	3.86	2.21	4.59
3	10:42 AM - 11:02 AM	14.22	3.87	2.03	4.23
Average		14.21	3.87	2.25	4.68
Guideline ¹ (ppm)				-	690
Guideline ² (mg/m ³)				2.58	5.36
Emission Rate at Actual O ₂ (g/s)				0.2546	
Method				US EPA Method 10	

Guideline : Notification of the Ministry of Industry 2006 (B.E. 2549) Published in the Royal Government Gazette, Vol.123 Special Part 125 D,
dated December 4, 2006 (B.E. 2549)

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Analysis / Test Report

Report to: Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Neangket,
Muang Chachoengsao, Chachoengsao
Thailand 24000
Attn: Chokpisan Tongdeeng
Phone: 0-3851-3911 • 1Ext.
Fax: - Ext.
Email: Chokpisan.gmnk@gulf.co.th

Lot ID: 2022929
Date Received: Jun 04, 2020
Date Reported: Jun 12, 2020

Project Name: Monitoring EIA
Location: GNNK
P/O:
Receipt No:

Page 1 of 2

Reference Number	2022929-1
Sample Description	Emission from Stationary Source
Location	Ulaa HRSG 12
Condition of Sample	Extracted into one filter paper placed in plastic petri dish
Sampling Date	Jun 04, 2020
Date of Analysis	Jun 05, 2020

Stack Description

Ambient Pressure	758	mmHg	Diameter	3.00	m	Oxygen	14.2	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	3.9	%
Type of Process	Combustion		Stack Temperature	102	°C	Gas Velocity	19.4	m/s
Type of Fuel	Natural Gas		Moisture	9.04	%	Flow Rate (Actual O2)	355770	Nm3/hr

Analyte	Sampling Time	Result	Guideline (1)	Guideline (2)	Unit	Method
Total Suspended Particulate	10.00 AM - 10.48 AM	1.5	0.7	60	30	mg/m3 US EPA, Method 5

Guideline (1) Notification of the Ministry of Industry on determining pollutant contents in air emitted from electric power generation, transmission and distribution plant, 2004 (B.E. 2547), dated September, 2004 (B.E. 2547).
Notification of the Ministry of Natural Resources and Environment, 2010 (B.E. 2553) on Emission Standard from New Power Plants.
Guideline (2) Environmental Impact Assessment Report of Gulf JP NKK Co., Ltd.

Technical Man

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S:\Report\Stack_O2_EmissionRate_2021.pdf (1122AM)



Analysis / Test Report

Report to: Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Neangket,
Muang Chachoengsao, Chachoengsao
Thailand 24000
Attn: Chokpisan Tongdeeng
Phone: 0-3851-3911 • 1Ext.
Fax: - Ext.
Email: Chokpisan.gmnk@gulf.co.th

Lot ID: 2022929
Date Received: Jun 04, 2020
Date Reported: Jun 12, 2020

Project Name: Monitoring EIA
Location: GNNK
P/O:
Receipt No:

Page 2 of 2

Reference Number	2022929-1
Sample Description	Emission from Stationary Source
Location	Ulaa HRSG 12
Condition of Sample	Extracted into one filter paper placed in plastic petri dish
Sampling Date	Jun 04, 2020
Date of Analysis	Jun 05, 2020

Stack Description

Ambient Pressure	758	mmHg	Diameter	3.00	m	Oxygen	14.2	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	3.9	%
Type of Process	Combustion		Stack Temperature	102	°C	Gas Velocity	19.4	m/s
Type of Fuel	Natural Gas		Moisture	9.04	%	Flow Rate (Actual O2)	355770	Nm3/hr

Analyte	Sampling Time	Result (s)	Emission Rate	Guideline (1)	Guideline (2)	Unit	Method
Total Suspended Particulate	10.00 AM - 10.48 AM	0.07	-	-	-	g/s	Calculated

Technical Managem

หน้าผืนที่ 7-204-4-4717

หน้าผืนที่ 7-204-4-4700

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ภาคผนวก ค-4

ระดับเสียง



Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Attn : Chokpisan Tongdeepeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnkk@gulf.co.th

Lot ID: 2022931

Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696298-1

Reference Number 2022931-1

Parameter Noise (Leq 24 hrs.)

Location บ้านนาหมื่น (GPS 47P 0721870, 1520731)

Measurement Date May 29, 2020 - May 30, 2020

Measurement By Audit Aonism Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Sound Level Meter Serial No. 5572452

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	52.0	73.8	45.3
03:00 PM - 04:00 PM	51.9	68.3	47.3
04:00 PM - 05:00 PM	52.8	72.7	46.9
05:00 PM - 06:00 PM	53.6	82.1	44.3
06:00 PM - 07:00 PM	48.8	81.5	40.6
07:00 PM - 08:00 PM	47.9	73.3	40.2
08:00 PM - 09:00 PM	40.8	65.1	38.2
09:00 PM - 10:00 PM	41.4	58.0	38.8
10:00 PM - 11:00 PM	45.7	63.1	39.2
11:00 PM - 12:00 PM	40.3	63.9	37.4
12:00 AM - 01:00 AM	44.6	72.4	37.8
01:00 AM - 02:00 AM	40.0	67.1	36.9
02:00 AM - 03:00 AM	39.2	68.7	36.7
03:00 AM - 04:00 AM	49.4	73.5	40.5
04:00 AM - 05:00 AM	56.5	75.3	41.1
05:00 AM - 06:00 AM	52.5	74.0	43.4
06:00 AM - 07:00 AM	51.4	75.2	41.9
07:00 AM - 08:00 AM	54.7	82.8	42.3
08:00 AM - 09:00 AM	54.4	82.1	42.1
09:00 AM - 10:00 AM	52.3	74.3	42.0
10:00 AM - 11:00 AM	53.9	80.0	44.3
11:00 AM - 12:00 PM	56.6	84.0	41.9
12:00 PM - 01:00 PM	57.3	90.2	39.4
01:00 PM - 02:00 PM	49.8	74.8	39.9
Leq Average 24 hrs. (dB(A))	52.1		
Lmax (dB(A))	90.2		40.6
L90 (dB(A))			
Ldn (dB(A))	57.1		
Standard (dB(A))	70		115
Reference Method	: Based on ISO (1996)/1		
Standard	: 1. ใช้เกณฑ์มาตรฐานการวัดระดับเสียงตามข้อกำหนด 15 (พ.ศ. 2540) สำหรับการวัดระดับเสียงในสถานที่ 2. ใช้เกณฑ์มาตรฐานการวัดระดับเสียงตามข้อกำหนด 15 (พ.ศ. 2540) สำหรับการวัดระดับเสียงในสถานที่		

Technical Ms

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Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Attn : Chokpisan Tongdeepeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnkk@gulf.co.th

Lot ID: 2022931

Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696300-1

Reference Number 2022931-2

Parameter Noise (Leq 24 hrs.)

Location บ้านนาหมื่น (GPS 47P 0721870, 1520731)

Measurement Date May 30, 2020 - May 31, 2020

Measurement By Audit Aonism Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Sound Level Meter Serial No. 5572452

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	55.0	91.6	41.1
03:00 PM - 04:00 PM	50.5	77.3	43.7
04:00 PM - 05:00 PM	51.0	84.4	46.9
05:00 PM - 06:00 PM	50.4	70.7	46.2
06:00 PM - 07:00 PM	48.7	74.9	44.1
07:00 PM - 08:00 PM	52.2	80.9	44.4
08:00 PM - 09:00 PM	47.3	74.6	43.1
09:00 PM - 10:00 PM	44.3	69.2	41.3
10:00 PM - 11:00 PM	45.8	74.7	40.1
11:00 PM - 12:00 PM	46.2	77.4	40.1
12:00 AM - 01:00 AM	55.0	81.6	38.0
01:00 AM - 02:00 AM	45.1	74.1	40.0
02:00 AM - 03:00 AM	49.6	70.9	43.7
03:00 AM - 04:00 AM	54.9	77.7	40.9
04:00 AM - 05:00 AM	51.4	78.4	44.3
05:00 AM - 06:00 AM	53.8	78.1	42.6
06:00 AM - 07:00 AM	53.5	82.1	42.0
07:00 AM - 08:00 AM	56.1	87.7	43.2
08:00 AM - 09:00 AM	51.9	73.5	44.4
09:00 AM - 10:00 AM	53.8	78.4	44.7
10:00 AM - 11:00 AM	51.5	75.1	45.0
11:00 AM - 12:00 PM	50.7	80.0	43.1
12:00 PM - 01:00 PM	55.7	77.5	44.3
Leq Average 24 hrs. (dB(A))	52.2		
Lmax (dB(A))	91.6		43.1
L90 (dB(A))			
Ldn (dB(A))	58.0		
Standard (dB(A))	70		115
Reference Method	: Based on ISO (1996)/1		
Standard	: 1. ใช้เกณฑ์มาตรฐานการวัดระดับเสียงตามข้อกำหนด 15 (พ.ศ. 2540) สำหรับการวัดระดับเสียงในสถานที่ 2. ใช้เกณฑ์มาตรฐานการวัดระดับเสียงตามข้อกำหนด 15 (พ.ศ. 2540) สำหรับการวัดระดับเสียงในสถานที่		

Technical Manager

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Analysis / Test Report

Report to : Gulf JP NNK Co., Ltd.

Report to : Gulf JP NNK Co., Ltd.
99 Moo 17, Kong Nakorn Neangket, Muang
Chachoengsao, Chachoengsao Thailand

Chachoengsao, Chacheungsao Thailand
P/O :
Receipt No : 24000

Attn: Chokpisan Tongdeepeng

Phone: 0-3851-3911 - 13

Fax: •

Email: Chokpisan.gnkn@gulf.co.th

Lot ID: 2022931

Date Received : Jun 08, 2020

Date Reported : Jun 16, 2020

Report Number : 1696302-1

Page 1 of 1

Reference Number	Parameter	Value
2022931-4	Noise (Leq 24 hrs.)	119.6dB(A)
	Location	Thuaenon (GPS 47P 0721870, 1520731)
	Measurement Date	Jun 01, 2020 - Jun 02, 2020
	Measurement By	Aurix Aomsim Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
	Sound Level Meter	Serial No. 5572452

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	44.6	63.3	39.4
03:00 PM - 04:00 PM	49.0	80.0	37.2
04:00 PM - 05:00 PM	39.2	55.9	37.3
05:00 PM - 06:00 PM	41.4	67.1	38.3
06:00 PM - 07:00 PM	47.4	70.1	39.7
07:00 PM - 08:00 PM	56.8	76.5	41.3
08:00 PM - 09:00 PM	53.7	77.4	48.8
09:00 PM - 10:00 PM	63.3	95.3	48.5
10:00 PM - 11:00 PM	53.6	88.4	45.2
11:00 PM - 12:00 AM	51.0	75.0	42.6
12:00 AM - 01:00 AM	53.9	82.6	44.8
01:00 AM - 02:00 AM	52.4	74.2	45.5
02:00 AM - 03:00 AM	50.6	74.0	44.2
03:00 AM - 04:00 AM	49.9	66.4	42.7
04:00 AM - 05:00 AM	55.8	83.2	41.8
05:00 AM - 06:00 AM	52.1	74.4	42.9
06:00 AM - 07:00 AM	54.6	74.1	42.1
07:00 AM - 08:00 AM	57.5	74.3	44.0
08:00 AM - 09:00 AM	52.1	83.0	43.7
09:00 AM - 10:00 AM	55.1	80.8	49.0
10:00 AM - 11:00 AM	51.0	78.2	43.2
11:00 AM - 12:00 PM	64.0	91.8	45.2
12:00 PM - 01:00 PM	56.2	90.5	46.7
01:00 PM - 02:00 PM	50.2	69.8	47.5

Leq Average 24 hrs. (dB(A))	55.8
-----------------------------	------

$$\lim_{\max} (dB(A))$$

L90 (dB(A))

$L_{dn}(dB(A))$	60.2
-----------------	------

Standard (DE/A)	70	115
-----------------	----	-----

Reference Method : Based on ISO (1996)/1

Standard
: 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป

2. **ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดัปล้างการรบกวน และระดัปล้างเสียงที่เกิดจากการรบกวน พ.ศ. 2548**

Technical Manage

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Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.
99 Moo 17, King Nakhon Nanglat, Muang
Chachoengsao, Chachoengsao Thailand
24000
Attn : Chokpisan Tongdeeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :

Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696303-1

Page 1 of 1

Reference Number	2022931-5
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่สาธารณะ (GPS 47P 0721870, 1520731)
Measurement Date	Jun 02, 2020 - Jun 03, 2020
Measurement By	Audit Aonisin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 5572452

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	47.2	79.9	43.4
03:00 PM - 04:00 PM	44.9	69.4	41.3
04:00 PM - 05:00 PM	45.9	81.2	41.1
05:00 PM - 06:00 PM	45.9	69.1	40.2
06:00 PM - 07:00 PM	47.5	81.7	41.2
07:00 PM - 08:00 PM	54.7	72.6	43.0
08:00 PM - 09:00 PM	51.7	77.3	43.7
09:00 PM - 10:00 PM	50.1	74.5	43.6
10:00 PM - 11:00 PM	53.3	82.5	43.6
11:00 PM - 12:00 AM	51.5	76.6	42.1
12:00 AM - 01:00 AM	50.3	69.4	44.7
01:00 AM - 02:00 AM	52.8	73.9	46.9
02:00 AM - 03:00 AM	56.5	79.6	43.9
03:00 AM - 04:00 AM	62.4	83.0	52.5
04:00 AM - 05:00 AM	52.4	80.0	45.2
05:00 AM - 06:00 AM	57.8	77.0	43.6
06:00 AM - 07:00 AM	50.1	67.2	43.8
07:00 AM - 08:00 AM	53.4	82.7	43.0
08:00 AM - 09:00 AM	52.2	80.7	43.5
09:00 AM - 10:00 AM	50.4	82.3	43.7
10:00 AM - 11:00 AM	50.5	71.6	43.2
11:00 AM - 12:00 PM	49.3	72.4	42.4
12:00 PM - 01:00 PM	50.4	76.9	41.9
01:00 PM - 02:00 PM	49.3	81.0	42.5

Leq Average 24 hrs. (dB(A))	53.5
Lmax (dB(A))	83.0
L90 (dB(A))	43.4
Ldn (dB(A))	62.1
Standard (dB(A))	70
Reference Method	: Based on ISO 1996/1
Standard	: 1. ปริมาณการจราจรทางบกและทางอากาศ 15 (ก.ม. 2540) ด้านถนนและทางรถไฟ 2. ปริมาณการจราจรทางบกและทางอากาศ 15 (ก.ม. 2540) ด้านถนนและทางรถไฟ

Technical Manager

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Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.
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24000
Attn : Chokpisan Tongdeeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :

Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696304-1

Page 1 of 1

Reference Number	2022931-6
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่สาธารณะ (GPS 47P 0721870, 1520731)
Measurement Date	Jun 03, 2020 - Jun 04, 2020
Measurement By	Audit Aonisin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 5572452

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	46.0	56.7	42.1
03:00 PM - 04:00 PM	44.2	58.5	41.2
04:00 PM - 05:00 PM	42.0	58.3	40.3
05:00 PM - 06:00 PM	44.6	68.3	39.8
06:00 PM - 07:00 PM	53.0	76.5	41.8
07:00 PM - 08:00 PM	60.0	81.8	42.8
08:00 PM - 09:00 PM	51.5	76.2	45.5
09:00 PM - 10:00 PM	49.9	77.4	43.0
10:00 PM - 11:00 PM	50.6	92.6	42.0
11:00 PM - 12:00 AM	50.1	67.6	40.2
12:00 AM - 01:00 AM	54.9	77.7	40.9
01:00 AM - 02:00 AM	53.8	78.1	42.6
02:00 AM - 03:00 AM	51.9	73.5	44.4
03:00 AM - 04:00 AM	50.7	80.0	43.1
04:00 AM - 05:00 AM	63.0	87.9	47.9
05:00 AM - 06:00 AM	51.3	84.0	44.3
06:00 AM - 07:00 AM	49.0	73.2	40.6
07:00 AM - 08:00 AM	42.1	61.7	38.3
08:00 AM - 09:00 AM	42.1	64.4	38.7
09:00 AM - 10:00 AM	52.6	77.3	45.3
10:00 AM - 11:00 AM	52.7	85.3	45.7
11:00 AM - 12:00 PM	45.9	82.9	39.5
12:00 PM - 01:00 PM	45.2	85.8	40.9
01:00 PM - 02:00 PM	39.2	55.9	37.3

Leq Average 24 hrs. (dB(A))	54.2
Lmax (dB(A))	92.6
L90 (dB(A))	41.8
Ldn (dB(A))	62.7
Standard (dB(A))	70
Reference Method	: Based on ISO 1996/1
Standard	: 1. ปริมาณการจราจรทางบกและทางอากาศ 15 (ก.ม. 2540) ด้านถนนและทางรถไฟ 2. ปริมาณการจราจรทางบกและทางอากาศ 15 (ก.ม. 2540) ด้านถนนและทางรถไฟ

Technical Manager

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24000
Attn : Chokpisan Tongdeppeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 20229317
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696305-1

Page 1 of 1

Reference Number	2022931-7
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่ (GPS 47P 0721870, 1520731)
Measurement Date	Jun 04, 2020 - Jun 05, 2020
Measurement By	Audit Aonisin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 5572452

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	53.7	71.4	48.8
03:00 PM - 04:00 PM	51.0	75.0	42.6
04:00 PM - 05:00 PM	50.6	74.0	44.2
05:00 PM - 06:00 PM	51.0	76.2	44.2
06:00 PM - 07:00 PM	47.2	79.9	43.4
07:00 PM - 08:00 PM	47.5	81.7	41.2
08:00 PM - 09:00 PM	50.1	74.5	43.6
09:00 PM - 10:00 PM	51.5	76.6	42.1
10:00 PM - 11:00 PM	52.8	73.9	46.9
11:00 PM - 12:00 AM	50.1	67.2	43.8
12:00 AM - 01:00 AM	50.4	82.3	43.7
01:00 AM - 02:00 AM	45.3	66.5	40.5
02:00 AM - 03:00 AM	52.7	85.3	45.7
03:00 AM - 04:00 AM	44.7	68.3	40.8
04:00 AM - 05:00 AM	56.8	76.5	41.3
05:00 AM - 06:00 AM	53.6	88.4	45.2
06:00 AM - 07:00 AM	53.9	82.6	44.8
07:00 AM - 08:00 AM	50.6	74.0	42.9
08:00 AM - 09:00 AM	52.1	74.4	42.9
09:00 AM - 10:00 AM	56.2	90.5	46.7
10:00 AM - 11:00 AM	54.7	72.6	43.0
11:00 AM - 12:00 PM	53.1	82.5	43.6
12:00 PM - 01:00 PM	50.3	67.2	43.8
01:00 PM - 02:00 PM	46.0	56.7	42.1

Leq Average 24 hrs. (dB(A))	52.1
Lmax (dB(A))	90.5
L90 (dB(A))	43.6
L01 (dB(A))	
Standard (dB(A))	70
Reference Method	: Based on ISO (1996)/1
Standard	
: 1. วิธีการทดสอบการวัดเสียงตามข้อกำหนด มาตรฐาน 15 (พ.ร.บ. 2540) สำหรับการทดสอบระดับเสียงในพื้นที่ 2. วิธีการตรวจสอบความถูกต้องของการวัดเสียงตามข้อกำหนด มาตรฐาน 15 (พ.ร.บ. 2540) สำหรับการทดสอบระดับเสียงในพื้นที่	

Technical Manager

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24000
Attn : Chokpisan Tongdeppeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 20229318
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696306-1

Page 1 of 1

Reference Number	2022931-8
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่ (GPS 47P 0721473, 1518765)
Measurement Date	May 29, 2020 - May 30, 2020
Measurement By	Audit Aonisin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 572457

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	49.3	74.0	42.3
02:00 PM - 03:00 PM	51.1	76.0	42.2
03:00 PM - 04:00 PM	51.4	75.5	45.2
04:00 PM - 05:00 PM	51.4	73.7	44.5
05:00 PM - 06:00 PM	51.3	76.1	44.7
06:00 PM - 07:00 PM	49.8	82.1	40.2
07:00 PM - 08:00 PM	46.3	64.3	41.6
08:00 PM - 09:00 PM	45.9	67.7	43.7
09:00 PM - 10:00 PM	46.3	62.2	44.6
10:00 PM - 11:00 PM	48.1	62.7	43.6
11:00 PM - 12:00 AM	46.2	73.0	41.7
12:00 AM - 01:00 AM	47.1	62.4	43.8
01:00 AM - 02:00 AM	47.0	67.2	40.9
02:00 AM - 03:00 AM	44.2	57.8	42.1
03:00 AM - 04:00 AM	41.3	67.8	42.0
04:00 AM - 05:00 AM	44.4	55.3	42.9
05:00 AM - 06:00 AM	54.6	77.6	45.2
06:00 AM - 07:00 AM	53.4	75.9	44.4
07:00 AM - 08:00 AM	53.3	75.7	43.8
08:00 AM - 09:00 AM	56.2	82.7	43.8
09:00 AM - 10:00 AM	52.4	75.8	42.6
10:00 AM - 11:00 AM	51.0	73.8	43.5
11:00 AM - 12:00 PM	52.5	75.0	44.1
12:00 PM - 01:00 PM	49.6	72.0	42.1

Leq Average 24 hrs. (dB(A))	50.7
Lmax (dB(A))	82.7
L90 (dB(A))	43.5
L01 (dB(A))	
Standard (dB(A))	70
Reference Method	: Based on ISO (1996)/1
Standard	
: 1. วิธีการทดสอบการวัดเสียงตามข้อกำหนด มาตรฐาน 15 (พ.ร.บ. 2540) สำหรับการทดสอบระดับเสียงในพื้นที่ 2. วิธีการตรวจสอบความถูกต้องของการวัดเสียงตามข้อกำหนด มาตรฐาน 15 (พ.ร.บ. 2540) สำหรับการทดสอบระดับเสียงในพื้นที่	

Technical Manager

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24000
Attn : Chokpian Tongdepong
Phone : 0-3851-3911 - 13
Fax :
Email : Chokpian.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696307-1

Page 1 of 1

Reference Number	Noise (Leq 24 hrs.)	Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
Parameter	Noise (Leq 24 hrs.)	Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
Location	พื้นที่วัด (GPS 47P 0721473, 1518765)				
Measurement Date	May 30, 2020 - May 31, 2020				
Measurement By	Audit Aonimsin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.				
Sound Level Meter	Serial No. 572457				

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	51.4	74.1	42.3
02:00 PM - 03:00 PM	51.6	77.3	42.3
03:00 PM - 04:00 PM	51.3	77.0	43.3
04:00 PM - 05:00 PM	51.3	81.6	44.3
05:00 PM - 06:00 PM	49.7	74.1	44.2
06:00 PM - 07:00 PM	50.0	72.2	42.8
07:00 PM - 08:00 PM	52.1	74.4	43.7
08:00 PM - 09:00 PM	48.3	61.6	46.9
09:00 PM - 10:00 PM	48.7	71.1	47.0
10:00 PM - 11:00 PM	48.0	68.0	47.2
11:00 PM - 12:00 AM	51.1	69.9	46.9
12:00 AM - 01:00 AM	50.7	68.2	47.6
01:00 AM - 02:00 AM	50.5	53.4	48.2
02:00 AM - 03:00 AM	47.7	56.3	44.8
03:00 AM - 04:00 AM	43.6	57.3	42.8
04:00 AM - 05:00 AM	45.9	63.2	44.5
05:00 AM - 06:00 AM	55.5	77.3	45.2
06:00 AM - 07:00 AM	51.8	75.5	42.2
07:00 AM - 08:00 AM	54.3	77.8	41.7
08:00 AM - 09:00 AM	49.2	70.2	41.1
09:00 AM - 10:00 AM	50.2	73.0	40.7
10:00 AM - 11:00 AM	51.2	71.8	42.5
11:00 AM - 12:00 PM	47.8	69.5	41.8
12:00 PM - 01:00 PM	48.2	67.5	42.1

Leq Average 24 hrs. (dB(A))	50.7
Lmax (dB(A))	81.6
L90 (dB(A))	43.3
L90 (dB(A))	43.3
L90 (dB(A))	43.3
Standard (dB(A))	70
Reference Method	: Based on ISO (1996)/1
Standard	: 1. ใช้มาตรฐานการวัดระดับเสียงตามข้อกำหนดของกรมส่งเสริมการค้าระหว่างประเทศ พ.ศ. 2540 2. ใช้มาตรฐานการวัดระดับเสียงตามข้อกำหนดของกรมส่งเสริมการค้าระหว่างประเทศ พ.ศ. 2548

Technical Manager

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Attn : Chokpian Tongdepong
Phone : 0-3851-3911 - 13
Fax :
Email : Chokpian.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696308-1

Page 1 of 1

Reference Number	2022931-10
Parameter	Noise (Leq 24 hrs.)
Location	1Thun1st (GPS 47P 0721473, 1518765)
Measurement Date	May 31, 2020 - Jun 01, 2020
Measurement By	Audit Aonimsin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 572457

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	48.4	69.2	44.5
02:00 PM - 03:00 PM	49.5	73.3	43.1
03:00 PM - 04:00 PM	51.3	77.0	43.5
04:00 PM - 05:00 PM	51.7	74.9	44.9
05:00 PM - 06:00 PM	53.1	77.6	42.4
06:00 PM - 07:00 PM	50.9	83.0	41.3
07:00 PM - 08:00 PM	46.5	66.4	41.8
08:00 PM - 09:00 PM	48.3	61.5	44.7
09:00 PM - 10:00 PM	54.1	79.0	47.9
10:00 PM - 11:00 PM	48.7	68.7	47.6
11:00 PM - 12:00 AM	45.7	60.9	44.3
12:00 AM - 01:00 AM	46.6	68.8	45.1
01:00 AM - 02:00 AM	46.6	54.3	45.6
02:00 AM - 03:00 AM	45.8	57.0	44.6
03:00 AM - 04:00 AM	45.3	60.8	43.1
04:00 AM - 05:00 AM	45.7	71.5	42.7
05:00 AM - 06:00 AM	57.7	81.6	44.9
06:00 AM - 07:00 AM	55.1	81.1	46.1
07:00 AM - 08:00 AM	52.5	76.3	43.8
08:00 AM - 09:00 AM	50.7	74.8	42.2
09:00 AM - 10:00 AM	49.8	71.4	41.4
10:00 AM - 11:00 AM	51.0	71.5	43.7
11:00 AM - 12:00 PM	51.7	77.8	42.2
12:00 PM - 01:00 PM	60.9	77.0	42.7

Leq Average 24 hrs. (dB(A))	52.5
Lmax (dB(A))	83.0
L90 (dB(A))	43.7
L90 (dB(A))	43.7
L90 (dB(A))	43.7
Standard (dB(A))	70
Reference Method	: Based on ISO (1996)/1
Standard	: 1. ใช้มาตรฐานการวัดระดับเสียงตามข้อกำหนดของกรมส่งเสริมการค้าระหว่างประเทศ พ.ศ. 2540 2. ใช้มาตรฐานการวัดระดับเสียงตามข้อกำหนดของกรมส่งเสริมการค้าระหว่างประเทศ พ.ศ. 2548

Technical Manager

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Attn: Chokpisan Tongdeepsing
Phone : 0-3851-3911 - 13
Fax : -
Email: Chokpisan.gnnk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696309-1

Page 1 of 1

Reference Number 2022931-11
Parameter Noise (Leq 24 hrs.)
Location ถนนวิภาวดี (GPS 47P 0721473, 1518765)
Measurement Date Jun 01, 2020 - Jun 02, 2020
Measurement By Audit Aonissim Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter Serial No. 572457

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	48.5	70.4	42.7
02:00 PM - 03:00 PM	52.4	77.3	44.4
03:00 PM - 04:00 PM	52.4	74.7	44.1
04:00 PM - 05:00 PM	51.9	78.8	44.0
05:00 PM - 06:00 PM	52.0	77.5	43.6
06:00 PM - 07:00 PM	53.7	77.8	41.0
07:00 PM - 08:00 PM	42.9	59.7	41.2
08:00 PM - 09:00 PM	44.8	64.1	42.7
09:00 PM - 10:00 PM	46.6	70.0	43.8
10:00 PM - 11:00 PM	43.3	59.3	41.9
11:00 PM - 12:00 AM	44.7	74.9	42.0
12:00 AM - 01:00 AM	45.4	63.5	43.6
01:00 AM - 02:00 AM	50.0	60.1	46.2
02:00 AM - 03:00 AM	50.8	56.1	43.2
03:00 AM - 04:00 AM	51.4	61.2	48.1
04:00 AM - 05:00 AM	47.1	63.5	42.4
05:00 AM - 06:00 AM	58.0	79.3	44.5
06:00 AM - 07:00 AM	56.8	78.1	49.7
07:00 AM - 08:00 AM	53.9	77.8	46.2
08:00 AM - 09:00 AM	51.2	71.0	43.3
09:00 AM - 10:00 AM	54.9	84.1	43.5
10:00 AM - 11:00 AM	50.8	73.0	44.4
11:00 AM - 12:00 PM	55.6	79.1	45.2
12:00 PM - 01:00 PM	52.6	80.7	43.4

Leq Average 24 hrs. (dB(A)) 52.0
Lmax (dB(A)) 84.1
L90 (dB(A)) 43.6
L10 (dB(A)) 58.3
Standard (dB(A)) 70
Reference Method : Based on ISO (1996)/1
Standard : 1. วิธีการวัดและประเมินค่าเสียงตามข้อกำหนดของมาตรฐานการควบคุมเสียงรบกวน พ.ร.บ. 2548
2. วิธีการวัดและประเมินค่าเสียงตามข้อกำหนดของมาตรฐานการควบคุมเสียงรบกวน พ.ร.บ. 2548

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Attn: Chokpisan Tongdeepsing
Phone : 0-3851-3911 - 13
Fax : -
Email: Chokpisan.gnnk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696310-1

Page 1 of 1

Reference Number 2022931-12
Parameter Noise (Leq 24 hrs.)
Location ถนนวิภาวดี (GPS 47P 0721473, 1518765)
Measurement Date Jun 02, 2020 - Jun 03, 2020
Measurement By Audit Aonissim Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter Serial No. 572457

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	61.1	92.7	43.2
02:00 PM - 03:00 PM	58.9	96.8	42.2
03:00 PM - 04:00 PM	51.2	75.9	42.3
04:00 PM - 05:00 PM	55.1	85.0	42.4
05:00 PM - 06:00 PM	51.1	86.4	42.6
06:00 PM - 07:00 PM	51.8	80.6	42.6
07:00 PM - 08:00 PM	44.8	68.8	41.3
08:00 PM - 09:00 PM	48.8	73.1	42.9
09:00 PM - 10:00 PM	69.7	98.2	47.0
10:00 PM - 11:00 PM	60.6	91.4	50.2
11:00 PM - 12:00 AM	55.2	74.0	51.4
12:00 AM - 01:00 AM	51.6	73.0	48.1
01:00 AM - 02:00 AM	49.8	70.5	46.1
02:00 AM - 03:00 AM	47.3	62.7	46.1
03:00 AM - 04:00 AM	48.1	56.6	46.9
04:00 AM - 05:00 AM	47.8	64.2	45.9
05:00 AM - 06:00 AM	51.7	69.7	48.0
06:00 AM - 07:00 AM	57.8	88.2	46.7
07:00 AM - 08:00 AM	51.7	70.3	45.6
08:00 AM - 09:00 AM	51.4	81.2	44.6
09:00 AM - 10:00 AM	51.0	69.9	43.5
10:00 AM - 11:00 AM	56.6	94.5	43.5
11:00 AM - 12:00 PM	52.1	88.9	43.5
12:00 PM - 01:00 PM	51.2	88.2	43.7

Leq Average 24 hrs. (dB(A)) 58.3
Lmax (dB(A)) 98.2
L90 (dB(A)) 43.7
L10 (dB(A)) 62.2
Standard (dB(A)) 70
Reference Method : Based on ISO (1996)/1
Standard : 1. วิธีการวัดและประเมินค่าเสียงตามข้อกำหนดของมาตรฐานการควบคุมเสียงรบกวน พ.ร.บ. 2548
2. วิธีการวัดและประเมินค่าเสียงตามข้อกำหนดของมาตรฐานการควบคุมเสียงรบกวน พ.ร.บ. 2548

Technical Manager

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Report to : Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakom Nangphet, Muang
Chachoengsao, Chachoengsao Thailand
24000
Attn : Chokpisan Tongdeeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696311-1

Page 1 of 1

Reference Number	Noise (Leq 24 hrs.)	Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
Parameter	พื้นที่วัด (GPS 47P 0721473, 1518765)				
Location	พื้นที่วัด (GPS 47P 0721473, 1518765)				
Measurement Date	Jun 03, 2020 - Jun 04, 2020				
Measurement By	Audit Aonimsin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.				
Sound Level Meter	Serial No. 572457				

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	65.6	81.8	47.9
02:00 PM - 03:00 PM	52.6	74.9	45.9
03:00 PM - 04:00 PM	54.2	80.4	44.4
04:00 PM - 05:00 PM	51.2	79.3	44.2
05:00 PM - 06:00 PM	53.0	77.3	44.2
06:00 PM - 07:00 PM	53.5	80.7	43.3
07:00 PM - 08:00 PM	48.5	73.9	42.9
08:00 PM - 09:00 PM	47.2	69.0	44.9
09:00 PM - 10:00 PM	51.8	68.1	47.8
10:00 PM - 11:00 PM	53.1	58.4	51.3
11:00 PM - 12:00 AM	48.6	70.9	46.3
12:00 AM - 01:00 AM	50.2	69.4	46.2
01:00 AM - 02:00 AM	51.0	70.7	48.2
02:00 AM - 03:00 AM	46.7	55.1	44.6
03:00 AM - 04:00 AM	49.2	62.3	45.6
04:00 AM - 05:00 AM	48.8	61.7	43.6
05:00 AM - 06:00 AM	54.2	78.3	46.8
06:00 AM - 07:00 AM	54.2	80.3	47.6
07:00 AM - 08:00 AM	53.5	72.3	47.3
08:00 AM - 09:00 AM	52.1	71.8	45.3
09:00 AM - 10:00 AM	51.4	74.7	43.5
10:00 AM - 11:00 AM	51.6	75.5	43.3
11:00 AM - 12:00 PM	52.1	76.9	43.7
12:00 PM - 01:00 PM	57.8	88.9	42.5
Leq Average 24 hrs. (dB(A))	55.0	88.9	45.3
Lmax (dB(A))			
L90 (dB(A))			
Ldn (dB(A))	58.9		
Standard (dB(A))	70	115	
Reference Method	Based on ISO (1996)/1		
Standard	: 1. ใช้มาตรฐานวิธีมาตรฐานของกรมอนามัย ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงในชุมชน 2. ใช้มาตรฐานวิธีมาตรฐานของกรมอนามัย ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงในชุมชน		

Technical Manager

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11729-2/1 DMUL



Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakom Nangphet, Muang
Chachoengsao, Chachoengsao Thailand
24000
Attn : Chokpisan Tongdeeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696312-1

Page 1 of 1

Reference Number	Noise (Leq 24 hrs.)	Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
Parameter	พื้นที่วัด (GPS 47P 0721473, 1518765)				
Location	พื้นที่วัด (GPS 47P 0721473, 1518765)				
Measurement Date	Jun 04, 2020 - Jun 05, 2020				
Measurement By	Audit Aonimsin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.				
Sound Level Meter	Serial No. 572457				

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	56.7	84.8	42.8
02:00 PM - 03:00 PM	50.9	85.3	43.3
03:00 PM - 04:00 PM	48.7	72.3	42.6
04:00 PM - 05:00 PM	51.8	81.2	42.0
05:00 PM - 06:00 PM	49.2	73.2	42.1
06:00 PM - 07:00 PM	52.0	76.3	41.9
07:00 PM - 08:00 PM	51.4	73.1	44.4
08:00 PM - 09:00 PM	51.1	68.9	49.3
09:00 PM - 10:00 PM	51.7	68.6	49.4
10:00 PM - 11:00 PM	50.9	76.3	49.2
11:00 PM - 12:00 AM	50.8	73.0	48.7
12:00 AM - 01:00 AM	52.9	73.3	48.9
01:00 AM - 02:00 AM	50.2	62.1	46.6
02:00 AM - 03:00 AM	48.9	61.0	47.5
03:00 AM - 04:00 AM	48.1	66.5	46.6
04:00 AM - 05:00 AM	49.3	73.3	45.0
05:00 AM - 06:00 AM	51.6	77.6	46.0
06:00 AM - 07:00 AM	54.3	78.0	46.0
07:00 AM - 08:00 AM	51.7	70.8	44.2
08:00 AM - 09:00 AM	50.5	72.0	43.4
09:00 AM - 10:00 AM	52.3	73.6	42.8
10:00 AM - 11:00 AM	50.7	76.0	42.6
11:00 AM - 12:00 PM	51.0	71.5	43.1
12:00 PM - 01:00 PM	51.2	73.9	42.3
Leq Average 24 hrs. (dB(A))	51.6	85.3	44.2
Lmax (dB(A))			
L90 (dB(A))			
Ldn (dB(A))	57.7	115	
Standard (dB(A))	70		
Reference Method	Based on ISO (1996)/1		
Standard	: 1. ใช้มาตรฐานวิธีมาตรฐานของกรมอนามัย ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงในชุมชน 2. ใช้มาตรฐานวิธีมาตรฐานของกรมอนามัย ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงในชุมชน		

Technical Manager

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Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.

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24000
Attn : Chokpisan Tongdeengeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnnk@gulf.co.th

Project Name : Monitoring EIA

Location : GNNK
P/O :
Receipt No :

Lot ID: 2022931

Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696213-1

Page 1 of 1

Reference Number	2022931-15
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่อาคาร (GPS 47P 0719792, 1516992)
Measurement Date	May 29, 2020 - May 30, 2020
Measurement By	Audit Aconsim Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 572609

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	58.0	83.9	43.1
12:00 PM - 01:00 PM	57.3	80.9	43.7
01:00 PM - 02:00 PM	55.4	83.1	44.1
02:00 PM - 03:00 PM	56.6	78.5	45.3
03:00 PM - 04:00 PM	81.8	85.9	45.9
04:00 PM - 05:00 PM	57.9	89.0	46.8
05:00 PM - 06:00 PM	58.1	84.0	47.2
06:00 PM - 07:00 PM	58.3	85.5	45.2
07:00 PM - 08:00 PM	56.1	84.1	43.2
08:00 PM - 09:00 PM	50.0	76.0	42.8
09:00 PM - 10:00 PM	53.4	84.3	42.9
10:00 PM - 11:00 PM	48.1	67.1	42.4
11:00 PM - 12:00 AM	44.8	64.1	42.4
12:00 AM - 01:00 AM	48.5	63.6	42.7
01:00 AM - 02:00 AM	44.6	66.9	42.4
02:00 AM - 03:00 AM	44.5	64.7	42.7
03:00 AM - 04:00 AM	45.9	66.2	43.1
04:00 AM - 05:00 AM	46.3	69.0	43.6
05:00 AM - 06:00 AM	55.5	80.6	47.6
06:00 AM - 07:00 AM	59.4	83.6	48.5
07:00 AM - 08:00 AM	56.9	82.2	46.4
08:00 AM - 09:00 AM	55.5	81.5	45.1
09:00 AM - 10:00 AM	55.0	75.2	45.2
10:00 AM - 11:00 AM	54.4	74.6	44.4

Leq Average 24 hrs. (dB(A))	55.4
Lmax (dB(A))	89.0
L90 (dB(A))	43.7
Ldn (dB(A))	
Standard (dB(A))	115
Reference Method	: Based on ISO (1996)/1
Standard	

: 1. ข้อมูลผลการตรวจวัดที่ได้มาจากการสุ่มตัวอย่างตามข้อกำหนดใน ม.ร.ว. 2548
2. ข้อมูลผลการตรวจวัดที่ได้มาจากการสุ่มตัวอย่างตามข้อกำหนดใน ม.ร.ว. 2548

Technical Manager

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Attn : Chokpisan Tongdeengeng
Phone : 0-3851-3911 - 13
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Email : Chokpisan.gnnk@gulf.co.th

Project Name : Monitoring EIA

Location : GNNK
P/O :
Receipt No :

Lot ID: 2022931

Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696214-1

Page 1 of 1

Reference Number	2022931-16
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่อาคาร (GPS 47P 0719792, 1516992)
Measurement Date	May 30, 2020 - May 31, 2020
Measurement By	Audit Aconsim Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 572609

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	54.9	80.4	44.5
12:00 PM - 01:00 PM	53.6	80.0	43.5
01:00 PM - 02:00 PM	57.9	86.6	44.1
02:00 PM - 03:00 PM	56.4	75.8	44.3
03:00 PM - 04:00 PM	53.6	79.7	43.8
04:00 PM - 05:00 PM	58.1	83.7	45.3
05:00 PM - 06:00 PM	57.4	85.0	45.2
06:00 PM - 07:00 PM	58.6	84.4	45.3
07:00 PM - 08:00 PM	52.3	74.8	44.3
08:00 PM - 09:00 PM	52.2	75.5	43.9
09:00 PM - 10:00 PM	49.6	74.2	44.3
10:00 PM - 11:00 PM	50.2	76.3	44.3
11:00 PM - 12:00 AM	48.5	70.7	45.9
12:00 AM - 01:00 AM	45.5	62.0	43.3
01:00 AM - 02:00 AM	45.5	63.9	43.9
02:00 AM - 03:00 AM	46.1	69.0	43.7
03:00 AM - 04:00 AM	46.8	72.9	44.0
04:00 AM - 05:00 AM	50.4	75.3	43.8
05:00 AM - 06:00 AM	53.6	75.0	46.8
06:00 AM - 07:00 AM	53.4	70.0	45.4
07:00 AM - 08:00 AM	56.1	82.3	45.2
08:00 AM - 09:00 AM	61.0	80.0	45.3
09:00 AM - 10:00 AM	53.2	79.9	44.8
10:00 AM - 11:00 AM	55.1	76.1	44.4

Leq Average 24 hrs. (dB(A))	55.0
Lmax (dB(A))	86.6
L90 (dB(A))	44.3
Ldn (dB(A))	
Standard (dB(A))	115
Reference Method	: Based on ISO (1996)/1
Standard	

: 1. ข้อมูลผลการตรวจวัดที่ได้มาจากการสุ่มตัวอย่างตามข้อกำหนดใน ม.ร.ว. 2548
2. ข้อมูลผลการตรวจวัดที่ได้มาจากการสุ่มตัวอย่างตามข้อกำหนดใน ม.ร.ว. 2548

Technical Manager

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Attn: Chokpisan Tongdeppang
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696315-1

Page 1 of 1

Reference Number	Noise (Leq 24 hrs.)	Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
Parameter	Noise (Leq 24 hrs.)				
Location	พื้นที่วัด (GPS 47P 0719792, 1516992)				
Measurement Date	May 31, 2020 - Jun 01, 2020				
Measurement By	Audit Aconsim Personnel of ALS Laboratory Group (Thailand) Co., Ltd.				
Sound Level Meter	Serial No. 572609				

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	54.7	79.6	43.8
12:00 PM - 01:00 PM	54.1	74.5	43.9
01:00 PM - 02:00 PM	53.5	81.9	43.7
02:00 PM - 03:00 PM	54.2	79.7	43.6
03:00 PM - 04:00 PM	56.4	77.4	45.1
04:00 PM - 05:00 PM	56.4	79.6	46.0
05:00 PM - 06:00 PM	57.1	83.9	45.7
06:00 PM - 07:00 PM	53.1	73.2	44.2
07:00 PM - 08:00 PM	51.7	72.2	43.7
08:00 PM - 09:00 PM	51.7	73.0	43.8
09:00 PM - 10:00 PM	49.9	74.7	44.0
10:00 PM - 11:00 PM	52.0	73.9	47.5
11:00 PM - 12:00 AM	46.7	66.1	44.0
12:00 AM - 01:00 AM	47.7	74.3	43.3
01:00 AM - 02:00 AM	43.9	60.7	43.1
02:00 AM - 03:00 AM	46.7	71.9	42.8
03:00 AM - 04:00 AM	48.2	69.3	43.3
04:00 AM - 05:00 AM	50.1	77.7	43.3
05:00 AM - 06:00 AM	72.8	106.6	47.0
06:00 AM - 07:00 AM	58.2	47.1	47.1
07:00 AM - 08:00 AM	56.2	79.1	46.5
08:00 AM - 09:00 AM	54.3	81.8	44.2
09:00 AM - 10:00 AM	56.2	77.8	45.9
10:00 AM - 11:00 AM	56.1	79.7	45.2

Leq Average 24 hrs. (dB(A))	60.1
Lmax (dB(A))	106.6
L90 (dB(A))	44.0
Ldn (dB(A))	69.4
Standard (dB(A))	70
Reference Method	: Based on ISO (1996)/1
Standard	: 1. วิธีการตรวจวัดและประเมินค่าเสียงตามข้อกำหนด 15 (พ.ร.บ. 2540) ซึ่งกำหนดมาตรฐานระดับเสียงโดยทั่วไป 2. วิธีการตรวจวัดและประเมินค่าเสียงตามข้อกำหนด และระดับเสียงที่ได้จากการประเมินค่าเสียงตาม พ.ร.บ. 2548

Technical Manager

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Chachoengsao, Chachoengsao Thailand
24000
Attn: Chokpisan Tongdeppang
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696316-1

Page 1 of 1

Reference Number	7022931-18
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่วัด (GPS 47P 0719792, 1516992)
Measurement Date	Jun 01, 2020 - Jun 02, 2020
Measurement By	Audit Aconsim Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 572609

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	53.9	80.8	44.0
12:00 PM - 01:00 PM	57.8	87.5	44.0
01:00 PM - 02:00 PM	57.4	79.4	44.3
02:00 PM - 03:00 PM	53.1	71.7	44.7
03:00 PM - 04:00 PM	73.0	110.1	44.6
04:00 PM - 05:00 PM	57.7	79.3	45.7
05:00 PM - 06:00 PM	56.6	82.5	45.5
06:00 PM - 07:00 PM	56.0	75.7	44.1
07:00 PM - 08:00 PM	52.9	82.8	42.9
08:00 PM - 09:00 PM	51.8	74.9	42.9
09:00 PM - 10:00 PM	50.3	78.6	43.8
10:00 PM - 11:00 PM	47.3	67.1	43.1
11:00 PM - 12:00 AM	45.5	69.7	43.1
12:00 AM - 01:00 AM	46.2	71.9	42.8
01:00 AM - 02:00 AM	43.2	58.3	42.7
02:00 AM - 03:00 AM	45.6	70.7	43.3
03:00 AM - 04:00 AM	48.1	66.8	42.9
04:00 AM - 05:00 AM	50.0	71.4	42.9
05:00 AM - 06:00 AM	58.2	77.6	46.5
06:00 AM - 07:00 AM	58.8	80.0	45.8
07:00 AM - 08:00 AM	57.2	83.8	44.3
08:00 AM - 09:00 AM	53.8	72.9	44.7
09:00 AM - 10:00 AM	55.0	84.0	44.7
10:00 AM - 11:00 AM	59.0	82.5	44.8

Leq Average 24 hrs. (dB(A))	60.6
Lmax (dB(A))	110.1
L90 (dB(A))	44.0
Ldn (dB(A))	62.6
Standard (dB(A))	70
Reference Method	: Based on ISO (1996)/1
Standard	: 1. วิธีการตรวจวัดและประเมินค่าเสียงตามข้อกำหนด 15 (พ.ร.บ. 2540) ซึ่งกำหนดมาตรฐานระดับเสียงโดยทั่วไป 2. วิธีการตรวจวัดและประเมินค่าเสียงตามข้อกำหนด และระดับเสียงที่ได้จากการประเมินค่าเสียงตาม พ.ร.บ. 2548

Technical Manager

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1172-32/ EMAIL



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99 Moo 17, Khong Nakorn Nanglat, Muang
Chachengao, Chachengao Thailand
24000
Attn : Chokplean Tongdeeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokplean.gnkk@gulf.co.th

Project Name : Monitoring EIA

Location : GNKK
P/O :
Receipt No :

Lot ID: 2022931

Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696317-1

Page 1 of 1

Reference Number	2022931-19
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่อาคาร (GPS 47P 0719792, 1516992)
Measurement Date	Jun 02, 2020 - Jun 03, 2020
Measurement By	Audit Aonissin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 572609

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	56.8	61.4	45.2
12:00 PM - 01:00 PM	58.8	60.5	44.7
01:00 PM - 02:00 PM	57.3	76.9	45.0
02:00 PM - 03:00 PM	56.5	78.6	43.7
03:00 PM - 04:00 PM	55.7	80.0	44.0
04:00 PM - 05:00 PM	55.8	77.1	44.4
05:00 PM - 06:00 PM	56.7	77.8	45.5
06:00 PM - 07:00 PM	56.0	77.9	45.3
07:00 PM - 08:00 PM	54.5	75.1	44.5
08:00 PM - 09:00 PM	67.1	77.0	46.3
09:00 PM - 10:00 PM	68.5	95.8	51.8
10:00 PM - 11:00 PM	55.0	72.8	49.5
11:00 PM - 12:00 AM	53.0	70.3	46.9
12:00 AM - 01:00 AM	49.7	65.3	47.5
01:00 AM - 02:00 AM	50.3	68.7	51.9
02:00 AM - 03:00 AM	53.1	67.6	52.3
03:00 AM - 04:00 AM	53.2	70.3	52.1
04:00 AM - 05:00 AM	53.4	84.1	47.8
05:00 AM - 06:00 AM	53.6	79.2	47.1
06:00 AM - 07:00 AM	55.7	86.3	46.0
07:00 AM - 08:00 AM	57.2	86.2	44.6
08:00 AM - 09:00 AM	54.0	84.2	44.0
09:00 AM - 10:00 AM	54.8	84.2	44.0
10:00 AM - 11:00 AM	56.4	90.4	44.8

Leq Average 24 hrs. (dB(A))	59.2
Lmax (dB(A))	95.8
L90 (dB(A))	45.5
L50 (dB(A))	
L5 (dB(A))	

Standard (dB(A))	115
Reference Method	: Based on ISO (1996)/1
Standard	

: 1. ปริมาณการจราจรที่ผ่านจุดวัดเสียงเฉลี่ยต่อวัน 15 (พ.ศ. 2540) (ปริมาณการจราจรที่ผ่านจุดวัดเสียง)
2. ปริมาณการจราจรที่ผ่านจุดวัดเสียงเฉลี่ยต่อวัน 15 (พ.ศ. 2540) (ปริมาณการจราจรที่ผ่านจุดวัดเสียง)

Technical Manager

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1175-22/ ENAL



Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.

99 Moo 17, Khong Nakorn Nanglat, Muang
Chachengao, Chachengao Thailand
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Attn : Chokplean Tongdeeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokplean.gnkk@gulf.co.th

Project Name : Monitoring EIA

Location : GNKK
P/O :
Receipt No :

Lot ID: 2022931

Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696318-1

Page 1 of 1

Reference Number	2022931-20
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่อาคาร (GPS 47P 0719792, 1516992)
Measurement Date	Jun 03, 2020 - Jun 04, 2020
Measurement By	Audit Aonissin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 572609

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	53.6	74.9	44.2
12:00 PM - 01:00 PM	57.3	77.3	45.0
01:00 PM - 02:00 PM	56.8	82.4	47.7
02:00 PM - 03:00 PM	57.4	81.5	46.4
03:00 PM - 04:00 PM	55.9	79.5	45.2
04:00 PM - 05:00 PM	54.5	74.2	45.1
05:00 PM - 06:00 PM	55.0	76.7	45.4
06:00 PM - 07:00 PM	56.5	82.0	44.9
07:00 PM - 08:00 PM	54.8	80.0	45.4
08:00 PM - 09:00 PM	53.8	84.5	47.3
09:00 PM - 10:00 PM	51.0	73.8	47.0
10:00 PM - 11:00 PM	49.4	71.2	47.0
11:00 PM - 12:00 AM	50.9	76.9	47.1
12:00 AM - 01:00 AM	48.0	63.2	47.0
01:00 AM - 02:00 AM	48.1	63.0	47.0
02:00 AM - 03:00 AM	48.5	66.1	46.9
03:00 AM - 04:00 AM	48.8	70.3	46.8
04:00 AM - 05:00 AM	49.6	70.1	45.4
05:00 AM - 06:00 AM	53.9	72.0	45.9
06:00 AM - 07:00 AM	58.0	80.7	49.1
07:00 AM - 08:00 AM	59.1	85.9	47.3
08:00 AM - 09:00 AM	55.2	80.6	44.7
09:00 AM - 10:00 AM	54.2	78.2	44.4
10:00 AM - 11:00 AM	56.6	85.3	45.8

Leq Average 24 hrs. (dB(A))	54.8
Lmax (dB(A))	85.9
L90 (dB(A))	45.9
L50 (dB(A))	
L5 (dB(A))	

Standard (dB(A))	115
Reference Method	: Based on ISO (1996)/1
Standard	

: 1. ปริมาณการจราจรที่ผ่านจุดวัดเสียงเฉลี่ยต่อวัน 15 (พ.ศ. 2540) (ปริมาณการจราจรที่ผ่านจุดวัดเสียง)
2. ปริมาณการจราจรที่ผ่านจุดวัดเสียงเฉลี่ยต่อวัน 15 (พ.ศ. 2540) (ปริมาณการจราจรที่ผ่านจุดวัดเสียง)

Technical Manager

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1175-22/ ENAL



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Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696319-1

Page 1 of 1

Reference Number	2022931-21
Parameter	Noise (Leq 24 hrs.)
Location	ชุมชนบ้าน (GPS 47P 0719792, 1516992)
Measurement Date	Jun 04, 2020 - Jun 05, 2020
Measurement By	Audit Aconsim Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 572609

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	54.5	77.0	43.2
12:00 PM - 01:00 PM	55.8	79.4	43.9
01:00 PM - 02:00 PM	57.4	89.5	44.0
02:00 PM - 03:00 PM	58.8	87.0	43.5
03:00 PM - 04:00 PM	60.5	88.4	45.0
04:00 PM - 05:00 PM	60.8	91.6	43.8
05:00 PM - 06:00 PM	61.6	91.3	45.6
06:00 PM - 07:00 PM	58.0	85.5	46.0
07:00 PM - 08:00 PM	56.7	82.2	45.0
08:00 PM - 09:00 PM	49.0	71.5	44.4
09:00 PM - 10:00 PM	51.7	78.1	44.9
10:00 PM - 11:00 PM	48.7	69.9	44.6
11:00 PM - 12:00 AM	46.6	70.8	43.7
12:00 AM - 01:00 AM	44.2	63.9	42.9
01:00 AM - 02:00 AM	45.7	68.3	43.5
02:00 AM - 03:00 AM	44.6	66.8	42.6
03:00 AM - 04:00 AM	44.7	63.7	42.6
04:00 AM - 05:00 AM	48.5	67.6	43.0
05:00 AM - 06:00 AM	53.3	73.7	44.3
06:00 AM - 07:00 AM	57.7	80.6	47.5
07:00 AM - 08:00 AM	58.3	83.4	45.6
08:00 AM - 09:00 AM	60.4	84.3	44.6
09:00 AM - 10:00 AM	59.7	91.0	44.6
10:00 AM - 11:00 AM	60.4	89.8	45.2

Leq Average 24 hrs. (dB(A))	57.0
Lmax (dB(A))	91.6
L90 (dB(A))	44.3
Ldn (dB(A))	59.6
Standard (dB(A))	70
Reference Method	: Based on ISO (1996)/1
Standard	: 1. ปริมาณการจราจรในเขตชุมชนเมือง 25-40 คัน/ชั่วโมง 2. ปริมาณการจราจรในเขตเมือง 40-60 คัน/ชั่วโมง

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Attn : Chokpisan Tongdeeng
Phone : 0-3851-3911 - 13
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Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696320-1

Page 1 of 1

Reference Number	2022931-22
Parameter	Noise (Leq 24 hrs.)
Location	ชุมชนบ้าน (GPS 47P 0714361, 1518864)
Measurement Date	May 29, 2020 - May 30, 2020
Measurement By	Audit Aconsim Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 584982

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	46.4	73.2	36.6
11:00 AM - 12:00 PM	45.7	66.6	38.1
12:00 PM - 01:00 PM	46.5	70.7	38.5
01:00 PM - 02:00 PM	47.6	67.5	40.6
02:00 PM - 03:00 PM	49.7	71.9	42.7
03:00 PM - 04:00 PM	51.4	65.9	46.3
04:00 PM - 05:00 PM	50.8	78.7	44.7
05:00 PM - 06:00 PM	47.4	75.7	41.6
06:00 PM - 07:00 PM	46.1	63.3	40.0
07:00 PM - 08:00 PM	40.9	54.2	38.9
08:00 PM - 09:00 PM	41.4	57.4	38.1
09:00 PM - 10:00 PM	46.8	58.5	41.5
10:00 PM - 11:00 PM	43.7	53.3	40.7
11:00 PM - 12:00 AM	43.2	54.0	38.5
12:00 AM - 01:00 AM	48.9	58.8	40.5
01:00 AM - 02:00 AM	43.4	69.4	36.2
02:00 AM - 03:00 AM	40.3	55.8	36.9
03:00 AM - 04:00 AM	45.8	69.5	37.4
04:00 AM - 05:00 AM	55.1	76.7	42.0
05:00 AM - 06:00 AM	50.4	69.3	42.6
06:00 AM - 07:00 AM	51.6	83.0	40.9
07:00 AM - 08:00 AM	50.0	84.6	40.4
08:00 AM - 09:00 AM	46.7	67.6	40.1
09:00 AM - 10:00 AM	46.9	67.0	40.9

Leq Average 24 hrs. (dB(A))	48.4
Lmax (dB(A))	84.6
L90 (dB(A))	40.4
Ldn (dB(A))	55.5
Standard (dB(A))	70
Reference Method	: Based on ISO (1996)/1
Standard	: 1. ปริมาณการจราจรในเขตชุมชนเมือง 25-40 คัน/ชั่วโมง 2. ปริมาณการจราจรในเขตเมือง 40-60 คัน/ชั่วโมง

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Phone : 0-3851-3911 - 13
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Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696321-1

Page 1 of 1

Reference Number	2022931-23
Parameter	Noise (Leq 24 hrs.)
Location	Thunruaylun (GPS 47P 0714361, 1518864)
Measurement Date	May 30, 2020 - May 31, 2020
Measurement By	Audit Aonimsin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 584982

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	45.4	67.1	40.7
11:00 AM - 12:00 PM	46.7	69.9	38.4
12:00 PM - 01:00 PM	44.7	72.2	37.3
01:00 PM - 02:00 PM	53.5	73.6	40.9
02:00 PM - 03:00 PM	52.0	69.3	43.5
03:00 PM - 04:00 PM	73.7	111.9	45.0
04:00 PM - 05:00 PM	48.8	71.5	43.8
05:00 PM - 06:00 PM	47.2	69.9	41.0
06:00 PM - 07:00 PM	46.8	64.6	40.3
07:00 PM - 08:00 PM	44.9	59.0	41.4
08:00 PM - 09:00 PM	44.6	60.4	42.2
09:00 PM - 10:00 PM	45.4	59.7	43.3
10:00 PM - 11:00 PM	45.3	54.0	43.1
11:00 PM - 12:00 AM	42.4	55.1	38.2
12:00 AM - 01:00 AM	41.5	59.0	37.8
01:00 AM - 02:00 AM	41.8	62.6	36.6
02:00 AM - 03:00 AM	46.6	56.1	36.4
03:00 AM - 04:00 AM	47.3	56.5	38.7
04:00 AM - 05:00 AM	53.4	79.1	44.0
05:00 AM - 06:00 AM	49.3	77.3	39.4
06:00 AM - 07:00 AM	47.4	69.0	38.9
07:00 AM - 08:00 AM	62.5	99.9	38.5
08:00 AM - 09:00 AM	50.3	77.9	38.1
09:00 AM - 10:00 AM	47.3	71.6	38.2

Leq Average 24 hrs. (dB(A))	60.5
Lmax (dB(A))	111.9
L90 (dB(A))	39.4
L01 (dB(A))	61.2
L05 (dB(A))	70
Standard (dB(A))	115
Reference Method	: Based on ISO (1996)/1
Standard	: 1. ปริมาณการจราจรที่ผ่านจุดวัดเสียงในช่วงเวลา 15 (น.ค. 2540) ซึ่งกำหนดการจราจรที่ผ่านจุดวัดเสียง 2. ปริมาณการจราจรที่ผ่านจุดวัดเสียงในช่วงเวลา 15 (น.ค. 2540) ซึ่งกำหนดการจราจรที่ผ่านจุดวัดเสียง

Technical Manager

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Attn : Chokpisan Tongdeeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696321-1

Page 1 of 1

Reference Number	2022931-24
Parameter	Noise (Leq 24 hrs.)
Location	Thunruaylun (GPS 47P 0714361, 1518864)
Measurement Date	May 31, 2020 - Jun 01, 2020
Measurement By	Audit Aonimsin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 584982

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	46.2	72.0	37.7
11:00 AM - 12:00 PM	46.6	74.1	38.3
12:00 PM - 01:00 PM	43.5	66.1	36.6
01:00 PM - 02:00 PM	48.5	75.2	36.5
02:00 PM - 03:00 PM	44.7	68.8	36.0
03:00 PM - 04:00 PM	50.7	75.2	40.1
04:00 PM - 05:00 PM	48.3	72.2	39.4
05:00 PM - 06:00 PM	47.6	69.4	40.4
06:00 PM - 07:00 PM	46.3	62.1	38.5
07:00 PM - 08:00 PM	43.1	58.2	39.4
08:00 PM - 09:00 PM	45.0	64.8	41.4
09:00 PM - 10:00 PM	47.7	56.8	44.5
10:00 PM - 11:00 PM	48.0	60.1	45.0
11:00 PM - 12:00 AM	44.3	53.1	40.7
12:00 AM - 01:00 AM	43.1	61.1	39.8
01:00 AM - 02:00 AM	45.6	55.2	43.8
02:00 AM - 03:00 AM	46.7	57.1	42.8
03:00 AM - 04:00 AM	56.6	90.7	41.2
04:00 AM - 05:00 AM	53.3	68.0	44.6
05:00 AM - 06:00 AM	52.7	75.2	45.2
06:00 AM - 07:00 AM	52.1	78.0	45.8
07:00 AM - 08:00 AM	48.2	60.1	40.2
08:00 AM - 09:00 AM	46.9	70.0	39.2
09:00 AM - 10:00 AM	51.3	75.4	38.7

Leq Average 24 hrs. (dB(A))	49.4
Lmax (dB(A))	90.7
L90 (dB(A))	40.1
L01 (dB(A))	57.3
L05 (dB(A))	70
Standard (dB(A))	115
Reference Method	: Based on ISO (1996)/1
Standard	: 1. ปริมาณการจราจรที่ผ่านจุดวัดเสียงในช่วงเวลา 15 (น.ค. 2540) ซึ่งกำหนดการจราจรที่ผ่านจุดวัดเสียง 2. ปริมาณการจราจรที่ผ่านจุดวัดเสียงในช่วงเวลา 15 (น.ค. 2540) ซึ่งกำหนดการจราจรที่ผ่านจุดวัดเสียง

Technical Manager

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11782-2/1 EMAIL



Analysis / Test Report

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24000
Attn: Chokpisan Tongdeapeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696324-1

Page 1 of 1

Reference Number	Noise (Leq 24 hrs.)
2022931-25	11.8864
Location	พื้นที่วัดเสียง (GPS 47° 07' 43.61", 15° 18' 6.64")
Measurement Date	Jun 01, 2020 - Jun 02, 2020
Measurement By	Audit Aonissin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 584982

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	54.5	74.9	43.3
11:00 AM - 12:00 PM	48.3	69.4	43.1
12:00 PM - 01:00 PM	53.8	73.9	43.5
01:00 PM - 02:00 PM	47.2	66.7	43.7
02:00 PM - 03:00 PM	48.7	75.0	43.3
03:00 PM - 04:00 PM	47.6	68.0	43.2
04:00 PM - 05:00 PM	48.8	70.3	43.7
05:00 PM - 06:00 PM	48.3	69.9	43.1
06:00 PM - 07:00 PM	46.1	67.0	42.6
07:00 PM - 08:00 PM	48.0	63.3	44.9
08:00 PM - 09:00 PM	48.5	59.4	44.9
09:00 PM - 10:00 PM	48.2	75.7	45.5
10:00 PM - 11:00 PM	46.3	54.0	47.2
11:00 PM - 12:00 AM	47.7	58.1	46.2
12:00 AM - 01:00 AM	48.6	75.7	44.4
01:00 AM - 02:00 AM	44.3	63.7	43.0
02:00 AM - 03:00 AM	45.7	54.7	44.6
03:00 AM - 04:00 AM	45.8	58.7	43.4
04:00 AM - 05:00 AM	61.7	78.7	44.2
05:00 AM - 06:00 AM	63.4	77.4	48.7
06:00 AM - 07:00 AM	52.1	76.1	46.0
07:00 AM - 08:00 AM	54.8	77.5	44.8
08:00 AM - 09:00 AM	52.2	76.5	44.3
09:00 AM - 10:00 AM	49.9	69.3	43.6

Leq Average 24 hrs. (dB(A))	53.9
Lmax (dB(A))	78.7
L90 (dB(A))	43.7
L01 (dB(A))	62.5
Standard (dB(A))	70
Reference Method	: Based on ISO (1996)/1
Standard	: 1. ปริมาณการจราจรในบริเวณพื้นที่วัดเสียง 15 (พ.ศ. 2540) ที่กำหนดการจราจรในบริเวณพื้นที่วัดเสียง 2. ปริมาณการจราจรในบริเวณพื้นที่วัดเสียง 15 (พ.ศ. 2540) ที่กำหนดการจราจรในบริเวณพื้นที่วัดเสียง

Technical Manager

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11732-22/ENWL



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Chachoengsao, Chachoengsao Thailand
24000
Attn: Chokpisan Tongdeapeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696324-1

Page 1 of 1

Reference Number	Noise (Leq 24 hrs.)
2022931-26	11.8864
Location	พื้นที่วัดเสียง (GPS 47° 07' 43.61", 15° 18' 6.64")
Measurement Date	Jun 02, 2020 - Jun 03, 2020
Measurement By	Audit Aonissin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 584982

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	50.9	77.9	44.1
11:00 AM - 12:00 PM	51.9	86.2	43.9
12:00 PM - 01:00 PM	49.9	73.2	43.8
01:00 PM - 02:00 PM	48.4	71.0	43.1
02:00 PM - 03:00 PM	52.8	87.1	43.4
03:00 PM - 04:00 PM	48.1	70.5	43.7
04:00 PM - 05:00 PM	49.6	73.1	43.9
05:00 PM - 06:00 PM	48.8	69.1	44.0
06:00 PM - 07:00 PM	48.1	72.3	43.2
07:00 PM - 08:00 PM	48.0	63.0	45.3
08:00 PM - 09:00 PM	76.8	88.4	47.5
09:00 PM - 10:00 PM	68.3	103.0	50.1
10:00 PM - 11:00 PM	52.2	66.1	50.6
11:00 PM - 12:00 AM	49.1	68.9	48.1
12:00 AM - 01:00 AM	48.0	55.6	46.4
01:00 AM - 02:00 AM	48.6	54.2	47.3
02:00 AM - 03:00 AM	50.9	65.4	46.7
03:00 AM - 04:00 AM	54.2	70.5	49.8
04:00 AM - 05:00 AM	55.9	74.3	51.8
05:00 AM - 06:00 AM	54.6	75.2	48.0
06:00 AM - 07:00 AM	52.8	74.6	45.1
07:00 AM - 08:00 AM	51.4	69.8	44.3
08:00 AM - 09:00 AM	48.7	69.8	43.9

Leq Average 24 hrs. (dB(A))	63.8
Lmax (dB(A))	103.0
L90 (dB(A))	45.1
L01 (dB(A))	64.8
Standard (dB(A))	115
Reference Method	: Based on ISO (1996)/1
Standard	: 1. ปริมาณการจราจรในบริเวณพื้นที่วัดเสียง 15 (พ.ศ. 2540) ที่กำหนดการจราจรในบริเวณพื้นที่วัดเสียง 2. ปริมาณการจราจรในบริเวณพื้นที่วัดเสียง 15 (พ.ศ. 2540) ที่กำหนดการจราจรในบริเวณพื้นที่วัดเสียง

Technical Manager

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Analysis / Test Report

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Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Attn : Chokpisan Tongdeeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnkk@gulf.co.th

Lot ID: 2022931

Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696325-1

Page 1 of 1

Reference Number	2022931-27
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณที่ดิน (GPS 472 0714361, 1518864)
Measurement Date	Jun 03, 2020 - Jun 04, 2020
Measurement By	Audit Aonimsin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 584982

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	53.8	78.4	43.7
11:00 AM - 12:00 PM	53.7	75.5	43.8
12:00 PM - 01:00 PM	71.8	105.0	44.9
01:00 PM - 02:00 PM	62.8	94.0	47.0
02:00 PM - 03:00 PM	51.1	72.5	45.4
03:00 PM - 04:00 PM	50.5	72.2	44.5
04:00 PM - 05:00 PM	50.7	71.3	45.0
05:00 PM - 06:00 PM	51.0	79.0	44.8
06:00 PM - 07:00 PM	51.6	71.7	46.6
07:00 PM - 08:00 PM	54.5	70.6	45.3
08:00 PM - 09:00 PM	58.5	71.9	57.0
09:00 PM - 10:00 PM	53.0	62.4	53.7
10:00 PM - 11:00 PM	54.2	70.1	50.8
11:00 PM - 12:00 AM	51.5	58.6	45.9
12:00 AM - 01:00 AM	52.2	64.2	45.2
01:00 AM - 02:00 AM	53.7	59.4	45.3
02:00 AM - 03:00 AM	51.4	60.3	45.6
03:00 AM - 04:00 AM	47.8	56.9	45.5
04:00 AM - 05:00 AM	49.1	70.5	45.2
05:00 AM - 06:00 AM	54.6	72.4	47.1
06:00 AM - 07:00 AM	51.4	70.8	45.0
07:00 AM - 08:00 AM	51.4	70.8	44.6
08:00 AM - 09:00 AM	52.9	75.3	44.8
09:00 AM - 10:00 AM	51.1	73.4	44.3

Leq Average 24 hrs. (dB(A))	59.6
Lmax (dB(A))	105.0
L90 (dB(A))	46.2
Ldn (dB(A))	
Standard (dB(A))	115
Reference Method	: Based on ISO (1995)/1
Standard	

: 1. ใช้เครื่องมือวัดระดับเสียงที่ผ่านการสอบเทียบจากกรมมาตรฐานแห่งชาติ (NMI) หรือเทียบเท่า
2. ใช้เครื่องมือวัดระดับเสียงที่ผ่านการสอบเทียบจากกรมมาตรฐานแห่งชาติ (NMI) หรือเทียบเท่า

Technical Manager

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Project Name : Monitoring EIA
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P/O :
Receipt No :
Attn : Chokpisan Tongdeeng
Phone : 0-3851-3911 - 13
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Email : Chokpisan.gnkk@gulf.co.th

Lot ID: 2022931

Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696326-1

Page 1 of 1

Reference Number	2022931-28
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณที่ดิน (GPS 472 0714361, 1518864)
Measurement Date	Jun 04, 2020 - Jun 05, 2020
Measurement By	Audit Aonimsin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 584982

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	49.1	67.9	43.4
11:00 AM - 12:00 PM	48.7	71.4	43.2
12:00 PM - 01:00 PM	47.7	68.3	43.1
01:00 PM - 02:00 PM	48.2	71.0	44.3
02:00 PM - 03:00 PM	50.1	70.6	44.8
03:00 PM - 04:00 PM	49.5	76.3	45.5
04:00 PM - 05:00 PM	51.4	75.8	44.0
05:00 PM - 06:00 PM	51.0	73.9	47.3
06:00 PM - 07:00 PM	47.8	67.4	43.3
07:00 PM - 08:00 PM	54.2	60.2	49.5
08:00 PM - 09:00 PM	54.4	70.3	50.0
09:00 PM - 10:00 PM	52.5	66.3	47.6
10:00 PM - 11:00 PM	49.2	58.1	45.3
11:00 PM - 12:00 AM	46.4	55.1	44.3
12:00 AM - 01:00 AM	47.0	60.2	44.0
01:00 AM - 02:00 AM	46.6	60.1	44.5
02:00 AM - 03:00 AM	45.9	66.1	44.8
03:00 AM - 04:00 AM	46.6	51.9	44.8
04:00 AM - 05:00 AM	49.9	73.2	43.8
05:00 AM - 06:00 AM	49.6	73.1	43.9
06:00 AM - 07:00 AM	52.2	66.1	50.6
07:00 AM - 08:00 AM	54.6	74.3	48.0
08:00 AM - 09:00 AM	53.7	75.5	43.8
09:00 AM - 10:00 AM	54.5	70.6	45.3

Leq Average 24 hrs. (dB(A))	50.9
Lmax (dB(A))	76.3
L90 (dB(A))	44.5
Ldn (dB(A))	
Standard (dB(A))	115
Reference Method	: Based on ISO (1995)/1
Standard	

: 1. ใช้เครื่องมือวัดระดับเสียงที่ผ่านการสอบเทียบจากกรมมาตรฐานแห่งชาติ (NMI) หรือเทียบเท่า
2. ใช้เครื่องมือวัดระดับเสียงที่ผ่านการสอบเทียบจากกรมมาตรฐานแห่งชาติ (NMI) หรือเทียบเท่า

Technical Manager

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Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696327-1

Page 1 of 1

Reference Number	Noise (Leq 24 hrs.)
2022931-29	15 (ม.ร. 2540) ซึ่งกำหนดค่ามาตรฐานระดับเสียงโดยทั่วไป
Parameter	Noise (Leq 24 hrs.)
Location	15 (ม.ร. 2540) ซึ่งกำหนดค่ามาตรฐานระดับเสียงโดยทั่วไป
Measurement Date	May 29, 2020 - May 30, 2020
Measurement By	Audit Aorasm Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 584983

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	57.9	81.8	52.9
10:00 AM - 11:00 AM	57.6	79.6	52.7
11:00 AM - 12:00 PM	53.5	66.1	52.2
12:00 PM - 01:00 PM	53.0	62.1	51.8
01:00 PM - 02:00 PM	53.1	61.7	51.9
02:00 PM - 03:00 PM	53.5	64.4	52.3
03:00 PM - 04:00 PM	55.2	78.8	52.9
04:00 PM - 05:00 PM	54.6	74.2	52.5
05:00 PM - 06:00 PM	57.5	79.1	53.4
06:00 PM - 07:00 PM	54.2	68.6	53.2
07:00 PM - 08:00 PM	53.7	72.1	53.0
08:00 PM - 09:00 PM	55.1	64.8	53.3
09:00 PM - 10:00 PM	55.3	60.9	54.6
10:00 PM - 11:00 PM	54.8	67.4	54.2
11:00 PM - 12:00 AM	54.8	63.6	54.2
12:00 AM - 01:00 AM	53.8	57.5	53.2
01:00 AM - 02:00 AM	53.8	57.5	53.4
02:00 AM - 03:00 AM	56.1	71.8	54.4
03:00 AM - 04:00 AM	57.9	81.5	54.9
04:00 AM - 05:00 AM	56.5	79.3	54.2
05:00 AM - 06:00 AM	55.6	71.0	53.9
06:00 AM - 07:00 AM	55.1	77.0	53.6
07:00 AM - 08:00 AM	55.0	70.6	53.5
08:00 AM - 09:00 AM	55.3	81.8	53.2
Leq Average 24 hrs. (dB(A))	55.3		
Lmax (dB(A))			
L90 (dB(A))			
Ldn (dB(A))	61.9		
Standard (dB(A))	70	115	
Reference Method	: Based on ISO (1996)/1		
Standard	: 1. วิธีการทดสอบการวัดระดับเสียงตามข้อกำหนด ม.ร. 2540 ซึ่งกำหนดค่ามาตรฐานระดับเสียงโดยทั่วไป		
	2. วิธีการทดสอบการวัดระดับเสียงตามข้อกำหนด ม.ร. 2540 ซึ่งกำหนดค่ามาตรฐานระดับเสียงโดยทั่วไป		

Technical Manager

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Attn : Chokpisan Tongdeepsing
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696328-1

Page 1 of 1

Reference Number	Noise (Leq 24 hrs.)
2022931-30	15 (ม.ร. 2540) ซึ่งกำหนดค่ามาตรฐานระดับเสียงโดยทั่วไป
Parameter	Noise (Leq 24 hrs.)
Location	15 (ม.ร. 2540) ซึ่งกำหนดค่ามาตรฐานระดับเสียงโดยทั่วไป
Measurement Date	May 30, 2020 - May 31, 2020
Measurement By	Audit Aorasm Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 584983

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	54.3	71.0	52.9
10:00 AM - 11:00 AM	53.6	66.9	52.5
11:00 AM - 12:00 PM	54.0	68.4	52.6
12:00 PM - 01:00 PM	53.5	66.4	52.4
01:00 PM - 02:00 PM	53.1	70.2	52.0
02:00 PM - 03:00 PM	53.1	61.9	52.2
03:00 PM - 04:00 PM	53.7	70.9	52.0
04:00 PM - 05:00 PM	54.7	71.9	52.5
05:00 PM - 06:00 PM	57.1	76.1	53.2
06:00 PM - 07:00 PM	54.7	66.9	53.2
07:00 PM - 08:00 PM	53.9	61.2	53.2
08:00 PM - 09:00 PM	53.8	66.4	53.2
09:00 PM - 10:00 PM	54.0	59.0	53.5
10:00 PM - 11:00 PM	54.9	86.0	53.4
11:00 PM - 12:00 AM	56.4	91.1	53.4
12:00 AM - 01:00 AM	53.7	58.8	53.2
01:00 AM - 02:00 AM	54.2	69.6	53.6
02:00 AM - 03:00 AM	54.6	59.0	54.1
03:00 AM - 04:00 AM	55.4	62.4	54.4
04:00 AM - 05:00 AM	57.9	73.4	55.1
05:00 AM - 06:00 AM	56.7	80.0	54.2
06:00 AM - 07:00 AM	55.4	72.8	53.8
07:00 AM - 08:00 AM	54.2	67.5	53.1
08:00 AM - 09:00 AM	53.9	70.8	52.8
Leq Average 24 hrs. (dB(A))	54.8		
Lmax (dB(A))		91.1	
L90 (dB(A))			53.2
Ldn (dB(A))	61.9		
Standard (dB(A))	70	115	
Reference Method	: Based on ISO (1996)/1		
Standard	: 1. วิธีการทดสอบการวัดระดับเสียงตามข้อกำหนด ม.ร. 2540 ซึ่งกำหนดค่ามาตรฐานระดับเสียงโดยทั่วไป		
	2. วิธีการทดสอบการวัดระดับเสียงตามข้อกำหนด ม.ร. 2540 ซึ่งกำหนดค่ามาตรฐานระดับเสียงโดยทั่วไป		

Technical Manager

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Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.

99 Moo 17, Klong Nakorn Nangplek, Muang
Chachoengsao, Chachoengsao Thailand
24000

Attn : Chokpisan Tongdepong

Phone : 0-3851-3911 - 13

Fax : -

Email : Chokpisan.gnnk@gulf.co.th

Lot ID: 2022931

Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1695329-1

Project Name : Monitoring EIA

Location : GNNK

P/O :

Receipt No :

Page 1 of 1

Reference Number	2022931-31
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่บริเวณด้านหน้าอาคาร (GPS 47P 078073, 1519280)
Measurement Date	May 31, 2020 - Jun 01, 2020
Measurement By	Audit Aonimsin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 584983

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	53.7	70.9	52.7
10:00 AM - 11:00 AM	53.7	71.0	52.6
11:00 AM - 12:00 PM	53.7	76.8	52.3
12:00 PM - 01:00 PM	53.6	68.4	52.6
01:00 PM - 02:00 PM	53.9	66.0	52.8
02:00 PM - 03:00 PM	53.8	69.8	52.5
03:00 PM - 04:00 PM	54.9	72.8	52.6
04:00 PM - 05:00 PM	55.8	83.4	54.1
05:00 PM - 06:00 PM	56.9	74.0	53.8
06:00 PM - 07:00 PM	54.5	70.7	53.5
07:00 PM - 08:00 PM	54.3	71.1	53.7
08:00 PM - 09:00 PM	54.3	69.9	53.3
09:00 PM - 10:00 PM	54.3	58.0	53.6
10:00 PM - 11:00 PM	53.9	57.8	53.2
11:00 PM - 12:00 AM	54.1	64.6	53.7
12:00 AM - 01:00 AM	54.3	58.3	53.8
01:00 AM - 02:00 AM	54.2	58.3	53.8
02:00 AM - 03:00 AM	54.2	57.9	53.8
03:00 AM - 04:00 AM	56.1	82.5	54.3
04:00 AM - 05:00 AM	60.5	86.3	55.0
05:00 AM - 06:00 AM	54.9	67.7	53.9
06:00 AM - 07:00 AM	55.6	81.9	54.1
07:00 AM - 08:00 AM	54.7	72.2	53.3
08:00 AM - 09:00 AM	54.4	77.8	52.7
Leq Average 24 hrs. (dB(A))	55.1		
Lmax (dB(A))	86.3		53.5
L90 (dB(A))			
Ldn (dB(A))	62.1	115	
Standard (dB(A))	70		
Reference Method	: Based on ISO (1996)/1		
Standard			

: 1. ใช้กฎหมายมาตรฐานระดับความดังเสียง 15 (พ.ร.บ. 2540) สำหรับควบคุมการรบกวนเสียงในชุมชน
: 2. ใช้มาตรฐานระดับความดังเสียงที่แนะนำโดย WHO (พ.ร.บ. 2540) สำหรับควบคุมการรบกวนเสียงในชุมชน

Technical Manager

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Analysis / Test Report

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24000

Attn : Chokpisan Tongdepong

Phone : 0-3851-3911 - 13

Fax : -

Email : Chokpisan.gnnk@gulf.co.th

Lot ID: 2022931

Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1695330-1

Project Name : Monitoring EIA

Location : GNNK

P/O :

Receipt No :

Page 1 of 1

Reference Number	2022931-32
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่บริเวณด้านหน้าอาคาร (GPS 47P 078073, 1519280)
Measurement Date	Jun 01, 2020 - Jun 02, 2020
Measurement By	Audit Aonimsin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 584983

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	54.2	70.0	52.9
10:00 AM - 11:00 AM	54.6	74.3	52.3
11:00 AM - 12:00 PM	54.2	72.8	52.7
12:00 PM - 01:00 PM	54.2	73.2	52.7
01:00 PM - 02:00 PM	53.5	67.7	52.2
02:00 PM - 03:00 PM	53.3	69.0	51.0
03:00 PM - 04:00 PM	55.0	74.7	52.5
04:00 PM - 05:00 PM	56.5	74.9	52.7
05:00 PM - 06:00 PM	58.4	79.9	53.1
06:00 PM - 07:00 PM	53.9	70.2	52.8
07:00 PM - 08:00 PM	55.1	81.8	52.8
08:00 PM - 09:00 PM	53.9	71.2	53.0
09:00 PM - 10:00 PM	53.8	66.5	53.3
10:00 PM - 11:00 PM	54.0	68.1	53.4
11:00 PM - 12:00 AM	54.3	57.3	53.7
12:00 AM - 01:00 AM	55.9	65.4	54.8
01:00 AM - 02:00 AM	55.9	63.5	55.3
02:00 AM - 03:00 AM	55.9	59.7	55.1
03:00 AM - 04:00 AM	56.0	64.8	54.9
04:00 AM - 05:00 AM	60.1	77.3	56.1
05:00 AM - 06:00 AM	57.0	76.3	54.8
06:00 AM - 07:00 AM	58.3	75.1	54.9
07:00 AM - 08:00 AM	57.0	76.2	53.8
08:00 AM - 09:00 AM	57.3	80.5	53.1
Leq Average 24 hrs. (dB(A))	55.9		
Lmax (dB(A))	81.8		53.1
L90 (dB(A))			
Ldn (dB(A))	63.0	115	
Standard (dB(A))	70		
Reference Method	: Based on ISO (1996)/1		
Standard			

: 1. ใช้กฎหมายมาตรฐานระดับความดังเสียง 15 (พ.ร.บ. 2540) สำหรับควบคุมการรบกวนเสียงในชุมชน
: 2. ใช้มาตรฐานระดับความดังเสียงที่แนะนำโดย WHO (พ.ร.บ. 2540) สำหรับควบคุมการรบกวนเสียงในชุมชน

Technical Manager

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Chachoengsao, Chachoengsao Thailand
24000
Attn : Chokpisan Tongdeppeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696331-1

Page 1 of 1

Reference Number	Noise (Leq 24 hrs.)	Parameter
2022931-33	มกราคม 24 ชั่วโมง	
Location	มกราคม 24 ชั่วโมง	
Measurement Date	Jun 02, 2020 - Jun 03, 2020	
Measurement By	Audit Aonimsin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.	
Sound Level Meter	Serial No. 594983	

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	54.9	75.4	53.0
10:00 AM - 11:00 AM	54.9	69.6	53.2
11:00 AM - 12:00 PM	54.7	74.3	53.1
12:00 PM - 01:00 PM	54.8	80.4	52.8
01:00 PM - 02:00 PM	54.0	64.0	52.7
02:00 PM - 03:00 PM	54.2	67.7	52.7
03:00 PM - 04:00 PM	56.5	70.5	53.3
04:00 PM - 05:00 PM	58.3	72.4	54.2
05:00 PM - 06:00 PM	59.5	80.8	54.2
06:00 PM - 07:00 PM	56.7	71.9	53.8
07:00 PM - 08:00 PM	55.9	78.7	53.8
08:00 PM - 09:00 PM	57.0	82.2	56.6
09:00 PM - 10:00 PM	58.8	83.8	57.9
10:00 PM - 11:00 PM	59.4	64.6	58.2
11:00 PM - 12:00 AM	61.3	65.3	60.3
12:00 AM - 01:00 AM	61.2	66.8	60.6
01:00 AM - 02:00 AM	60.6	65.1	59.7
02:00 AM - 03:00 AM	60.5	72.3	59.8
03:00 AM - 04:00 AM	61.1	84.6	58.6
04:00 AM - 05:00 AM	58.2	80.6	55.5
05:00 AM - 06:00 AM	56.4	79.5	55.1
06:00 AM - 07:00 AM	57.1	81.5	54.7
07:00 AM - 08:00 AM	57.1	81.5	54.7
08:00 AM - 09:00 AM	58.7	71.8	54.7

Leq Average 24 hrs. (dB(A))	59.4
Lmax (dB(A))	87.7
L90 (dB(A))	54.7
Ldn (dB(A))	66.3
Standard (dB(A))	70
Reference Method	: Based on ISO (1996)/1
Standard	: 1. ปริมาณการจราจรที่ผ่านจุดวัดเสียง 15 (พ.ศ. 2540) ซึ่งกำหนดค่ามาตรฐานเสียงโดยทั่วไป 2. ปริมาณการจราจรที่ผ่านจุดวัดเสียง 15 (พ.ศ. 2540) ซึ่งกำหนดค่ามาตรฐานเสียงโดยทั่วไป

Technical Manager

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Attn : Chokpisan Tongdeppeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696332-1

Page 1 of 1

Reference Number	Noise (Leq 24 hrs.)	Parameter
2022931-34	มกราคม 24 ชั่วโมง	
Location	มกราคม 24 ชั่วโมง	
Measurement Date	Jun 03, 2020 - Jun 04, 2020	
Measurement By	Audit Aonimsin Personnel of ALS Laboratory Group (Thailand) Co., Ltd.	
Sound Level Meter	Serial No. 594983	

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	58.6	84.6	54.0
10:00 AM - 11:00 AM	58.1	74.3	54.5
11:00 AM - 12:00 PM	56.7	71.3	53.8
12:00 PM - 01:00 PM	62.8	91.1	56.0
01:00 PM - 02:00 PM	56.8	72.9	55.4
02:00 PM - 03:00 PM	58.0	84.2	55.1
03:00 PM - 04:00 PM	56.9	70.7	54.8
04:00 PM - 05:00 PM	56.7	69.7	54.4
05:00 PM - 06:00 PM	57.1	81.1	54.6
06:00 PM - 07:00 PM	57.8	72.0	55.7
07:00 PM - 08:00 PM	56.1	66.0	55.4
08:00 PM - 09:00 PM	55.6	60.8	55.2
09:00 PM - 10:00 PM	55.5	59.7	54.9
10:00 PM - 11:00 PM	55.3	65.0	54.8
11:00 PM - 12:00 AM	56.0	63.9	55.3
12:00 AM - 01:00 AM	58.5	60.8	57.1
01:00 AM - 02:00 AM	59.0	66.6	58.5
02:00 AM - 03:00 AM	58.7	61.4	57.7
03:00 AM - 04:00 AM	57.2	64.7	56.3
04:00 AM - 05:00 AM	59.5	73.9	57.5
05:00 AM - 06:00 AM	57.6	78.3	55.5
06:00 AM - 07:00 AM	57.3	84.3	55.2
07:00 AM - 08:00 AM	58.0	82.4	54.7
08:00 AM - 09:00 AM	58.7	83.1	53.8

Leq Average 24 hrs. (dB(A))	58.0
Lmax (dB(A))	91.1
L90 (dB(A))	55.2
Ldn (dB(A))	64.3
Standard (dB(A))	115
Reference Method	: Based on ISO (1996)/1
Standard	: 1. ปริมาณการจราจรที่ผ่านจุดวัดเสียง 15 (พ.ศ. 2540) ซึ่งกำหนดค่ามาตรฐานเสียงโดยทั่วไป 2. ปริมาณการจราจรที่ผ่านจุดวัดเสียง 15 (พ.ศ. 2540) ซึ่งกำหนดค่ามาตรฐานเสียงโดยทั่วไป

Technical Manager

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Attn : Chokkisan Tongdeesong
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokkisan.gnnk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Receipt No :
Lot ID: 2022931
Date Received : Jun 08, 2020
Date Reported : Jun 16, 2020
Report Number : 1696333-1

Page 1 of 1

Reference Number	2022931-35
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่บริเวณจุดพักน้ำ (GPS 47P-078073, 1519280)
Measurement Date	Jun 04, 2020 - Jun 05, 2020
Measurement By	Audit Anonim Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Sound Level Meter	Serial No. 584983

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	55.1	75.5	53.6
10:00 AM - 11:00 AM	55.9	69.5	53.4
11:00 AM - 12:00 PM	55.5	72.4	53.1
12:00 PM - 01:00 PM	55.5	70.6	53.2
01:00 PM - 02:00 PM	59.6	72.0	54.1
02:00 PM - 03:00 PM	55.1	75.2	53.1
03:00 PM - 04:00 PM	54.7	75.0	53.3
04:00 PM - 05:00 PM	55.4	73.8	53.8
05:00 PM - 06:00 PM	57.9	76.5	54.4
06:00 PM - 07:00 PM	56.9	69.3	54.7
07:00 PM - 08:00 PM	55.1	65.6	54.4
08:00 PM - 09:00 PM	55.3	62.4	54.6
09:00 PM - 10:00 PM	55.0	57.8	54.3
10:00 PM - 11:00 PM	55.4	58.3	54.5
11:00 PM - 12:00 AM	57.0	68.1	55.8
12:00 AM - 01:00 AM	58.3	64.5	57.7
01:00 AM - 02:00 AM	57.1	61.5	55.9
02:00 AM - 03:00 AM	56.3	76.1	55.4
03:00 AM - 04:00 AM	58.9	71.4	56.4
04:00 AM - 05:00 AM	56.5	79.8	54.8
05:00 AM - 06:00 AM	55.2	71.2	54.3
06:00 AM - 07:00 AM	54.7	75.3	53.6
07:00 AM - 08:00 AM	54.9	67.7	53.6
08:00 AM - 09:00 AM	56.3		
Leq Average 24 hrs. (dB(A))	56.3	79.8	54.3
Lmax (dB(A))			
L90 (dB(A))			
Ldn (dB(A))	63.1		
Standard (dB(A))	70	115	

Reference Method : Based on ISO (1996)/1
Standard :
: 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานสิ่งแวดล้อม
: 2. ประกาศกระทรวงสาธารณสุข เรื่องกำหนดค่าสัมประสิทธิ์การคำนวณ และวิธีคำนวณค่าการประเมินผลกระทบจากโรงงาน พ.ศ. 2548

Technical Manager

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ภาคผนวก ค-5

คุณภาพน้ำผิวดินในคลองพระองค์ไชยานุชิต



Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.
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Chachoengsao, Chachoengsao Thailand
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Email : Chokpisan.gnkk@gulf.co.th

Lot ID: 2030414

Date Received : Apr 07, 2020
Date Reported : Apr 14, 2020
Report Number: 1623138-1

TESTING
No.0009

Project Name : Monitoring EIA
Location : GNKK
P/O :

Lot ID: 2030414

Date Received : Apr 07, 2020
Date Reported : Apr 14, 2020
Report Number: 1623138-1

Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.
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24000
Attn : Chokpisan Tongdeeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnkk@gulf.co.th

Project Name : Monitoring EIA

Location : GNKK
P/O :

Lot ID: 2030414

Date Received : Apr 07, 2020
Date Reported : Apr 14, 2020
Report Number: 1623138-1

Reference Number	2030414-1				
Sampling Date	Apr 07, 2020 10:40 AM				
Sample Description	Surface water				
Location	เขื่อนบางลาง ตำบลบางลาง อำเภอบางบาล จังหวัดสุพรรณบุรี				
Condition of Sample	Contained in two BOD bottles, two plastic bottles and one amber glass bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)				
Date of Analysis	Apr 08, 2020				
Analyte	Unit	LOD	Result	Guideline Limit	Method
Water Testing					
BOD (5 days at 20 degree C)	mg/L	-	10	≤4	Based on APHA (2017), 5210 B
Dissolved Oxygen *	mg/L	-	6.8	≥2	Based on APHA (2017), 4500-O (C)
Oil & Grease	mg/L	-	<3	No Standard	Based on APHA (2017), 5520 B
pH	at 25 degree C	-	7.8	5.0-9.0	Based on APHA (2017), 4500-H (B)
Temperature *	Degree C	-	29.8	n'	Based on APHA (2017), 2550 B
Total Chlorine *	mg/L	-	0.3	No Standard	Based on APHA (2017), 4500-Cl (F)
Total Dissolved solids *	Dried at 180 degree C	-	838	No Standard	Based on APHA (2017), 2540 C
Total Suspended Solids *	Dried at 103-105 degree C	-	43	No Standard	Based on APHA (2017), 2540 D
Guideline: Notification of the National Environmental Board, No. 8, B.E.2537 issued under the Enhancement and Conservation of National Environmental Quality Act, B.E.2535, published in the Royal Government Gazette, Vol. 111, Part 16, Dated February 24, B.E. 2537 (Class 4) or Change from Natural condition not more than 3 degree C					

Guideline: Notification of the National Environmental Board, No. 8, B.E.2537 issued under the Enhancement and Conservation of National Environmental Quality Act. B.E.2535, published in the Royal Government Gazette, Vol. 111, Part 16, Dated February 24, B.E. 2537 (Class 4)

n': Change from Natural condition not more than 3 degree C

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Reference Number	2030414-2				
Sampling Date	Apr 07, 2020 11:00 AM				
Sample Description	Surface water				
Location	เขื่อนบางลาง ตำบลบางลาง อำเภอบางบาล จังหวัดสุพรรณบุรี				
Condition of Sample	Contained in two BOD bottles, two plastic bottles and one amber glass bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)				
Date of Analysis	Apr 08, 2020				
Analyte	Unit	LOD	Result	Guideline Limit	Method
Water Testing					
BOD (5 days at 20 degree C)	mg/L	-	10	≤4	Based on APHA (2017), 5210 B
Dissolved Oxygen *	mg/L	-	7.9	≥2	Based on APHA (2017), 4500-O (C)
Oil & Grease	mg/L	-	<3	No Standard	Based on APHA (2017), 5520 B
pH	at 25 degree C	-	8.0	5.0-9.0	Based on APHA (2017), 4500-H (B)
Temperature *	Degree C	-	33.9	n'	Based on APHA (2017), 2550 B
Total Chlorine *	mg/L	-	0.2	No Standard	Based on APHA (2017), 4500-Cl (F)
Total Dissolved solids *	mg/L	-	938	No Standard	Based on APHA (2017), 2540 C
Total Suspended Solids *	mg/L	-	75	No Standard	Based on APHA (2017), 2540 D
Guideline: Notification of the National Environmental Board, No. 8, B.E.2537 issued under the Enhancement and Conservation of National Environmental Quality Act. B.E.2535, published in the Royal Government Gazette, Vol. 111, Part 16, Dated February 24, B.E. 2537 (Class 4) for: Change from Natural condition not more than 3 degree C					

Guideline: Notification of the National Environmental Board, No. 8, B.E.2537 issued under the Enhancement and Conservation of National Environmental Quality Act. B.E.2535, published in the Royal Government Gazette, Vol. 111, Part 16, Dated February 24, B.E. 2537 (Class 4)

n': Change from Natural condition not more than 3 degree C

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Analysis / Test Report

TESTING
No.0009

Report to : Gulf JP NKK Co., Ltd.
99 Moo 17, Mong Nakorn Neangket, Muang
Chachoengsao, Chachoengsao Thailand
24000
Attn : Chokpisan Tongdeepeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnkk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Lot ID: 2030414
Date Received : Apr 07, 2020
Date Reported : Apr 14, 2020
Report Number: 1623138-1

Reference Number 2030414-3
Sampling Date Apr 07, 2020 12:00 PM
Sample Description Surface water
Location ภาณุพรสวรรค์นิคมอุตสาหกรรม 1 กม. ห่างจากแม่น้ำเจ้าพระยา ตำบลโพธิ์ตาก
Condition of Sample Contained in two BOD bottles, two plastic bottles and one amber glass bottle, sample containers comply to pretreatment -
preservation standards (APHA, USEPA)
Date of Analysis Apr 08, 2020

Analyte	Unit	LOD	Result	Guideline Limit	Method
Water Testing					
BOD (5 days at 20 degree C)	mg/L	-	8	≤4	Based on APHA (2017), 5210 B
Dissolved Oxygen *	mg/L	-	8.1	≥2	Based on APHA (2017), 4500-O (C)
Oil & Grease	mg/L	-	<3	No Standard	Based on APHA (2017), 5520 B
pH					Based on APHA (2017), 4500-H (B)
Temperature *	at 25 degree C	-	7.9	5.0-9.0	Based on APHA (2017), 2550 B
Total Chlorine *	Degree C	-	37.3	n ¹	Based on APHA (2017), 4500-Cl (F)
Total Dissolved solids *	mg/L	-	0.2	No Standard	Based on APHA (2017), 2540 C
Total Suspended Solids *	Dried at 180 degree C	-	1004	No Standard	Based on APHA (2017), 2540 C
	Dried at 103-105 degree C	-	59	No Standard	Based on APHA (2017), 2540 D

Guideline: Notification of the National Environmental Board, No. 8, B.E.2537 Issued under the Enhancement and Conservation of National Environmental Quality Act, B.E.2535, published in the Royal Government Gazette, Vol. 111, Part 16, Dated February 24, B.E. 2537 (Class 4)
n¹: Change from Natural condition not more than 3 degree C

Remark :

1. LOD : Limit of Detection
2. "<" : Lower than LOQ (Limit of Quantitation)
3. Analyte(s) marked * is/are not included in scope of Accreditation.

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ภาคผนวก ค-6

ทรัพยากรชีวภาพในคลองพระองค์ไชยานุชิต



Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Neangket, Muang
Chachoengsao, Chachoengsao Thailand 24000
Attn : Chokpisan Tongdeepsing
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Lot ID: 2026452
Date Received : Apr 07, 2020
Date Reported : Apr 24, 2020
Report Number : 1623182-1
Sampling by : Chuladek Warin

CC Email :
2026452-1 to 3
Apr 07, 2020
Natural Water
contained in one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Apr 08, 2020

Page 1 of 8

ตารางผลการตรวจวิเคราะห์คุณภาพน้ำ (Phytoplankton)

Reference Number	2026452-1 to 3	
	2026452-1	2026452-2
Sampling Date	Apr 07, 2020	Apr 07, 2020
Sample Description	Natural Water	Natural Water
Condition of Sample	contained in one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)	
Date of Analysis	Apr 08, 2020	Apr 08, 2020
Division Cyanophyta		
Class Cyanophyceae		
Order Chroococcales		
Family Chroococcaceae		
1. <i>Microcystis aeruginosa</i>	241,000	281,000
Order Nostocales		
Family Oscillatoriaceae		
3. <i>Lyngbya limnetica</i>	2,195,000	2,738,000
4. <i>Lyngbya major</i>	22,000	655,000
5. <i>Oscillatoria</i> sp.	154,000	421,000
Family Nostocaceae		
6. <i>Cylindrocapsa</i> sp.	-	-
7. <i>Raphidocapsa mediterranea</i>	-	-
Division Chlorophyta		
Class Chlorophyceae		
Order Tetrasporales		
Family Palmellaceae		
8. <i>Sphaerocapsa striatula</i>	22,000	-
Order Chlorococcales		
Family Hydrodictyaceae		
9. <i>Achnanthes tetras</i>	1,888,000	211,000
10. <i>Achnanthes simplex</i>	1,756,000	1,357,000
Family Coelastraceae		
12. <i>Coelastrum denticulatum</i>	110,000	-

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Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Lot ID: 2026452
Date Received : Apr 07, 2020
Date Reported : Apr 24, 2020
Report Number : 1623182-1
Sampling by : Chuladek Warin

CC Email :
2026452-1 to 3
Apr 07, 2020
Natural Water
contained in one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Apr 08, 2020

Page 2 of 8

ตารางผลการตรวจวิเคราะห์คุณภาพน้ำ (Phytoplankton)

Reference Number	2026452-1 to 3	
	2026452-1	2026452-2
Sampling Date	Apr 07, 2020	Apr 07, 2020
Sample Description	Natural Water	Natural Water
Condition of Sample	contained in one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)	
Date of Analysis	Apr 08, 2020	Apr 08, 2020
Family Oocystaceae		
13. <i>Achnanthes falcatus</i>	1,010,000	23,000
14. <i>Dactyloplecton pubescens</i>	-	608,000
15. <i>Oocystis lacustris</i>	7,902,000	679,000
16. <i>Tetraspora gracile</i>	220,000	23,000
17. <i>Tetraspora hyalinum</i>	-	117,000
Family Scenedesmeaceae		
18. <i>Scenedesmus apiculatus</i>	44,000	1,193,000
19. <i>Microcystis pusillum</i>	22,000	-
20. <i>Scenedesmus acuminatus</i>	615,000	117,000
21. <i>Scenedesmus biliga</i>	88,000	-
22. <i>Scenedesmus dimorphus</i>	1,537,000	2,059,000
23. <i>Scenedesmus lacustris</i>	-	576,000
24. <i>Scenedesmus ocellatus</i>	439,000	304,000
Order Zygonatales		
Family Desmidiaceae		
25. <i>Oocystis gracile</i>	-	92,000
26. <i>Oocystis linearis</i>	1,317,000	-
27. <i>Oocystis ralfsi</i>	-	585,000
28. <i>Oocystis nodum</i>	-	608,000
29. <i>Scenedesmus gracile</i>	-	-
Class Euglenophyceae		
Order Euglenales		
30. <i>Euglena acus</i>	21,292,000	9,898,000
31. <i>Euglena oxyuris</i>	7,156,000	4,774,000

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Report to : Gulf JP NKK Co., Ltd.
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Attn : Chokpisan Tongdeengang
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Lot ID: 2026452
Date Received : Apr 07, 2020
Date Reported : Apr 24, 2020
Report Number : 1623182-1
Sampling by : Chuladee Wain
CC Email :
Page 3 of 8

Page 3 of 8

Reference Number 2026452-1 to 3
Sampling Date Apr 07, 2020
Sample Description Natural Water
Condition of Sample contained in one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Date of Analysis Apr 08, 2020

ตารางผลการตรวจพบจุลินทรีย์ (Phytoplankton)

ชนิดของจุลินทรีย์	ปริมาณพบเจอ (หน่วยลูกบาศก์ไมครอน)		
	2026452-1	2026452-2	2026452-3
Family Euglenaceae			
32. <i>Euglena proxima</i>	395,000	-	-
33. <i>Euglena</i> sp.	2,634,000	3,767,000	4,149,000
34. <i>Euglena splendens</i>	22,000	257,000	1,844,000
35. <i>Leptodireis orum</i>	6,805,000	8,541,000	13,231,000
36. <i>Phacus angulatus</i>	3,732,000	5,054,000	1,614,000
37. <i>Phacus caudatus</i>	-	-	1,222,000
38. <i>Phacus curvicauda</i>	-	1,076,000	-
39. <i>Phacus hamulus</i>	6,585,000	4,075,000	4,610,000
40. <i>Phacus helioides</i>	198,000	117,000	645,000
41. <i>Phacus longicauda</i>	878,000	140,000	277,000
42. <i>Phacus nyssii</i>	1,449,000	749,000	968,000
43. <i>Phacus platys</i>	659,000	-	231,000
44. <i>Phacus pectinonostoeidis</i>	-	-	323,000
45. <i>Phacus rapula</i>	44,000	-	346,000
46. <i>Phacus</i> sp.	2,085,000	-	1,453,000
47. <i>Phacus tortus</i>	9,000,000	5,803,000	11,064,000
48. <i>Phacus triquetus</i>	-	-	1,883,000
49. <i>Strombomonas australis</i>	-	-	254,000
50. <i>Strombomonas deflandrei</i>	7,463,000	374,000	1,268,000
51. <i>Strombomonas gibberosa</i>	1,822,000	1,708,000	1,729,000
52. <i>Trachomonas orbea</i>	1,976,000	1,030,000	-
53. <i>Trachomonas hispida</i>	11,193,000	5,125,000	1,590,000
54. <i>Trachomonas bicoloris</i>	379,000	-	-

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Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Lot ID: 2026452
Date Received : Apr 07, 2020
Date Reported : Apr 24, 2020
Report Number : 1623182-1
Sampling by : Chuladee Wain
CC Email :
Page 4 of 8

Page 4 of 8

Reference Number 2026452-1 to 3
Sampling Date Apr 07, 2020
Sample Description Natural Water
Condition of Sample contained in one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Date of Analysis Apr 08, 2020

ตารางผลการตรวจพบจุลินทรีย์ (Phytoplankton)

ชนิดของจุลินทรีย์	ปริมาณพบเจอ (หน่วยลูกบาศก์ไมครอน)		
	2026452-1	2026452-2	2026452-3
Division Chromophyta			
Class Bacillariophyceae			
Order Biddulphiales			
Suborder Coscinodiscineae			
Family Thalassiosiraceae			
55. <i>Cyclotella meneghiniana</i>	7,244,000	7,862,000	10,142,000
56. <i>Cyclotella</i> sp.	42,144,000	28,688,000	68,688,000
57. <i>Cyclotella stelligera</i>	5,707,000	2,457,000	9,220,000
Family Aulacoseiraceae			
58. <i>Aulacoseira granulata</i>	3,951,000	2,293,000	5,532,000
Order Bacillariales			
Suborder Fragillariaceae			
Family Fragillariaceae			
59. <i>Dityonea wigmorei</i>	-	-	922,000
60. <i>Synechra acis</i>	549,000	936,000	-
61. <i>Synechra rufipennis</i>	-	140,000	-
62. <i>Synechra uha</i>	1,098,000	2,340,000	2,075,000
Family Tabellariaceae			
63. <i>Tabellaria fenestrata</i>	-	632,000	-
Family Licmophoriaceae			
64. <i>Licmophora abbreviata</i>	22,000	23,000	-
Suborder Bacillariitineae			
Family Eunotiaceae			
65. <i>Eunotia rubicula</i>	-	-	207,000
Family Lyellaceae			
66. <i>Lyrella lya</i>	22,000	-	-

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Report to : Gulf JP NKK Co., Ltd.
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Attn : Chokplean Tongdeepsang
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokplean.gnm@gulf.co.th

Project Name : Monitoring EIA
Location : GNMK
P/O :
Lot ID: 2026452
Date Received : Apr 07, 2020
Date Reported : Apr 24, 2020
Report Number : 1623182-1
Sampling by : Chuladet Warin

CC Email :
CC Email :

Page 5 of 8

Reference Number	2026452-1 to 3
Sampling Date	Apr 07, 2020
Sample Description	Natural Water
Condition of Sample	contained in one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Date of Analysis	Apr 08, 2020

ตารางผลการตรวจวัดแพลงก์ตอนพืช (Phytoplankton)

ชนิดของแพลงก์ตอนพืช	ปริมาณของแพลงก์ตอนพืช (หน่วยลูกบาศก์ไมครอน)	
	2026452-1	2026452-2
Family Naviculaceae		
67. <i>Fistula</i> sp.		23,000
68. <i>Navicula</i> sp.	7,024,000	12,636,000
Family Bacillariaceae		
69. <i>Micosthia actinoides</i>	6,146,000	25,971,000
70. <i>Micosthia palaeacea</i>	-	-
71. <i>Micosthia reversa</i>	4,149,000	2,223,000
72. <i>Micosthia</i> sp.	-	4,212,000
Family Surirellaceae		
73. <i>Surirella nobilis</i>	22,000	351,000
Class Dinophyceae		
Order Peridinales		
Family Peridiniaceae		
74. <i>Peridinium chitum</i>	17,780,000	21,177,000
ปริมาณของแพลงก์ตอนพืช	51	51
ปริมาณของแพลงก์ตอนพืช	204,159,000	178,092,000
จำนวนความถี่ของแพลงก์ตอนพืช	2,9953	2,9693
ดัชนีความถี่ของแพลงก์ตอนพืช	0.7618	0.7552

Note : Subcontract ภาวณิธิบรรณพิภพ

Sample Location

2026452-1 : คลองระบองคันขุมลึก ที่ 1 กม. เทปาดูบนและระบองคัน ข้างโครงการ

2026452-2 : คลองระบองคันขุมลึก บริเวณจุดสูบน้ำและระบองคันข้างโครงการ

2026452-3 : คลองระบองคันขุมลึก ที่ 1 กม. บริเวณจุดสูบน้ำและระบองคัน ข้างโครงการ

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Attn : Chokplean Tongdeepsang
Phone : 0-3851-3911 - 13
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Email : Chokplean.gnm@gulf.co.th

Project Name : Monitoring EIA
Location : GNMK
P/O :
Lot ID: 2026452
Date Received : Apr 07, 2020
Date Reported : Apr 24, 2020
Report Number : 1623182-1
Sampling by : Chuladet Warin

CC Email :
CC Email :

Page 6 of 8

Reference Number	2026452-1 to 3
Sampling Date	Apr 07, 2020
Sample Description	Natural Water
Condition of Sample	contained in one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Date of Analysis	Apr 08, 2020

ตารางผลการตรวจวัดแพลงก์ตอนสัตว์ (Zooplankton)

ชนิดของแพลงก์ตอนสัตว์	ปริมาณของแพลงก์ตอนสัตว์ (หน่วยลูกบาศก์ไมครอน)	
	2026452-1	2026452-2
Phylum Protozoa		
Subphylum Plasmodroma		
Class Sarcodina		
Subclass Rhizopoda		
Order Testacida		
Family Arcellidae		
1. <i>Arcella</i> sp.	-	23,000
2. <i>Arcella vulgaris</i>	-	23,000
Family Diffugiidae		
3. <i>Diffugia acuniphala</i>	66,000	23,000
4. <i>Diffugia elegans</i>	22,000	-
Phylum Rotifera		
Class Monogononta		
Order Plolima		
Family Brachionidae		
5. <i>Anuraecopsis coeniza</i>	176,000	47,000
6. <i>Anuraecopsis fissa</i>	198,000	140,000
7. <i>Brachionus angulatus</i>	-	23,000
8. <i>Brachionus calyciflorus</i>	263,000	23,000
9. <i>Brachionus curvatus</i>	66,000	-
10. <i>Brachionus plicatilis</i>	88,000	-
11. <i>Keratella cochlearis</i>	-	23,000
12. <i>Keratella velox</i>	110,000	-
Family Notozomatidae		
13. <i>Cyclosoella</i> sp.	132,000	187,000

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Attn: Chokpisan Tongdeeng
Phone : 0-3851-3911 - 13
Fax : -
Email: Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Lot ID: 2026452
Date Received : Apr 07, 2020
Date Reported : Apr 24, 2020
Report Number : 1623182-1
Sampling by : Chuladet Warin

CC Email. :
2026452-1 to 3
Apr 07, 2020
Natural Water
contained in one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Apr 08, 2020

Page 7 of 8

Reference Number	2026452-1 to 3
Sampling Date	Apr 07, 2020
Sample Description	Natural Water
Condition of Sample	contained in one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Date of Analysis	Apr 08, 2020

ตารางผลการตรวจวิเคราะห์ (Zooplankton)

ชนิดแพลงก์ตอนสัตว์	ปริมาณแพลงก์ตอนสัตว์ (นับต่อลูกบาศก์เมตร)		
	2026452-1	2026452-2	2026452-3
Family Tricocercidae			
14. <i>Tricocerca pusilla</i>	66,000	304,000	161,000
15. <i>Tricocerca</i> sp.	-	-	69,000
Family Gastropodidae			
16. <i>Asperochia priodonta</i>	-	94,000	-
Family Synchaetidae			
17. <i>Polyarthra dolichopora</i>	329,000	468,000	300,000
Order Flosculariacea			
Family Testudinellidae			
18. <i>Millia opulens</i>	-	23,000	-
19. <i>Millia ferrugalis</i>	-	-	23,000
20. <i>Testudinella parva</i>	66,000	-	-
Family Flosculariidae			
21. <i>Pygura</i> sp.	-	-	23,000
Phylum Arthropoda			
Class Crustacea			
Subclass Branchiopoda			
Order Diplostroaca			
Suborder Cladocera			
Family Moinidae			
22. <i>Moina macrocarpa</i>	22,000	-	23,000
Subclass Copepoda			
23. Copepod nauplii	988,000	749,000	645,000
Order Calanoida			
24. Calanoid copepod	110,000	73,000	73,000

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Fax : -
Email: Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Lot ID: 2026452
Date Received : Apr 07, 2020
Date Reported : Apr 24, 2020
Report Number : 1623182-1
Sampling by : Chuladet Warin

CC Email. :
2026452-1 to 3
Apr 07, 2020
Natural Water
contained in one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Apr 08, 2020

Page 8 of 8

Reference Number	2026452-1 to 3
Sampling Date	Apr 07, 2020
Sample Description	Natural Water
Condition of Sample	contained in one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Date of Analysis	Apr 08, 2020

ตารางผลการตรวจวิเคราะห์ (Zooplankton)

ชนิดแพลงก์ตอนสัตว์	ปริมาณแพลงก์ตอนสัตว์ (นับต่อลูกบาศก์เมตร)		
	2026452-1	2026452-2	2026452-3
ชนิดแพลงก์ตอนสัตว์	15	15	17
ปริมาณแพลงก์ตอนสัตว์	2,702,000	2,173,000	1,911,000
ค่าปริมาณแพลงก์ตอนสัตว์	2,181.1	1,964.5	2,238.1
ค่าปริมาณแพลงก์ตอนสัตว์	0.8054	0.7255	0.7900

Note : Subcontract สานักงานตรวจวิเคราะห์

Sample Location

2026452-1 : คลองชลประทานที่ 10, เขตหนองแขม กรุงเทพมหานคร

2026452-2 : คลองชลประทานที่ 10, เขตหนองแขม กรุงเทพมหานคร

2026452-3 : คลองชลประทานที่ 10, เขตหนองแขม กรุงเทพมหานคร

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Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpian.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Lot ID: 2028192
Date Received : Apr 07, 2020
Date Reported : Apr 24, 2020
Report Number : I623193-1
Sampling by : Chuladet Warin

CC Email :
OC Email :

Page 1 of 1

Reference Number	2028192-1 to 3
Sampling Date	Apr 06, 2020
Sample Description	Soil
Condition of Sample	contained in one plastic zip bag
Date of Analysis	Apr 08, 2020

ตารางผลการตรวจวัดสิ่งมีชีวิตในดิน (Benthos)

ชนิดสัตว์ที่พบ	ปริมาณสิ่งมีชีวิตพบ (ตัว/ตารางเมตร)		
	2028192-1	2028192-2	2028192-3
Phylum Annelida			
Class Clitellata			
Order Lumbricida			
Family Lumbricidae	15	-	-
<i>Lumbricus</i> sp. (ไส้เดือนจิ้ง)			
Phylum Arthropoda			
Class Insecta			
Order Diptera			
Family Chironomidae			
<i>Chironomus</i> sp. (มวนแดง)	89	15	30
Phylum Mollusca			
Class Gastropoda			
Order Mesogastropoda			
Family Viviparidae			
<i>Viviparus</i> sp. (หอยมด)	15	-	-
รวมจำนวนสปีชีส์ทั้งหมด	3	1	1
รวมปริมาณทั้งหมด	119	15	30
ค่าสัมประสิทธิ์ความหลากหลาย	0.7394	0.0000	0.0000

Note : Subcontract สถานีให้ผลตรวจ

Sample Location

2028192-1 : คลองห้วยน้ำขมิ้น หมู่ 1 ต.หนองขี้เหล็ก อ.บึงสามพัน จ.พิจิตร

2028192-2 : คลองห้วยน้ำขมิ้น หมู่ 1 ต.หนองขี้เหล็ก อ.บึงสามพัน จ.พิจิตร

2028192-3 : คลองห้วยน้ำขมิ้น หมู่ 1 ต.หนองขี้เหล็ก อ.บึงสามพัน จ.พิจิตร

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ภาคผนวก ค-7

คุณภาพน้ำทิ้งจากบ่อกักน้ำทิ้ง



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24000
Attn : Chokpisan Tongdeepsing
Phone : 0-3851-3911 - 13
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Email : Chokpisan.gnkk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O : GNKK-1106002615

Lot ID: 19121142
Date Received : Jan 06, 2020
Date Reported : Jan 13, 2020
Report Number: 1529742-2
Sampling by : Chuladee Wann

Page 1 of 1

Reference Number	19121142-1				
Sampling Date	Jan 06, 2020 9:00 AM				
Sample Description	Wastewater				
Location	ถังเก็บน้ำ (Wastewater Retention Pond)				
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)				
Date of Analysis	Jan 07, 2020				
Analyte	Unit	LOD	Result	Guideline Limit	Method
Metals Testing					
Calcium	mg/L	0.0005	3.86	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Sodium	mg/L	0.0005	9.23	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Magnesium	mg/L	0.003	3.82	No Standard	Based on US EPA, Method 200.7, Revision 4.4
SAR	-	-	4.71	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Water Testing					
Conductivity	at 25 degree C	micromhos/cm	1853	No Standard	Based on APHA (2017), 2510 B
Guideline: Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).					
Remark :					
1. LOD : Limit of Detection					
2. < < : Lower than LOD (Limit of Quantitation)					

Guideline: Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of the Ministry of Industry dated June 07, B.E.2560 (2017).

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation)

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Email : Chokpisan.gnkk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O : GNKK-1106002615

Lot ID: 19121142
Date Received : Jan 06, 2020
Date Reported : Jan 13, 2020
Report Number: 1529742-1
Sampling by : Chuladee Wann

Page 1 of 1

Reference Number	19121142-1				
Sampling Date	Jan 06, 2020 9:00 AM				
Sample Description	Wastewater				
Location	ถังเก็บน้ำ (Wastewater Retention Pond)				
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)				
Date of Analysis	Jan 07, 2020				
Analyte	Unit	LOD	Result	Guideline Limit	Method
Water Testing					
BOD (5 days at 20 degree C)	mg/L	-	5	≤20	Based on APHA (2017), 5210 B
Oil & Grease	mg/L	-	<3	≤5	Based on APHA (2017), 5520 B
pH	at 25 degree C	-	7.8	5.5-9.0	Based on APHA (2017), 4500-H (B)
Residual Free Chlorine *	mg/L	-	0.2	≤1.0	APHA (2017), 4500-Cl(F)
Temperature *	Degree C	-	28.2	≤40	Based on APHA (2017), 2550 B
Total Dissolved solids	Dried at 180 degree C	-	1076	≤3000	Based on APHA (2017), 2540 C
Total Suspended Solids	Dried at 103-105 degree C	-	17	≤50	Based on APHA (2017), 2540 D

Guideline: Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of the Ministry of Industry dated June 07, B.E.2560 (2017).

Remark :

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Technical Management

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Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O : GNNK-4106002615
Lot ID: 19121143
Date Received : Feb 03, 2020
Date Reported : Feb 11, 2020
Report Number: 1529744-1
Sampling by : Pichai Boonyong

TESTING
No.0009

Page 1 of 1

Reference Number	19121143-1				
Sampling Date	Feb 03, 2020 11:30 AM				
Sample Description	Wastewater				
Location	น้ำทิ้งน้ำ (Wastewater Retention Pond)				
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)				
Date of Analysis	Feb 04, 2020				
Analyte	Unit	LOD	Result	Guideline Limit	Method
Water Testing					
BOD (5 days at 20 degree C)	mg/L	-	3	≤20	Based on APHA (2017), 5210 B
Oil & Grease	mg/L	-	<3	≤5	Based on APHA (2017), 5520 B
pH	at 25 degree C	-	7.2	6.5-8.5	Based on APHA (2017), 4500-H (B)
Residual Free Chlorine *	mg/L	-	<0.1	≤1	APHA (2017), 4500-Cl(F)
Temperature *	Degree C	-	28.4	≤40	Based on APHA (2017), 2550 B
Total Dissolved solids	Dried at 180 degree C	-	760	≤1300	Based on APHA (2017), 2540 C
Total Suspended Solids	Dried at 103-105 degree C	-	10	≤30	Based on APHA (2017), 2540 D

Page 1 of 1

Guideline: Water Characteristics Discharge into Irrigation System, Royal Irrigation Department No.18/2561.

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation)
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Technical Management

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Phone : 0-3851-3911 • 13
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Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O : GNNK-4106002615
Lot ID: 19121143
Date Received : Feb 03, 2020
Date Reported : Feb 11, 2020
Report Number: 1529744-2
Sampling by : Pichai Boonyong

Page 1 of 1

Reference Number	19121143-1				
Sampling Date	Feb 03, 2020 11:30 AM				
Sample Description	Wastewater				
Location	Ua7n7n7v43 (Wastewater Retention Pond)				
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)				
Date of Analysis	Feb 04, 2020				
Analyte	Unit	LOD	Result	Guideline Limit	Method
Metals Testing					
Calcium	mg/L	0.0005	3.08	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Sodium	mg/L	0.0005	8.36	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Magnesium	mg/L	0.003	2.85	No Standard	Based on US EPA, Method 200.7, Revision 4.4
SAR	-	-	4.85	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Water Testing					
Conductivity	at 25 degree C	-	1437	No Standard	Based on APHA (2017), 2510 B

Guideline: Water Characteristics Discharge into Irrigation System, Royal Irrigation Department No.18/2561.

Remark :

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- "<" : Lower than LOQ (Limit of Quantitation)

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Phone: 0-3851-3911 - 13
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Email: Chokpisan.gmk@gulf.co.th

Project Name: Monitoring EIA
Location: GNKK
P/O:

Lot ID: 2022981

Date Received: Mar 02, 2020
Date Reported: Mar 19, 2020
Report Number: 1600934-1 C2
Sampling by: Chulladet Warm

TESTING
No.0009

Page 1 of 1

Reference Number: 2022981-1
Sampling Date: Mar 02, 2020 11:20 AM
Sample Description: Wastewater
Location: อุบลรัตน์ (Wastewater Retention Pond)
Condition of Sample: Contained in one amber glass bottle, five plastic bottles, two BOD bottles and two glass vials, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Date of Analysis: Mar 02, 2020

Analyte	Unit	LOD	Result	Guideline Limit	Method
Water Testing					
BOD (5 days at 20 degree C)	mg/L	-	3	≤20	Based on APHA (2017), 5210 B
Oil & Grease	mg/L	-	<3	≤5	Based on APHA (2017), 5520 B
pH	at 25 degree C	-	7.8	6.5-8.5	Based on APHA (2017), 4500-H (B)
Residual Free Chlorine *	mg/L	-	<0.1	≤1	APHA (2017), 4500-Cl(F)
Temperature *	Degree C	-	30.8	≤40	Based on APHA (2017), 2550 B
Total Dissolved Solids	mg/L	-	1104	≤1300	Based on APHA (2017), 2540 C
Total Suspended Solids	mg/L	-	12	≤30	Based on APHA (2017), 2540 D

Guideline: Water Characteristics Discharge into Irrigation System, Royal Irrigation Department No.18/2561.

Remark:
1. LOD : Unit of Detection
2. "<" : Lower than LOQ (Unit of Quantitation)
3. Analyte(s) marked * is/are not included in scope of Accreditation.

Technical Manager

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24000
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Phone: 0-3851-3911 - 13
Fax: -
Email: Chokpisan.gmk@gulf.co.th

Project Name: Monitoring EIA
Location: GNKK
P/O:

Lot ID: 2022981

Date Received: Mar 02, 2020
Date Reported: Mar 19, 2020
Report Number: 1600934-2C2
Sampling by: Chulladet Warm

Page 1 of 1

Reference Number: 2022981-1
Sampling Date: Mar 02, 2020 11:20 AM
Sample Description: Wastewater
Location: อุบลรัตน์ (Wastewater Retention Pond)
Condition of Sample: Contained in one amber glass bottle, five plastic bottles, two BOD bottles and two glass vials, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Date of Analysis: Mar 03, 2020

Analyte	Unit	LOD	Result	Guideline Limit	Method
Metals Testing					
Calcium	mg/L	0.0005	2.19	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Sodium	mg/L	0.0005	11.5	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Magnesium	mg/L	0.003	2.99	No Standard	Based on US EPA, Method 200.7, Revision 4.4
SAR	-	-	7.17	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Water Testing					
Conductivity	at 25 degree C	micromhos/cm	1869	No Standard	Based on APHA (2017), 2510 B

Guideline: Water Characteristics Discharge into Irrigation System, Royal Irrigation Department No.18/2561.

Remark:
1. LOD : Unit of Detection
2. "<" : Lower than LOQ (Unit of Quantitation)

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24000
Attn : Chokpisan Tongdeppeng
Phone : 0-3851-3911 - 13
Fax : -
Email : chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Lot ID: 2032517
Date Received : Apr 06, 2020
Date Reported : Apr 13, 2020
Report Number : 1623159-1
Sampling by : Chulaladet Wain

Page 1 of 1



TESTING
No.0009

Reference Number : 2032517-1
Sampling Date : Apr 06, 2020 8:40 AM
Sample Description : Wastewater
Location : 141km14 (Wastewater Retention Pond)
Condition of Sample : Contained in two BOD bottles, one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Date of Analysis : Apr 07, 2020

Page 1 of 1

Analyte	Unit	LOD	Result	Guideline Limit	Method
Water Testing					
BOD (5 days at 20 degree C)	mg/L	-	<2	≤20	Based on APHA (2017), 5210 B
Oil & Grease	mg/L	-	4	≤5	Based on APHA (2017), 5520 B
pH	at 25 degree C	-	7.4	6.5-8.5	Based on APHA (2017), 4500-H (B)
Residual Free Chlorine *	mg/L	-	0.1	≤1	APHA (2017), 4500-Cl(F)
Temperature *	Dried at 180 degree C	-	31.4	≤40	Based on APHA (2017), 2550 B
Total Dissolved Solids	mg/L	-	1116	≤1300	Based on APHA (2017), 2540 C
Total Suspended Solids	mg/L	-	6	≤30	Based on APHA (2017), 2540 D

Guideline: Water Characteristics Discharge into Irrigation System, Royal Irrigation Department No.18/2561.

Remark :
1. LOD : Limit of Detection
2. "<" : Lower than LOQ (Limit of Quantitation)
3. Analyte(s) marked * is/are not included in scope of Accreditation.

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S:\Report\055_01_Regis\No_Regis\Comment.rpt (6:03PM)



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Report to : Gulf JP NKK Co., Ltd.
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24000
Attn : Chokpisan Tongdeppeng
Phone : 0-3851-3911 - 13
Fax : -
Email : chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Lot ID: 2032517
Date Received : Apr 06, 2020
Date Reported : Jun 15, 2020
Report Number : 1623159-2 Rev. No.1 C2
Sampling by : Chulaladet Wain

Page 1 of 1

Analyte	Unit	LOD	Result	Guideline Limit	Method
Metals Testing					
Calcium	mg/L	0.0005	4.17	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Sodium	mg/L	0.0005	9.55	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Magnesium	mg/L	0.003	2.73	No Standard	Based on US EPA, Method 200.7, Revision 4.4
SAR	-	-	5.14	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Water Testing					
Conductivity	at 25 degree C	-	1756	No Standard	Based on APHA (2017), 2510 B
Dissolved Oxygen	mg/L	-	5.7	≥2	Based on APHA (2017), 4500-O (C)

Guideline: Water Characteristics Discharge into Irrigation System, Royal Irrigation Department No.18/2561.

Note: This Analysis test report is reissued to supersede report no.1623159-2 C2, Date Reported : Apr 21, 2020

Remark :
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24000
Attn : Chokpisan Tongdeeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Lot ID: 2041024
Date Received : May 04, 2020
Date Reported : May 15, 2020
Report Number: 1642314-1
Sampling by : Chuladet Warin

Page 1 of 1

Reference Number 2041024-1
Sampling Date May 04, 2020 11:30 AM
Sample Description Wastewater
Location วนิพนธ์ (Wastewater Retention Pond)
Condition of Sample Contained in one amber glass bottle, two BOD bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Date of Analysis May 05, 2020

Analyte	Unit	LOD	Result	Guideline Limit	Method
Water Testing					
BOD (5 days at 20 degree C)	mg/L	-	3	≤20	Based on APHA (2017), 5210 B
Oil & Grease	mg/L	-	<3	≤5	Based on APHA (2017), 5520 B
pH	at 25 degree C	-	7.4	6.5-8.5	Based on APHA (2017), 4500-H (B)
Residual Free Chlorine *	mg/L	-	<0.1	≤1	Based on APHA (2017), 4500-C(F)
Temperature *	Degree C	-	31.3	≤40	Based on APHA (2017), 2550 B
Total Dissolved Solids	mg/L	-	948	≤1300	Based on APHA (2017), 2540 C
Total Suspended Solids	mg/L	-	10	≤30	Based on APHA (2017), 2540 D

Guideline: Water Characteristics Discharge into Irrigation System, Royal Irrigation Department No.18/2561.

Remark :
1. LOD : Limit of Detection
2. "<" : Lower than LOQ (Limit of Quantitation)
3. Analyte(s) marked * is/are not included in scope of Accreditation.

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Attn : Chokpisan Tongdeeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Lot ID: 2041024
Date Received : May 04, 2020
Date Reported : May 15, 2020
Report Number: 1642314-2 Rev. No.1
Sampling by : Chuladet Warin

Page 1 of 1

Reference Number 2041024-1
Sampling Date May 04, 2020 11:30 AM
Sample Description Wastewater
Location วนิพนธ์ (Wastewater Retention Pond)
Condition of Sample Contained in one amber glass bottle, two BOD bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)
Date of Analysis May 05, 2020

Analyte	Unit	LOD	Result	Guideline Limit	Method
Metals Testing					
Calcium	mg/L	0.0005	2.36	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Sodium	mg/L	0.0005	10.5	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Magnesium	mg/L	0.003	2.79	No Standard	Based on US EPA, Method 200.7, Revision 4.4
SAR	-	-	6.54	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Water Testing					
Conductivity	at 25 degree C	-	1631	No Standard	Based on APHA (2017), 2510 B
Dissolved Oxygen	mg/L	-	4.1	≥2	Based on APHA (2017), 4500-O (C)

Guideline: Water Characteristics Discharge into Irrigation System, Royal Irrigation Department No.18/2561.

Note: This Analysis test report is resubmitted to supersede report no.1642314-2, Date Reported : May 15, 2020

Remark :
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24000
Attn: Chokpisan Tongdeepheng
Phone: 0-3851-3911 - 13
Fax: -
Email: Chokpisan.gmnk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Lot ID: 2050743
Date Received : Jun 01, 2020
Date Reported : Jun 30, 2020
Report Number: 1662556-2C2
Sampling by : Samart Khumpliee

Page 1 of 1

Reference Number	2030745-1				
Sampling Date	Jun 01, 2020 11:35 AM				
Sample Description	Wastewater				
Location	น้ำทิ้ง (Wastewater Retention Pond)				
Condition of Sample	Contained in one amber glass bottle, five plastic bottles, two BOD bottles and two glass vials, sample containers comply to pretreatment - preservation standards (APHA, USEPA)				
Date of Analysis	Jun 02, 2020				
Analyte	Unit	LOD	Result	Guideline Limit	Method
Metals Testing					
Calcium	mg/L	0.0005	1.53	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Sodium	mg/L	0.0005	10.1	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Magnesium	mg/L	0.003	2.31	No Standard	Based on US EPA, Method 200.7, Revision 4.4
SSAR	-	-	7.32	No Standard	Based on US EPA, Method 200.7, Revision 4.4
Water Testing					
Conductivity	at 25 degree C	-	1485	No Standard	Based on APHA (2017), 2510 B
Guideline: Water Characteristics Discharge into Irrigation System, Royal Irrigation Department No.18/2561.					

Guideline: Water Characteristics Discharge into Irrigation System, Royal Irrigation Department No.18/2561.

Remark :

1. LOD : Limit of Detection
2. "L" : Lower than LOQ (Limit of Quantitation)

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Report to : Gulf JP NKK Co., Ltd.
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24000
Attn : Chokpisan Tongdeepeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnnk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Lot ID: 2050743
Date Received : Jun 01, 2020
Date Reported : Jun 30, 2020
Report Number: 1662556-2C2
Sampling by : Samart Khumplee

Page 1 of 1

Reference Number	2050743-1				
Sampling Date	Jun 01, 2020 11:35 AM				
Sample Description	Wastewater				
Location	น้ำทิ้ง (Wastewater Retention Pond)				
Condition of Sample	Contained in one amber glass bottle, five plastic bottles, two BOD bottles and two glass vials, sample containers comply to pretreatment - preservation standards (APHA, USEPA)				
Date of Analysis	Jun 02, 2020				
Analyte	Unit	LOD	Result	Guideline Limit	Method
Water Testing					
Dissolved Oxygen	mg/L	-	3.4	≥2	Based on APHA (2017), 4500-O (C)

Guideline: Water Characteristics Discharge into Irrigation System, Royal Irrigation Department No.18/2561.

Remark :
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ภาคผนวก ค-8

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Attn : Chokpisan Tongdeepeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnkk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Report Number : 1618988-1

Lot ID: 2022934
Date Received : Mar 14, 2020
Date Reported : Mar 19, 2020
Report Number: 1618988-1

Page 1 of 1

Reference Number	2022934-1
Parameter	Noise (Leq 8 hrs.)
Location	ใกล้ Gas Turbine 1
Measurement Date	13/03/2020
Measurement By	Pheeraphong Thongthupida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:26 AM - 09:26 AM	69.4	80.6	68.0
09:26 AM - 10:26 AM	71.1	74.2	70.1
10:26 AM - 11:26 AM	70.4	73.3	69.6
11:26 AM - 12:26 PM	71.2	75.0	69.6
12:26 PM - 01:26 PM	73.3	75.6	72.2
01:26 PM - 02:26 PM	71.7	75.6	69.8
02:26 PM - 03:26 PM	70.4	72.9	69.9
03:26 PM - 04:26 PM	70.4	74.6	69.8
Leq Average 8 hrs. (dB(A))	71.1		
Lmax (dB(A))	80.6		
Standard (dB(A))	90	140	

Reference Method : Based on ISO (1996)/1
: มาตรฐานการวัดเสียงรบกวน (ทั้ง ภาคการก่อสร้างและภาคอื่น)
Standard : มาตรฐานการวัดเสียงรบกวน (ทั้ง ภาคการก่อสร้างและภาคอื่น) ในกรุงเทพมหานคร พ.ศ.๒๕๕๐

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Attn : Chokpisan Tongdeepeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnkk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Report Number : 1618989-1

Lot ID: 2022934
Date Received : Mar 14, 2020
Date Reported : Mar 19, 2020
Report Number: 1618989-1

Page 1 of 1

Reference Number	2022934-2
Parameter	Noise (Leq 8 hrs.)
Location	ใกล้ Gas Turbine 2
Measurement Date	13/03/2020
Measurement By	Pheeraphong Thongthupida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:23 AM - 09:23 AM	73.5	78.5	71.9
09:23 AM - 10:23 AM	74.9	77.4	73.8
10:23 AM - 11:23 AM	74.7	77.6	73.6
11:23 AM - 12:23 PM	73.8	76.4	73.0
12:23 PM - 01:23 PM	73.7	76.8	72.9
01:23 PM - 02:23 PM	74.3	77.0	73.6
02:23 PM - 03:23 PM	74.2	76.7	73.5
03:23 PM - 04:23 PM	74.1	77.2	73.2
Leq Average 8 hrs. (dB(A))	74.2		
Lmax (dB(A))	78.5		
Standard (dB(A))	90	140	

Reference Method : Based on ISO (1996)/1
: มาตรฐานการวัดเสียงรบกวน (ทั้ง ภาคการก่อสร้างและภาคอื่น)
Standard : มาตรฐานการวัดเสียงรบกวน (ทั้ง ภาคการก่อสร้างและภาคอื่น) ในกรุงเทพมหานคร พ.ศ.๒๕๕๐

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Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Receipt No :
Lot ID: 2022934
Date Received : Mar 14, 2020
Date Reported : Mar 19, 2020
Report Number: 1618990-1

Page 1 of 1

Reference Number 2022934-3
Parameter Noise (Leq 8 hrs.)
Location 11km Steam Turbine
Measurement Date 13/03/2020
Measurement By Phetaphong Thongkhunpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:31 AM - 09:31 AM	82.9	88.5	81.1
09:31 AM - 10:31 AM	84.0	84.9	82.8
10:31 AM - 11:31 AM	83.9	85.4	82.7
11:31 AM - 12:31 PM	83.7	88.2	82.4
12:31 PM - 01:31 PM	83.6	84.6	82.3
01:31 PM - 02:31 PM	83.8	84.8	82.6
02:31 PM - 03:31 PM	83.9	84.7	82.7
03:31 PM - 04:31 PM	83.9	85.0	82.5

Leq Average 8 hrs. (dB(A))
Lmax (dB(A))
Standard (dB(A))
Reference Method : Based on ISO (1996)/1
Standard :
: ปริมาณการวัดเสียงจากเครื่องจักรกลอุตสาหกรรมและโรงงานอุตสาหกรรม
: ตามมาตรฐานการวัดเสียงจากเครื่องจักรกลอุตสาหกรรมและโรงงานอุตสาหกรรม

Technical Manager

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Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Receipt No :
Lot ID: 2022934
Date Received : Mar 14, 2020
Date Reported : Mar 19, 2020
Report Number: 1618991-1

Page 1 of 1

Reference Number 2022934-4
Parameter Noise (Leq 8 hrs.)
Location 11km HRSG 1
Measurement Date 13/03/2020
Measurement By Phetaphong Thongkhunpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:26 AM - 09:26 AM	72.0	74.9	71.3
09:26 AM - 10:26 AM	71.5	72.6	71.2
10:26 AM - 11:26 AM	71.5	72.6	71.1
11:26 AM - 12:26 PM	71.4	72.4	71.1
12:26 PM - 01:26 PM	71.6	72.9	71.3
01:26 PM - 02:26 PM	71.8	72.8	71.5
02:26 PM - 03:26 PM	71.9	73.6	71.5
03:26 PM - 04:26 PM	71.9	72.8	71.6

Leq Average 8 hrs. (dB(A))
Lmax (dB(A))
Standard (dB(A))
Reference Method : Based on ISO (1996)/1
Standard :
: ปริมาณการวัดเสียงจากเครื่องจักรกลอุตสาหกรรมและโรงงานอุตสาหกรรม
: ตามมาตรฐานการวัดเสียงจากเครื่องจักรกลอุตสาหกรรมและโรงงานอุตสาหกรรม

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Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Report Number : 1618992-1

Lot ID: 2022934
Date Received : Mar 14, 2020
Date Reported : Mar 19, 2020
Report Number : 1618992-1

Page 1 of 1

Reference Number	2022934-5
Parameter	Noise (Leq 8 hrs.)
Location	อาคาร HRSG 2
Measurement Date	13/03/2020
Measurement By	Pheeraphong Thongkumpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:32 AM - 09:32 AM	72.8	75.5	71.7
09:32 AM - 10:32 AM	72.5	73.7	72.2
10:32 AM - 11:32 AM	72.4	73.7	72.1
11:32 AM - 12:32 PM	72.5	73.8	72.1
12:32 PM - 01:32 PM	72.4	73.9	72.0
01:32 PM - 02:32 PM	72.4	73.6	72.0
02:32 PM - 03:32 PM	72.4	73.6	72.0
03:32 PM - 04:32 PM	72.5	73.6	72.2

Leq Average 8 hrs. (dB(A)) 72.5
Lmax (dB(A)) 75.5
Standard (dB(A)) 90
Reference Method : Based on ISO (1996)/1
Standard : กรมควบคุมมลพิษ (กรมการควบคุมมลพิษ)
Turnaround time for report (turnaround time) 1 working day (1 working day)

Technical Manager

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Analysis / Test Report

Report to : Gulf JP NKK Co., Ltd.
99 Moo 17, Dong Nakorn Neangket, Muang
Chachoengsao, Chachoengsao Thailand
24000
Attn : Chokpisan Tongdeepheng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :
Receipt No :
Report Number : 1618993-1

Lot ID: 2022934
Date Received : Mar 14, 2020
Date Reported : Mar 19, 2020
Report Number : 1618993-1

Page 1 of 1

Reference Number	2022934-6
Parameter	Noise (Leq 8 hrs.)
Location	อาคาร Cooling Tower
Measurement Date	13/03/2020
Measurement By	Pheeraphong Thongkumpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:29 AM - 09:29 AM	77.7	85.7	77.4
09:29 AM - 10:29 AM	78.0	79.4	77.6
10:29 AM - 11:29 AM	77.5	79.0	77.0
11:29 AM - 12:29 PM	77.5	78.9	77.0
12:29 PM - 01:29 PM	77.2	78.4	76.8
01:29 PM - 02:29 PM	77.1	78.0	76.8
02:29 PM - 03:29 PM	77.0	77.8	76.7
03:29 PM - 04:29 PM	76.9	80.4	76.7

Leq Average 8 hrs. (dB(A)) 77.4
Lmax (dB(A)) 85.7
Standard (dB(A)) 90
Reference Method : Based on ISO (1996)/1
Standard : กรมควบคุมมลพิษ (กรมการควบคุมมลพิษ)
Turnaround time for report (turnaround time) 1 working day (1 working day)

Technical Manager

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Attn : Chokpisan Tongdeepseng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Receipt No. :

Lot ID: 2050748
Date Received : Jun 03, 2020
Date Reported : Jun 09, 2020
Report Number: 1689074-1

Page 1 of 1

Reference Number 2050748-1
Parameter Noise (Leq 8 hrs.)
Location 11701 Gas Turbine 1
Measurement Date 01/06/2020
Measurement By Pheeraphong Thongkumpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
06:52 AM - 09:52 AM	73.4	102.8	68.6
09:52 AM - 10:52 AM	69.9	72.7	69.1
10:52 AM - 11:52 AM	69.4	71.6	69.0
11:52 AM - 12:52 PM	69.5	78.7	68.8
12:52 PM - 01:52 PM	69.3	71.9	68.7
01:52 PM - 02:52 PM	69.6	72.1	69.0
02:52 PM - 03:52 PM	69.6	74.2	69.0
03:52 PM - 04:52 PM	70.7	87.5	69.5

Leq Average 8 hrs. (dB(A)) 70.4
Lmax (dB(A)) 102.8
Standard (dB(A)) 90

Reference Method : Based on ISO (1996)/1
Standard : มาตรฐานการวัดและประเมินผลเสียงในแหล่งกำเนิดเสียงจากเครื่องจักรกล
ตามข้อกำหนดของกรมควบคุมมลพิษ (กรมควบคุมมลพิษ) และมาตรฐานของกรมควบคุมมลพิษ (กรมควบคุมมลพิษ)

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Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GNNK
P/O :
Receipt No. :

Lot ID: 2050748
Date Received : Jun 03, 2020
Date Reported : Jun 09, 2020
Report Number: 1689075-1

Page 1 of 1

Reference Number 2050748-2
Parameter Noise (Leq 8 hrs.)
Location 11701 Gas Turbine 2
Measurement Date 01/06/2020
Measurement By Pheeraphong Thongkumpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:55 AM - 09:55 AM	74.0	101.1	71.5
09:55 AM - 10:55 AM	73.3	76.5	72.7
10:55 AM - 11:55 AM	73.7	76.7	72.8
11:55 AM - 12:55 PM	74.3	77.3	72.9
12:55 PM - 01:55 PM	73.8	77.8	72.8
01:55 PM - 02:55 PM	73.8	77.9	73.0
02:55 PM - 03:55 PM	74.0	76.9	73.0
03:55 PM - 04:55 PM	73.8	92.8	72.8

Leq Average 8 hrs. (dB(A)) 73.8
Lmax (dB(A)) 101.1
Standard (dB(A)) 90

Reference Method : Based on ISO (1996)/1
Standard : มาตรฐานการวัดและประเมินผลเสียงในแหล่งกำเนิดเสียงจากเครื่องจักรกล
ตามข้อกำหนดของกรมควบคุมมลพิษ (กรมควบคุมมลพิษ) และมาตรฐานของกรมควบคุมมลพิษ (กรมควบคุมมลพิษ)

Technical Manager

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24000

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Phone : 0-3851-3911 - 13

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Project Name : Monitoring EIA

Location : GNKK

P/O :

Receipt No :

Lot ID: 2050748

Date Received : Jun 03, 2020

Date Reported : Jun 09, 2020

Report Number: 1689076-1

Page 1 of 1

Reference Number 2050748-3

Parameter Noise (Leq 8 hrs.)

Location ultra Steam Turbine

Measurement Date 01/06/2020

Measurement By Pheeraphong Thongchunpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:48 AM - 09:48 AM	82.3	101.2	80.3
09:48 AM - 10:48 AM	83.2	83.8	83.0
10:48 AM - 11:48 AM	83.1	83.8	82.8
11:48 AM - 12:48 PM	82.9	83.5	82.6
12:48 PM - 01:48 PM	82.9	83.5	82.7
01:48 PM - 02:48 PM	82.9	83.5	82.7
02:48 PM - 03:48 PM	83.1	83.6	83.0
03:48 PM - 04:48 PM	83.1	87.3	82.9
Leq Average 8 hrs. (dB(A))	82.9		
Lmax (dB(A))	101.2		
Standard (dB(A))	90	140	

Reference Method : Based on ISO (1996)/1
: วิธีการตรวจวัดเสียงรบกวน จาก มาตราการคุ้มครองการมลพิษ
เสียง
Turn on the equipment for measurement of noise level in the work area

Technical Manager

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Phone : 0-3851-3911 - 13

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Email : Chokpisan.gnkk@gulf.co.th

Project Name : Monitoring EIA

Location : GNKK

P/O :

Receipt No :

Lot ID: 2050748

Date Received : Jun 03, 2020

Date Reported : Jun 09, 2020

Report Number: 1689077-1

Page 1 of 1

Reference Number 2050748-4

Parameter Noise (Leq 8 hrs.)

Location ultra HISSG 1

Measurement Date 01/06/2020

Measurement By Pheeraphong Thongchunpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:45 AM - 09:45 AM	73.4	91.4	72.7
09:45 AM - 10:45 AM	73.3	74.4	73.0
10:45 AM - 11:45 AM	73.5	74.3	73.1
11:45 AM - 12:45 PM	73.6	74.7	73.2
12:45 PM - 01:45 PM	74.0	75.0	73.4
01:45 PM - 02:45 PM	73.9	75.2	73.1
02:45 PM - 03:45 PM	73.3	77.1	72.7
03:45 PM - 04:45 PM	73.1	92.2	72.4
Leq Average 8 hrs. (dB(A))	73.5		
Lmax (dB(A))	92.2		
Standard (dB(A))	90	140	

Reference Method : Based on ISO (1996)/1
: วิธีการตรวจวัดเสียงรบกวน จาก มาตราการคุ้มครองการมลพิษ
เสียง
Turn on the equipment for measurement of noise level in the work area

Technical Manager

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Phone : 0-3851-3911 - 13
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Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GWNK
P/O :
Receipt No :

Lot ID: 2050748
Date Received : Jun 03, 2020
Date Reported : Jun 09, 2020
Report Number : 1689078-1

Page 1 of 1

Reference Number 2050748-5
Parameter Noise (Leq 8 hrs.)
Location บริเวณ HSG 2
Measurement Date 01/06/2020
Measurement By Pheeraphong Thongkumpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:54 AM - 09:54 AM	73.2	91.3	72.4
09:54 AM - 10:54 AM	72.5	74.4	72.2
10:54 AM - 11:54 AM	73.4	73.4	71.8
11:54 AM - 12:54 PM	72.1	73.2	71.6
12:54 PM - 01:54 PM	71.4	72.4	71.0
01:54 PM - 02:54 PM	71.6	74.4	71.3
02:54 PM - 03:54 PM	71.6	72.8	71.3
03:54 PM - 04:54 PM	71.9	85.3	71.4
Leq Average 8 hrs. (dB(A))	72.1		
Lmax (dB(A))	91.3		
Standard (dB(A))	90	140	

Reference Method : Based on ISO (1996)/1
Standard :
: วิธีการวัดและรายงานผลเสียง : วิธีการสุ่มค่าและรายงานผลเสียง
: การแปลผลค่าการวัดเสียง : การแปลผลค่าการวัดเสียง

Technical Manager

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Phone : 0-3851-3911 - 13
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Email : Chokpisan.gmk@gulf.co.th

Project Name : Monitoring EIA
Location : GWNK
P/O :
Receipt No :

Lot ID: 2050748
Date Received : Jun 03, 2020
Date Reported : Jun 09, 2020
Report Number : 1689079-1

Page 1 of 1

Reference Number 2050748-6
Parameter Noise (Leq 8 hrs.)
Location บริเวณ Cooling Tower
Measurement Date 01/06/2020
Measurement By Pheeraphong Thongkumpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:50 AM - 09:50 AM	75.7	96.2	75.1
09:50 AM - 10:50 AM	75.2	76.5	75.0
10:50 AM - 11:50 AM	75.1	75.9	74.9
11:50 AM - 12:50 PM	75.2	75.8	75.1
12:50 PM - 01:50 PM	75.2	79.8	75.0
01:50 PM - 02:50 PM	75.2	76.1	75.1
02:50 PM - 03:50 PM	75.2	76.1	75.1
03:50 PM - 04:50 PM	75.2	75.9	75.1
Leq Average 8 hrs. (dB(A))	75.3		
Lmax (dB(A))	96.2		
Standard (dB(A))	90	140	

Reference Method : Based on ISO (1996)/1
Standard :
: วิธีการวัดและรายงานผลเสียง : วิธีการสุ่มค่าและรายงานผลเสียง
: การแปลผลค่าการวัดเสียง : การแปลผลค่าการวัดเสียง

Technical Manager

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Thailand 24000
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Email : Chokpisan.gnkk@gulf.co.th

Lot ID: 2022938
Date Received : Mar 16, 2020
Date Reported : Mar 19, 2020
Report Number : 1600877-1
Sampling by : Pheeraphong
Thongkhumpida

Page 1 of 7

Reference Number	2022938-1				
Sampling Date	Mar 13, 2020				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Location	บริเวณ 1 หลัง (ด้านหลังของอาคาร : - อุณหภูมิ : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Condenser Exhaust Unit	120	30.4	27.6	37.2	36.8
Average (WBST)	30.4				
Guideline WBGT (°C)	34.0				
Reference Method : Wet Bulb Globe Temperature					

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management

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Fax : -
Email : Chokpisan.gnkk@gulf.co.th

Lot ID: 2022938
Date Received : Mar 16, 2020
Date Reported : Mar 19, 2020
Report Number : 1600877-1
Sampling by : Pheeraphong
Thongkhumpida

Page 2 of 7

Reference Number	2022938-2				
Sampling Date	Mar 13, 2020				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Location	บริเวณงาน 1 หลัง (ใต้-บนอาคาร อยู่ใกล้ถังน้ำ :- บนบน :-)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณใกล้ถังน้ำ	120	30.5	26.7	40.7	37.1
Average (WBGT)	30.5				
Guideline WBGT (°C)	34.0				
Reference Method : Wet Bulb Globe Temperature					

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

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Lot ID: 2022938
Date Received : Mar 16, 2020
Date Reported : Mar 19, 2020
Report Number : 1600877-1
Sampling by : Pheeraphong
Thongkhunpida

Page 3 of 7

Reference Number	2022938-3				
Sampling Date	Mar 13, 2020				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Location	บริเวณงาน 1 หลัง (บริเวณงาน : - งาน : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Generator 1	120	31.6	26.9	44.2	39.0
Average (WBGT)		31.6			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

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Thailand 24000
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Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnnk@gulf.co.th

Lot ID: 2022938
Date Received : Mar 16, 2020
Date Reported : Mar 19, 2020
Report Number : 1600877-1
Sampling by : Pheeraphong
Thongkhunpida

Page 4 of 7

Reference Number	2022938-4				
Sampling Date	Mar 13, 2020				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Location	บริเวณงาน 1 หลัง (บริเวณงาน อุปกรณ์งาน : - งาน : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Generator 2	120		26.5	41.4	38.8
Average (WBGT)		30.7			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

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Thailand 24000
Attn : Chokpisan Tongdeepeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnik@gulf.co.th

Lot ID: 2022938
Date Received : Mar 16, 2020
Date Reported : Mar 19, 2020
Report Number : 1600877-1
Sampling by : Pheeraphong
Thongkhumkida

Page 5 of 7

Reference Number	2022938-5				
Sampling Date	Mar 13, 2020				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Location	บริเวณรอบ 1 ห้อง (ด้านหน้ารถ ตู้เย็น : - แสง : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Combustion Turbine 1	120	32.1	27.7	44.8	37.2
Average (WBGT)		32.1			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management

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Thailand 24000
Attn : Chokpisan Tongdeepeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnik@gulf.co.th

Lot ID: 2022938
Date Received : Mar 16, 2020
Date Reported : Mar 19, 2020
Report Number : 1600877-1
Sampling by : Pheeraphong
Thongkhumkida

Page 6 of 7

Reference Number	2022938-6				
Sampling Date	Mar 13, 2020				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Location	บริเวณรอบ 1 พื้น (ด้านหน้ารถ ตู้เย็น : - แสง : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Combustion Turbine 2	120	31.0	26.8	42.7	37.2
Average (WBGT)		31.0			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

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Attn : Chokpisan Tongdeepeng
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Fax : -
Email : Chokpisan.gnntk@gulf.co.th

Lot ID: 2022938
Date Received : Mar 16, 2020
Date Reported : Mar 19, 2020
Report Number : 1600877-1
Sampling by : Pheeraphong
Thongkumpida

Page 7 of 7

Reference Number	2022938-7				
Sampling Date	Mar 13, 2020				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Location	บริเวณ 1 หลัง (ด้านหลังอาคาร อยู่กลางแจ้ง : - ภายใน : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณอาคารหลังแรก	120	30.0	27.0	37.1	36.6
Average (WBGT)		30.0			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561).
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

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S' Report/Year op (11-4344)



Analysis / Test Report

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Thailand 24000
Attn : Chokpisan Tongdeepeng
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnntk@gulf.co.th

Lot ID: 2050749
Date Received : Jun 02, 2020
Date Reported : Jun 05, 2020
Report Number : 1662589-1
Sampling by : Pheeraphong
Thongkumpida

Page 1 of 7

Reference Number	2050749-1				
Sampling Date	Jun 01, 2020				
Parameter	Heat Stress (Sampling Time : 10.30 AM - 12.30 PM)				
Location	บริเวณ 1 หลัง (ด้านหลังสำนักงาน : - ภายใน : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ Condenser Exhaust Unit	120	29.9	27.7	35.3	34.4
Average (WBGT)		29.9			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561).
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

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Email : Chokpisan.gmk@gulf.co.th

Lot ID: 2050749
Date Received : Jun 02, 2020
Date Reported : Jun 05, 2020
Report Number : 1662589-1
Sampling by : Pheeraphong
Thongkhumprada

Page 2 of 7

Reference Number	2050749-2				
Sampling Date	Jun 01, 2020				
Parameter	Heat Stress (Sampling Time : 10.30 AM - 12.30 PM)				
Location	อุปกรณ์ 1 พื้น (ผ้า-รวมถุงมือ) : - แสง : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณแผงสวิตช์	120	29.9	27.3	36.1	35.2
Average (WBGT)	29.9				
Guideline WBGT (°C)	34.0				

Reference Method : Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Managi

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Lot ID: 2050749
Date Received : Jun 02, 2020
Date Reported : Jun 05, 2020
Report Number : 1662589-1
Sampling by : Pheeraphong
Thongkhumprada

Page 3 of 7

Reference Number	2050749-3				
Sampling Date	Jun 01, 2020				
Parameter	Heat Stress (Sampling Time : 10.30 AM - 12.30 PM)				
Location	อุปกรณ์ 1 พื้น (ผ้า-รวมถุงมือ) : - อุณหภูมิ : -				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
อุปกรณ์ Generator 1	120	30.1	27.3	37.1	35.2
Average (WBGT)	30.1				
Guideline WBGT (°C)	34.0				

Reference Method : Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

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Email : Chokpisan.gmnk@gulf.co.th

Lot ID: 2050749
Date Received : Jun 02, 2020
Date Reported : Jun 05, 2020
Report Number : 1662589-1
Sampling by : Pheeraphong
Thongkumpida

Page 4 of 7

Reference Number	2050749-4				
Sampling Date	Jun 01, 2020				
Parameter	Heat Stress (Sampling Time : 10.30 AM - 12.30 PM)				
Location	อุปกรณ์ 1 รั้ว (ด้านหน้า อุปกรณ์ : - อุณหภูมิ : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Ultra Generator 2	120	30.2	27.4	37.5	35.0
Average (WBGT)	30.2				
Guideline WBGT (°C)	34.0				

Reference Method : Wet Bulb Globe Temperature

Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
- Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

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Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gmnk@gulf.co.th

Lot ID: 2050749
Date Received : Jun 02, 2020
Date Reported : Jun 05, 2020
Report Number : 1662589-1
Sampling by : Pheeraphong
Thongkumpida

Page 5 of 7

Reference Number	2050749-5				
Sampling Date	Jun 01, 2020				
Parameter	Heat Stress (Sampling Time : 10.30 AM - 12.30 PM)				
Location	อุปกรณ์ 1 รั้ว (ด้านหน้า อุปกรณ์ : - อุณหภูมิ : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Ultra Combustion Turbine 1	120	30.0	27.3	37.0	35.1
Average (WBGT)	30.0				
Guideline WBGT (°C)	34.0				

Reference Method : Wet Bulb Globe Temperature

Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
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Fax : -
Email : Chokpisan.gnkk@gulf.co.th

Lot ID: 2050749
Date Received : Jun 02, 2020
Date Reported : Jun 05, 2020
Report Number : 1662589-1
Sampling by : Pheeraphong
Thongthumpida

Project Name : Monitoring EIA
Location : GNKK
P/O :

Reference Number	2050749-6
Sampling Date	Jun 01, 2020
Parameter	Heat Stress (Sampling Time : 10.30 AM - 12.30 PM)
Location	บริเวณ 1 ฝักร (ด้านหน้ารถบรรทุก :- อุณหภูมิ :-)
Location	Duration (min) WBGT (°C) NWB (°C) GT (°C) DB (°C)
บริเวณ 1 ฝักร	120 30.3 27.5 37.6 35.1
Average (WBGT)	30.3
Guideline WBGT (°C)	34.0
Reference Method	Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

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Attn : Chokpisan Tongdeepsing
Phone : 0-3851-3911 - 13
Fax : -
Email : Chokpisan.gnkk@gulf.co.th

Project Name : Monitoring EIA
Location : GNKK
P/O :

Reference Number	2050749-7
Sampling Date	Jun 01, 2020
Parameter	Heat Stress (Sampling Time : 10.30 AM - 12.00 PM)
Location	บริเวณ 1 ฝักร (ด้านหน้ารถบรรทุก :- อุณหภูมิ :-)
Location	Duration (min) WBGT (°C) NWB (°C) GT (°C) DB (°C)
บริเวณ 1 ฝักร	120 29.8 27.3 35.9 34.8
Average (WBGT)	29.8
Guideline WBGT (°C)	34.0
Reference Method	Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
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S. Vongpraditwong (S. Vongpraditwong)

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Analysis / Test Report

Lot ID: 2031096

Client : Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Neangket, Muang Chachoengsao, Chachoengsao Thailand 24000
P/O :
Project Name : Monitoring EIA
Project Location : GNNK

Lot ID: 2031096

Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1629547-1

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)	Spot	Average	Spot/Min	Limit	Average	Comment
Area - Electrical and Control Building : 2nd floor : Electrical Room											
1.1	2031096-1	13 Mar 2020	Day time	1	264	264	287.5	100	200	200	Pass
1.2	2031096-2	13 Mar 2020	Day time	2	248						
1.3	2031096-3	13 Mar 2020	Day time	3	283						
1.4	2031096-4	13 Mar 2020	Day time	4	355						
1.1	2031096-5	13 Mar 2020	Night time	1	238	233.5	100	200	200	200	Pass
1.2	2031096-6	13 Mar 2020	Night time	2	240						
1.3	2031096-7	13 Mar 2020	Night time	3	241						
1.4	2031096-8	13 Mar 2020	Night time	4	215						

Measurement by : Pteraphong Thongkhunpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

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Analysis / Test Report

Lot ID: 2022951

Client : Gulf JP NKK Co., Ltd.
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P/O :
Project Name : Monitoring EIA
Project Location : GNNK

Lot ID: 2022951

Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1609501-1

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)	Spot	Average	Spot/Min	Limit	Average	Comment
Area - Electrical and Control Building : 1 st floor : Cable Room											
1.1	2022951-1	13 Mar 2020	Day time	1	204	204	246.3	100	200	200	Pass
1.2	2022951-2	13 Mar 2020	Day time	2	274						
1.3	2022951-3	13 Mar 2020	Day time	3	248						
1.4	2022951-4	13 Mar 2020	Day time	4	259						
1.1	2022951-5	13 Mar 2020	Night time	1	208	229.8	100	200	200	200	Pass
1.2	2022951-6	13 Mar 2020	Night time	2	274						
1.3	2022951-7	13 Mar 2020	Night time	3	218						
1.4	2022951-8	13 Mar 2020	Night time	4	219						

Measurement by : Pteraphong Thongkhunpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

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P/O :
Project Name : Monitoring EIA
Project Location : GNNK

Lot ID: 2031097
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1629563-1

Page 1 of 4

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)	Spot	Average	Spot/Min	Limit	Comment
Area - Electrical and Control Building : 3 rd floor : Bathroom-Lady (T-04)										
1.1	2031097-1	13 Mar 2020	Day time	1	736	686.5	50	100	Pass	
1.2	2031097-2	13 Mar 2020	Day time	2	637					
1.1	2031097-3	13 Mar 2020	Night time	1	640	553.0	50	100	Pass	
1.2	2031097-4	13 Mar 2020	Night time	2	478					
Area - Electrical and Control Building : 3 rd floor : Broom Closet										
2.1	2031097-5	13 Mar 2020	Day time	1	416	505.0	50	100	Pass	
2.2	2031097-6	13 Mar 2020	Day time	2	594					
2.1	2031097-7	13 Mar 2020	Night time	1	409	410.5	50	100	Pass	
2.2	2031097-8	13 Mar 2020	Night time	2	412					
Area - Electrical and Control Building : 3 rd floor : Canteen										
3.1	2031097-9	13 Mar 2020	Day time	1	411	363.0	150	300	Pass	
3.2	2031097-10	13 Mar 2020	Day time	2	315					
3.1	2031097-11	13 Mar 2020	Night time	1	402	406.5	150	300	Pass	
3.2	2031097-12	13 Mar 2020	Night time	2	411					
Spot - Electrical and Control Building : 3 rd floor : Control Room #1										
4	2031097-13	13 Mar 2020	Day time	1	487	-	400-500	-	Pass	
4	2031097-14	13 Mar 2020	Night time	1	471	-	400-500	-	Pass	
Spot - Electrical and Control Building : 3 rd floor : Control Room #2										
5	2031097-15	13 Mar 2020	Day time	1	551	-	400-500	-	Pass	
5	2031097-16	13 Mar 2020	Night time	1	461	-	400-500	-	Pass	
Spot - Electrical and Control Building : 3 rd floor : Control Room #3										
6	2031097-17	13 Mar 2020	Day time	1	612	-	400-500	-	Pass	
6	2031097-18	13 Mar 2020	Night time	1	462	-	400-500	-	Pass	
Spot - Electrical and Control Building : 3 rd floor : Control Room #4										
7	2031097-19	13 Mar 2020	Day time	1	687	-	400-500	-	Pass	
7	2031097-20	13 Mar 2020	Night time	1	715	-	400-500	-	Pass	

Technical Management

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S:\Report\1629563-1



Analysis / Test Report

Client : Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Neangket, Muang Chachoengsao, Chachoengsao Thailand 24000
P/O :
Project Name : Monitoring EIA
Project Location : GNNK

Lot ID: 2031097
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1629563-1

Page 2 of 4

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)	Spot	Average	Spot/Min	Limit	Comment
Area - Electrical and Control Building : 3 rd floor : Document Room										
8.1	2031097-21	13 Mar 2020	Day time	1	751	827.5	150	300	Pass	
8.2	2031097-22	13 Mar 2020	Day time	2	904					
8.1	2031097-23	13 Mar 2020	Night time	1	640	640.5	150	300	Pass	
8.2	2031097-24	13 Mar 2020	Night time	2	641					
Area - Electrical and Control Building : 3 rd floor : DSC Room										
9.1	2031097-25	13 Mar 2020	Day time	1	355	355.7	100	200	Pass	
9.2	2031097-26	13 Mar 2020	Day time	2	364					
9.3	2031097-27	13 Mar 2020	Day time	3	360					
9.1	2031097-28	13 Mar 2020	Night time	1	361	362.3	100	200	Pass	
9.2	2031097-29	13 Mar 2020	Night time	2	362					
9.3	2031097-30	13 Mar 2020	Night time	3	364					
Area - Electrical and Control Building : 3 rd floor : Engineering Work Station Room										
10.1	2031097-31	13 Mar 2020	Day time	1	515	495.0	100	200	Pass	
10.2	2031097-32	13 Mar 2020	Day time	2	637					
10.3	2031097-33	13 Mar 2020	Day time	3	333					
10.1	2031097-34	13 Mar 2020	Night time	1	406	409.0	100	200	Pass	
10.2	2031097-35	13 Mar 2020	Night time	2	478					
10.3	2031097-36	13 Mar 2020	Night time	3	343					
Spot - Electrical and Control Building : 3 rd floor : Operation Manager										
11	2031097-37	13 Mar 2020	Day time	1	718	-	400-500	-	Pass	
11	2031097-38	13 Mar 2020	Night time	1	716	-	400-500	-	Pass	
Area - Electrical and Control Building : 3 rd floor : Restroom-Gentlemen (T-01)										
12.1	2031097-39	13 Mar 2020	Day time	1	640	689.0	50	100	Pass	
12.2	2031097-40	13 Mar 2020	Day time	2	738					
12.1	2031097-41	13 Mar 2020	Night time	1	550	590.0	50	100	Pass	
12.2	2031097-42	13 Mar 2020	Night time	2	630					

Technical Management

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Analysis / Test Report

Client : Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Nangphet, Muang Chachoengsao, Chachoengsao Thailand 24000
P/O :
Project Name : Monitoring EIA
Project Location : GNNK

Lot ID: 2031097
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1629563-1

Page 3 of 4

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux) Spot	Average	Spot/Min	Limit	Average	Comment
Area - Electrical and Control Building : 3 rd floor : Restroom-Gentlemen (T-03)										
13.1	2031097-43	13 Mar 2020	Day time	1	597	432.5	50	100	50	Pass
13.2	2031097-44	13 Mar 2020	Day time	2	268					
13.1	2031097-45	13 Mar 2020	Night time	1	611	444.5	50	100	50	Pass
13.2	2031097-46	13 Mar 2020	Night time	2	278					
Area - Electrical and Control Building : 3 rd floor : Restroom-Lady (T-02)										
14.1	2031097-47	13 Mar 2020	Day time	1	897	649.5	50	100	50	Pass
14.2	2031097-48	13 Mar 2020	Day time	2	402					
14.1	2031097-49	13 Mar 2020	Night time	1	711	637.5	50	100	50	Pass
14.2	2031097-50	13 Mar 2020	Night time	2	564					
Spot - Electrical and Control Building : 3 rd floor : Shift Operator Room #1										
15	2031097-51	13 Mar 2020	Day time	1	683	-	400-500	-	-	Pass
15	2031097-52	13 Mar 2020	Night time	1	425	-	400-500	-	-	Pass
Spot - Electrical and Control Building : 3 rd floor : Shift Operator Room #2										
16	2031097-53	13 Mar 2020	Day time	1	676	-	400-500	-	-	Pass
16	2031097-54	13 Mar 2020	Night time	1	470	-	400-500	-	-	Pass
Spot - Electrical and Control Building : 3 rd floor : Shift Operator Room #3										
17	2031097-55	13 Mar 2020	Day time	1	670	-	400-500	-	-	Pass
17	2031097-56	13 Mar 2020	Night time	1	460	-	400-500	-	-	Pass
Spot - Electrical and Control Building : 3 rd floor : Shift Operator Room #4										
18	2031097-57	13 Mar 2020	Day time	1	610	-	400-500	-	-	Pass
18	2031097-58	13 Mar 2020	Night time	1	470	-	400-500	-	-	Pass
Spot - Electrical and Control Building : 3 rd floor : Shift Operator Room #5										
19	2031097-59	13 Mar 2020	Day time	1	623	-	400-500	-	-	Pass
19	2031097-60	13 Mar 2020	Night time	1	560	-	400-500	-	-	Pass

Technical Manager

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Analysis / Test Report

Client : Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Nangphet, Muang Chachoengsao, Chachoengsao Thailand 24000
P/O :
Project Name : Monitoring EIA
Project Location : GNNK

Lot ID: 2031097
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1629563-1

Page 4 of 4

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux) Spot	Average	Spot/Min	Limit	Average	Comment
Area - Electrical and Control Building : 3 rd floor : Up-down Main Way (Stair)										
20.1	2031097-61	13 Mar 2020	Day time	1	522	495.0	50	100	50	Pass
20.2	2031097-62	13 Mar 2020	Day time	2	468					
20.1	2031097-63	13 Mar 2020	Night time	1	128	132.5	50	100	50	Pass
20.2	2031097-64	13 Mar 2020	Night time	2	137					
Area - Electrical and Control Building : 3 rd floor : Up-down Way (Exit Way)										
21.1	2031097-65	13 Mar 2020	Day time	1	497	577.5	50	100	50	Pass
21.2	2031097-66	13 Mar 2020	Day time	2	658					
21.1	2031097-67	13 Mar 2020	Night time	1	130	135.0	50	100	50	Pass
21.2	2031097-68	13 Mar 2020	Night time	2	140					
Area - Electrical and Control Building : 3 rd floor : Utility Room										
22.1	2031097-69	13 Mar 2020	Day time	1	224	182.5	100	200	100	Fail
22.2	2031097-70	13 Mar 2020	Day time	2	141					
22.1	2031097-71	13 Mar 2020	Night time	1	240	230.5	100	200	100	Pass
22.2	2031097-72	13 Mar 2020	Night time	2	221					

Measurement by : Pheeraphong Thongkumpitak Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

Technical Manager

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Analysis / Test Report

Lot ID: 2022954

Client : Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Neangket, Muang Chachoengsao, Chachoengsao Thailand 24000
P/O :
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1600913-1

Project Name : Monitoring EIA
Project Location : GNNK

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux) Spot	Average	Spot/Min	Limit	Comment
Spot - Water Laboratory : Balance									
1	2022954-1	13 Mar 2020	Day time	1	908	-	400-500	-	Pass
1	2022954-2	13 Mar 2020	Night time	1	672	-	400-500	-	Pass
Spot - Water Laboratory : Computer									
2	2022954-3	13 Mar 2020	Day time	1	931	-	400-500	-	Pass
2	2022954-4	13 Mar 2020	Night time	1	617	-	400-500	-	Pass
Area - Water Laboratory : Restroom (T-02)									
3.1	2022954-5	13 Mar 2020	Day time	1	254	271.0	50	100	Pass
3.2	2022954-6	13 Mar 2020	Day time	2	288				
3.1	2022954-7	13 Mar 2020	Night time	1	308	300.0	50	100	Pass
3.2	2022954-8	13 Mar 2020	Night time	2	292				
Area - Water Laboratory : Rise Floor#1 (Water Treatment)									
4.1	2022954-9	13 Mar 2020	Day time	1	598	646.5	100	200	Pass
4.2	2022954-10	13 Mar 2020	Day time	2	695				
4.1	2022954-11	13 Mar 2020	Night time	1	738	728.0	100	200	Pass
4.2	2022954-12	13 Mar 2020	Night time	2	718				
Spot - Water Laboratory : Rise Floor#2 (Water Treatment)									
5	2022954-13	13 Mar 2020	Day time	1	859	-	400-500	-	Pass
5	2022954-14	13 Mar 2020	Night time	1	635	-	400-500	-	Pass

Measurement by : Pheeraphong Thongkumpida, Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part. 35D dated February 21 (B.E.2561 (2018))

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Analysis / Test Report

Lot ID: 2022956

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P/O :
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1600919-1

Project Name : Monitoring EIA
Project Location : GNNK

Page 1 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux) Spot	Average	Spot/Min	Limit	Comment
Spot - Workshop & Warehouse : 2nd floor : C & I Staff Office #1									
1	2022956-1	13 Mar 2020	Day time	1	457	-	400-500	-	Pass
Spot - Workshop & Warehouse : 2nd floor : C & I Staff Office #2									
2	2022956-2	13 Mar 2020	Day time	1	617	-	400-500	-	Pass
Spot - Workshop & Warehouse : 2nd floor : C & I Staff Office #3									
3	2022956-3	13 Mar 2020	Day time	1	665	-	400-500	-	Pass
Area - Workshop & Warehouse : 2nd floor : Canteen									
4.1	2022956-4	13 Mar 2020	Day time	1	661	653.5	150	300	Pass
4.2	2022956-5	13 Mar 2020	Day time	2	646				
4.1	2022956-6	13 Mar 2020	Night time	1	495	375.5	150	300	Pass
4.2	2022956-7	13 Mar 2020	Night time	2	256				
Area - Workshop & Warehouse : 2nd floor : Document Center									
5.1	2022956-8	13 Mar 2020	Day time	1	579	586.5	150	300	Pass
5.2	2022956-9	13 Mar 2020	Day time	2	594				
5.1	2022956-10	13 Mar 2020	Night time	1	527	530.5	150	300	Pass
5.2	2022956-11	13 Mar 2020	Night time	2	534				
Spot - Workshop & Warehouse : 2nd floor : Electronic Staff Office									
6	2022956-12	13 Mar 2020	Day time	1	423	-	400-500	-	Pass
Spot - Workshop & Warehouse : 2nd floor : Information Technology (IT)									
7	2022956-13	13 Mar 2020	Day time	1	712	-	400-500	-	Pass
7	2022956-14	13 Mar 2020	Night time	1	507	-	400-500	-	Pass
Area - Workshop & Warehouse : 2nd floor : Maids Room									
8.1	2022956-15	13 Mar 2020	Day time	1	523	469.5	50	100	Pass
8.2	2022956-16	13 Mar 2020	Day time	2	416				
Spot - Workshop & Warehouse : 2nd floor : Maintenance Manager									
9	2022956-17	13 Mar 2020	Day time	1	464	-	400-400	-	Pass
9	2022956-18	13 Mar 2020	Night time	1	415	-	400-400	-	Pass
Spot - Workshop & Warehouse : 2nd floor : Mechanical Staff Office									
10	2022956-19	13 Mar 2020	Day time	1	484	-	400-400	-	Pass
10	2022956-20	13 Mar 2020	Night time	1	492	-	400-400	-	Pass

Technical Management

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Analysis / Test Report

Lot ID: 2022956

Client : Gulf JP NKK Co., Ltd.
99 Moo 17, King Nakorn Nangjiet, Muang Chachoengsao, Chachoengsao Thailand 24000
P/O :
Project Name : Monitoring EIA
Project Location : GNNK
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1600919-1

Page 2 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)	Spot	Average	Spot/Min	Average	Comment
Area - Workshop & Warehouse : 2nd floor : Meeting Room										
11.1	2022956-21	13 Mar 2020	Day time	1	686	686.0	150	300		Pass
11.2	2022956-22	13 Mar 2020	Day time	2	646					
11.1	2022956-23	13 Mar 2020	Night time	1	609	536.5	150	300		Pass
11.2	2022956-24	13 Mar 2020	Night time	2	464					
Area - Workshop & Warehouse : 2nd floor : Restroom-Gentlemen (T-03)										
12.1	2022956-25	13 Mar 2020	Day time	1	274	323.0	50	100		Pass
12.2	2022956-26	13 Mar 2020	Day time	2	372					
12.1	2022956-27	13 Mar 2020	Night time	1	296	287.0	50	100		Pass
12.2	2022956-28	13 Mar 2020	Night time	2	278					
Area - Workshop & Warehouse : 2nd floor : Restroom-Lady (T-04)										
13.1	2022956-29	13 Mar 2020	Day time	1	256	301.0	50	100		Pass
13.2	2022956-30	13 Mar 2020	Day time	2	346					
13.1	2022956-31	13 Mar 2020	Night time	1	245	280.5	50	100		Pass
13.2	2022956-32	13 Mar 2020	Night time	2	316					
Area - Workshop & Warehouse : 2nd floor : Spare Part Electrical Room										
14.1	2022956-33	13 Mar 2020	Day time	1	501	475.5	50	100		Pass
14.2	2022956-34	13 Mar 2020	Day time	2	450					
14.1	2022956-35	13 Mar 2020	Night time	1	519	519.5	50	100		Pass
14.2	2022956-36	13 Mar 2020	Night time	2	520					

Measurement by : Pheeraphong Thongkhanpida, Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 303 dated February 21 B.E.2561 (2018)

Technical Manager

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Analysis / Test Report

Lot ID: 2022944

Client : Gulf JP NKK Co., Ltd.
99 Moo 17, King Nakorn Nangjiet, Muang Chachoengsao, Chachoengsao Thailand 24000
P/O :
Project Name : Monitoring EIA
Project Location : GNNK
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1600890-1

Page 1 of 3

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)	Spot	Average	Spot/Min	Average	Comment
Area - Administration Building : Broom Closet										
1.1	2022944-1	13 Mar 2020	Day time	1	450	600.5	50	100		Pass
1.2	2022944-2	13 Mar 2020	Day time	2	751					
Area - Administration Building : Canteen & Pantry										
2.1	2022944-3	13 Mar 2020	Day time	1	707	666.5	150	300		Pass
2.2	2022944-4	13 Mar 2020	Day time	2	626					
2.1	2022944-5	13 Mar 2020	Night time	1	348	375.0	150	300		Pass
2.2	2022944-6	13 Mar 2020	Night time	2	402					
Area - Administration Building : Corridors										
3.1	2022944-7	13 Mar 2020	Day time	1	336	330.5	50	100		Pass
3.2	2022944-8	13 Mar 2020	Day time	2	325					
3.1	2022944-9	13 Mar 2020	Night time	1	248	253.5	50	100		Pass
3.2	2022944-10	13 Mar 2020	Night time	2	259					
Spot - Administration Building : EHS										
4	2022944-11	13 Mar 2020	Day time	1	984	-	400-500	-		Pass
4	2022944-12	13 Mar 2020	Night time	1	421	-	400-500	-		Pass
Area - Administration Building : First Aid Room										
5.1	2022944-13	13 Mar 2020	Day time	1	632	663.0	25	50		Pass
5.2	2022944-14	13 Mar 2020	Day time	2	694					
5.1	2022944-15	13 Mar 2020	Night time	1	469	473.5	25	50		Pass
5.2	2022944-16	13 Mar 2020	Night time	2	478					
Spot - Administration Building : General Office #1										
6	2022944-17	13 Mar 2020	Day time	1	634	-	400-500	-		Pass
6	2022944-18	13 Mar 2020	Night time	1	406	-	400-500	-		Pass
Spot - Administration Building : General Office #2										
7	2022944-19	13 Mar 2020	Day time	1	547	-	400-500	-		Pass
7	2022944-20	13 Mar 2020	Night time	1	598	-	400-500	-		Pass
Spot - Administration Building : General Office #3										
8	2022944-21	13 Mar 2020	Day time	1	546	-	400-500	-		Pass
8	2022944-22	13 Mar 2020	Night time	1	547	-	400-500	-		Pass

Technical Manager

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Analysis / Test Report

Client : Gulf JP NKK Co., Ltd.
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P/O :
Project Name : Monitoring EIA
Project Location : GNKK

Lot ID: 2022944
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1600890-1

Lay out No.		Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux) Spot	Average	Guideline Limit Spot/Min	Average	Comment
Spot - Administration Building : General Office #4										
9	2022944-23	13 Mar 2020	Day time	1	646	-	400-500	-	Pass	
9	2022944-24	13 Mar 2020	Night time	1	559	-	400-500	-	Pass	
Spot - Administration Building : General Office #5										
10	2022944-25	13 Mar 2020	Day time	1	652	-	400-500	-	Pass	
10	2022944-26	13 Mar 2020	Night time	1	604	-	400-500	-	Pass	
Area - Administration Building : Lan Sever Room										
11.1	2022944-27	13 Mar 2020	Day time	1	265	267.5	100	200	Pass	
11.2	2022944-28	13 Mar 2020	Day time	2	270					
Area - Administration Building : Master Document Room										
12.1	2022944-29	13 Mar 2020	Day time	1	492	530.0	150	300	Pass	
12.2	2022944-30	13 Mar 2020	Day time	2	568					
12.1	2022944-31	13 Mar 2020	Night time	1	409	409.5	150	300	Pass	
12.2	2022944-32	13 Mar 2020	Night time	2	410					
Area - Administration Building : Meeting Room 1										
13.1	2022944-33	13 Mar 2020	Day time	1	1,092	728.0	150	300	Pass	
13.2	2022944-34	13 Mar 2020	Day time	2	566					
13.3	2022944-35	13 Mar 2020	Day time	3	526					
13.1	2022944-36	13 Mar 2020	Night time	1	460	457.3	150	300	Pass	
13.2	2022944-37	13 Mar 2020	Night time	2	468					
13.3	2022944-38	13 Mar 2020	Night time	3	444					
Area - Administration Building : Meeting Room 2										
14.1	2022944-39	13 Mar 2020	Day time	1	497	492.0	150	300	Pass	
14.2	2022944-40	13 Mar 2020	Day time	2	487					
14.1	2022944-41	13 Mar 2020	Night time	1	359	359.5	150	300	Pass	
14.2	2022944-42	13 Mar 2020	Night time	2	360					
Area - Administration Building : Office Supply Area										
15.1	2022944-43	13 Mar 2020	Day time	1	256	406.5	50	100	Pass	
15.2	2022944-44	13 Mar 2020	Day time	2	557					
15.1	2022944-45	13 Mar 2020	Night time	1	240	235.5	50	100	Pass	
15.2	2022944-46	13 Mar 2020	Night time	2	231					

Technical Manager

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Analysis / Test Report

Client : Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Neanglet, Muang Chachoengsao, Chachoengsao Thailand 24000
P/O :
Project Name : Monitoring EIA
Project Location : GNKK

Lot ID: 2022944
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1600890-1

Lay out No.		Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux) Spot	Average	Guideline Limit Spot/Min	Average	Comment
Spot - Administration Building : Plant Manager										
16	2022944-47	13 Mar 2020	Day time	1	474	-	400-500	-	Pass	
16	2022944-48	13 Mar 2020	Night time	1	644	-	400-500	-	Pass	
Area - Administration Building : Reception Area										
17.1	2022944-49	13 Mar 2020	Day time	1	326	323.0	150	300	Pass	
17.2	2022944-50	13 Mar 2020	Day time	2	320					
17.1	2022944-51	13 Mar 2020	Night time	1	341	326.0	150	300	Pass	
17.2	2022944-52	13 Mar 2020	Night time	2	311					
Area - Administration Building : Restroom-Gentlemen										
18.1	2022944-53	13 Mar 2020	Day time	1	295	377.0	50	100	Pass	
18.2	2022944-54	13 Mar 2020	Day time	2	459					
18.1	2022944-55	13 Mar 2020	Night time	1	280	277.5	50	100	Pass	
18.2	2022944-56	13 Mar 2020	Night time	2	275					
Area - Administration Building : Restroom-Lady										
19.1	2022944-57	13 Mar 2020	Day time	1	371	351.5	50	100	Pass	
19.2	2022944-58	13 Mar 2020	Day time	2	332					
19.1	2022944-59	13 Mar 2020	Night time	1	278	273.0	50	100	Pass	
19.2	2022944-60	13 Mar 2020	Night time	2	268					
Spot - Administration Building : Spare Office										
20	2022944-61	13 Mar 2020	Day time	1	459	-	400-500	-	Pass	
20	2022944-62	13 Mar 2020	Night time	1	426	-	400-500	-	Pass	
Area - Administration Building : Utility Room										
21.1	2022944-63	13 Mar 2020	Day time	1	843	746.0	100	200	Pass	
21.2	2022944-64	13 Mar 2020	Day time	2	649					
21.1	2022944-65	13 Mar 2020	Night time	1	731	642.5	100	200	Pass	
21.2	2022944-66	13 Mar 2020	Night time	2	554					

Measurement by : Pheeraphong Thongkumpkha Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 29D dated February 21 B.E.2561 (2018)

Technical Manager

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Analysis / Test Report

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P/O :
Project Name : Monitoring EIA
Project Location : GNKK

Lot ID: 2022952
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1600907-1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Guard Room									
1.1	2022952-1	13 Mar 2020	Day time	1	4,030	3,530	-	100	Pass
1.2	2022952-2	13 Mar 2020	Day time	2	3,030				
1.1	2022952-3	13 Mar 2020	Night time	1	450	472.0	-	100	Pass
1.2	2022952-4	13 Mar 2020	Night time	2	494				
Area - Guard Room : Restroom (Logger Room)									
2.1	2022952-5	13 Mar 2020	Day time	1	396	379.5	50	100	Pass
2.2	2022952-6	13 Mar 2020	Day time	2	363				
2.1	2022952-7	13 Mar 2020	Night time	1	376	398.5	50	100	Pass
2.2	2022952-8	13 Mar 2020	Night time	2	421				
Area - Guard Room : Restroom (T-01)									
3.1	2022952-9	13 Mar 2020	Day time	1	411	414.5	50	100	Pass
3.2	2022952-10	13 Mar 2020	Day time	2	418				
3.1	2022952-11	13 Mar 2020	Night time	1	333	314.5	50	100	Pass
3.2	2022952-12	13 Mar 2020	Night time	2	296				

Measurement by : Pheeraphong Thongkumpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

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P/O :
Project Name : Monitoring EIA
Project Location : GNKK

Lot ID: 2022953
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1600909-1

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Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Switchyard Control Building : Battery Room									
1.1	2022953-1	13 Mar 2020	Day time	1	208	185.5	50	100	Pass
1.2	2022953-2	13 Mar 2020	Day time	2	163				
1.1	2022953-3	13 Mar 2020	Night time	1	118	142.5	50	100	Pass
1.2	2022953-4	13 Mar 2020	Night time	2	167				
Area - Switchyard Control Building : Control Room #1									
2.1	2022953-5	13 Mar 2020	Day time	1	550	431.0	100	200	Pass
2.2	2022953-6	13 Mar 2020	Day time	2	312				
2.1	2022953-7	13 Mar 2020	Night time	1	292	300.5	100	200	Pass
2.2	2022953-8	13 Mar 2020	Night time	2	309				
Area - Switchyard Control Building : Control Room #2									
3.1	2022953-9	13 Mar 2020	Day time	1	556	726.0	100	200	Pass
3.2	2022953-10	13 Mar 2020	Day time	2	856				
3.1	2022953-11	13 Mar 2020	Night time	1	261	266.0	100	200	Pass
3.2	2022953-12	13 Mar 2020	Night time	2	271				
Area - Switchyard Control Building : Switchyard Room									
4.1	2022953-13	13 Mar 2020	Day time	1	286	262.0	100	200	Pass
4.2	2022953-14	13 Mar 2020	Day time	2	238				
4.1	2022953-15	13 Mar 2020	Night time	1	205	207.0	100	200	Pass
4.2	2022953-16	13 Mar 2020	Night time	2	209				

Measurement by : Pheeraphong Thongkumpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

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P/O :
Project Name : Monitoring EIA
Project Location : GNNK

Lot ID: 2028633
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1614634-1

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux) Spot	Average	Guideline Limit Spot/Min	Average	Comment
Area - Terminal Substation : Control Room									
1.1	2028633-1	13 Mar 2020	Day time	1	726	595.5	100	200	Pass
1.2	2028633-2	13 Mar 2020	Day time	2	465				
1.1	2028633-3	13 Mar 2020	Night time	1	688	644.0	100	200	Pass
1.2	2028633-4	13 Mar 2020	Night time	2	600				
Area - Terminal Substation : Battery Room									
2.1	2028633-5	13 Mar 2020	Day time	1	275	295.0	50	100	Pass
2.2	2028633-6	13 Mar 2020	Day time	2	315				
2.1	2028633-7	13 Mar 2020	Night time	1	204	235.0	50	100	Pass
2.2	2028633-8	13 Mar 2020	Night time	2	266				

Measurement by : Pheeraphong Thongkhitpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 38D dated February 21 B.E.2561 (2018)

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P/O :
Project Name : Monitoring EIA
Project Location : GNNK

Lot ID: 2022955
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1628478-1

Page 1 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux) Spot	Average	Guideline Limit Spot/Min	Average	Comment
Area - Workshop & Warehouse : 1st floor : C & I Lab Room									
1.1	2022955-1	13 Mar 2020	Day time	1	359	388.5	50	100	Pass
1.2	2022955-2	13 Mar 2020	Day time	2	418				
Area - Workshop & Warehouse : 1st floor : Control Temp Spare Part									
2.1	2022955-3	13 Mar 2020	Day time	1	233	243.0	50	100	Pass
2.2	2022955-4	13 Mar 2020	Day time	2	253				
Area - Workshop & Warehouse : 1st floor : Helper Room									
3.1	2022955-5	13 Mar 2020	Day time	1	360	355.0	50	100	Pass
3.2	2022955-6	13 Mar 2020	Day time	2	350				
3.1	2022955-7	13 Mar 2020	Night time	1	353	348.0	50	100	Pass
3.2	2022955-8	13 Mar 2020	Night time	2	343				
Area - Workshop & Warehouse : 1st floor : MDO Electrical Control Room									
4.1	2022955-9	13 Mar 2020	Day time	1	387	389.5	50	100	Pass
4.1	2022955-11	13 Mar 2020	Night time	1	360	360.5	50	100	Pass
4.2	2022955-12	13 Mar 2020	Night time	2	361				
Area - Workshop & Warehouse : 1st floor : Restroom-Gentlemen (T-02)									
5.1	2022955-13	13 Mar 2020	Day time	1	386	324.5	50	100	Pass
5.2	2022955-14	13 Mar 2020	Day time	2	263				
5.1	2022955-15	13 Mar 2020	Night time	1	378	369.0	50	100	Pass
5.2	2022955-16	13 Mar 2020	Night time	2	360				
Area - Workshop & Warehouse : 1st floor : Spare Part Mechanical Room									
6.1	2022955-17	13 Mar 2020	Day time	1	272	221.0	50	100	Pass
6.2	2022955-18	13 Mar 2020	Day time	2	170				
6.1	2022955-19	13 Mar 2020	Night time	1	280	260.5	50	100	Pass
6.2	2022955-20	13 Mar 2020	Night time	2	261				
Area - Workshop & Warehouse : 1st floor : Storage Room									
7.1	2022955-21	13 Mar 2020	Day time	1	281	255.0	50	100	Pass
7.2	2022955-22	13 Mar 2020	Day time	2	229				
Area - Workshop & Warehouse : 1st floor : Unsecured Heavy/Bulky A/B									
8.1	2022955-23	13 Mar 2020	Day time	1	197	225.5	50	100	Pass
8.2	2022955-24	13 Mar 2020	Day time	2	254				

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Analysis / Test Report

Client : Gulf JP NKK Co., Ltd.
99 Moo 17, King Nakorn Neangket, Muang Chachoengsao, Chachoengsao Thailand 24000
P/O :
Project Name : Monitoring EIA
Project Location : GNNK

Lot ID: 2022955
Date Received : Mar 19, 2020
Date Reported : Apr 01, 2020
Report Number : 1629478-1

Page 2 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)	Spot	Average	Spot/Min	Average	Comment
Area - Workshop & Warehouse : 1st floor : Unsecured Heavy/Bulky C; D										
9.1	2022955-25	13 Mar 2020	Day time	1	245	254.5	50	100		Pass
9.2	2022955-26	13 Mar 2020	Day time	2	264					
Area - Workshop & Warehouse : 1st floor : Unsecured Heavy/Bulky E; F										
10.1	2022955-27	13 Mar 2020	Day time	1	116	198.0	50	100		Pass
10.2	2022955-28	13 Mar 2020	Day time	2	280					
Area - Workshop & Warehouse : 1st floor : Unsecured Warehouse Area										
11.1	2022955-29	13 Mar 2020	Day time	1	292	280.0	50	100		Pass
11.2	2022955-30	13 Mar 2020	Day time	2	268					
11.1	2022955-31	13 Mar 2020	Night time	1	290	275.0	50	100		Pass
11.2	2022955-32	13 Mar 2020	Night time	2	260					
Area - Workshop & Warehouse : 1st floor : Warehouse Room										
12.1	2022955-33	13 Mar 2020	Day time	1	621	599.5	50	100		Pass
12.2	2022955-34	13 Mar 2020	Day time	2	578					

Measurement by : Pheeraphong Thongkumpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

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P/O :
Project Name : Monitoring EIA
Project Location : GNNK

Lot ID: 2065401
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1694905-1

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)	Spot	Average	Spot/Min	Average	Comment
Area - Electrical and Control Building : 2nd floor : Electrical Room										
1.1	2065401-1	1 Jun 2020	Day time	1	432	389.5	100	200		Pass
1.2	2065401-2	1 Jun 2020	Day time	2	414					
1.3	2065401-3	1 Jun 2020	Day time	3	389					
1.4	2065401-4	1 Jun 2020	Day time	4	323					

Measurement by : Pheeraphong Thongkumpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

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P/O :
Project Name : Monitoring EIA
Project Location : GNKK

Lot ID: 2065394
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1694858-1

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux) Spot	Average	Guideline Limit Spot/Min	Average	Comment
Area - Electrical and Control Building : 1 st floor : Cable Room									
1.1	2065394-1	1 Jun 2020	Day time	1	402	411.3	100	200	Pass
1.2	2065394-2	1 Jun 2020	Day time	2	421				
1.3	2065394-3	1 Jun 2020	Day time	3	359				
1.4	2065394-4	1 Jun 2020	Day time	4	463				

Measurement by : Pheeraphong Thongbunpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)



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P/O :
Project Name : Monitoring EIA
Project Location : GNKK

Lot ID: 2065402
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1694915-1

Page 1 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux) Spot	Average	Guideline Limit Spot/Min	Average	Comment
Area - Electrical and Control Building : 3 rd floor : Bathroom-Lady (T-04)									
1.1	2065402-1	1 Jun 2020	Day time	1	930	924.5	50	100	Pass
1.2	2065402-2	1 Jun 2020	Day time	2	919				
Area - Electrical and Control Building : 3 rd floor : Broom Closet									
2.1	2065402-3	1 Jun 2020	Day time	1	505	554.0	50	100	Pass
2.2	2065402-4	1 Jun 2020	Day time	2	603				
Area - Electrical and Control Building : 3 rd floor : Canteen									
3.1	2065402-5	1 Jun 2020	Day time	1	369	372.5	150	300	Pass
3.2	2065402-6	1 Jun 2020	Day time	2	376				
Spot - Electrical and Control Building : 3 rd floor : Control Room #1									
4	2065402-7	1 Jun 2020	Day time	1	493	-	400-500	-	Pass
Spot - Electrical and Control Building : 3 rd floor : Control Room #2									
5	2065402-8	1 Jun 2020	Day time	1	436	-	400-500	-	Pass
Spot - Electrical and Control Building : 3 rd floor : Control Room #3									
6	2065402-9	1 Jun 2020	Day time	1	412	-	400-500	-	Pass
Spot - Electrical and Control Building : 3 rd floor : Control Room #4									
7	2065402-10	1 Jun 2020	Day time	1	709	-	400-500	-	Pass
Area - Electrical and Control Building : 3 rd floor : Document Room									
8.1	2065402-11	1 Jun 2020	Day time	1	696	740.5	150	300	Pass
8.2	2065402-12	1 Jun 2020	Day time	2	785				
Area - Electrical and Control Building : 3 rd floor : DSC Room									
9.1	2065402-13	1 Jun 2020	Day time	1	560	586.3	100	200	Pass
9.2	2065402-14	1 Jun 2020	Day time	2	669				
9.3	2065402-15	1 Jun 2020	Day time	3	530				
Area - Electrical and Control Building : 3 rd floor : Engineering Work Station Room									
10.1	2065402-16	1 Jun 2020	Day time	1	990	921.0	100	200	Pass
10.2	2065402-17	1 Jun 2020	Day time	2	861				
10.3	2065402-18	1 Jun 2020	Day time	3	912				
Spot - Electrical and Control Building : 3 rd floor : Operation Manager									
11	2065402-19	1 Jun 2020	Day time	1	629	-	400-500	-	Pass

Technical Management

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P/O :
Project Name : Monitoring EIA
Project Location : GNNK
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1694915-1

Page 2 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)	Spot	Average	Spot/Min	Guideline Limit	Comment
12.1	Area - Electrical and Control Building : 3 rd floor : Restroom-Gentlemen (T-01)	1 Jun 2020	Day time	1	777	623.5	50	100	Pass	
12.2	Area - Electrical and Control Building : 3 rd floor : Restroom-Gentlemen (T-01)	1 Jun 2020	Day time	2	470					
13.1	Area - Electrical and Control Building : 3 rd floor : Restroom-Gentlemen (T-03)	1 Jun 2020	Day time	1	284	505.0	50	100	Pass	
13.2	Area - Electrical and Control Building : 3 rd floor : Restroom-Gentlemen (T-03)	1 Jun 2020	Day time	2	726					
14.1	Area - Electrical and Control Building : 3 rd floor : Restroom-Lady (T-02)	1 Jun 2020	Day time	1	492	478.5	50	100	Pass	
14.2	Area - Electrical and Control Building : 3 rd floor : Restroom-Lady (T-02)	1 Jun 2020	Day time	2	465					
15	Spot - Electrical and Control Building : 3 rd floor : Shift Operator Room #1	1 Jun 2020	Day time	1	687	-	400-500	-	Pass	
16	Spot - Electrical and Control Building : 3 rd floor : Shift Operator Room #2	1 Jun 2020	Day time	1	640	-	400-500	-	Pass	
17	Spot - Electrical and Control Building : 3 rd floor : Shift Operator Room #3	1 Jun 2020	Day time	1	540	-	400-500	-	Pass	
18	Spot - Electrical and Control Building : 3 rd floor : Shift Operator Room #4	1 Jun 2020	Day time	1	649	-	400-500	-	Pass	
19	Spot - Electrical and Control Building : 3 rd floor : Shift Operator Room #5	1 Jun 2020	Day time	1	707	-	400-500	-	Pass	
20.1	Area - Electrical and Control Building : 3 rd floor : Up-down Main Way (Stair)	1 Jun 2020	Day time	1	496	510.0	50	100	Pass	
20.2	Area - Electrical and Control Building : 3 rd floor : Up-down Main Way (Stair)	1 Jun 2020	Day time	2	524					
21.1	Area - Electrical and Control Building : 3 rd floor : Up-down Way (Exit Way)	1 Jun 2020	Day time	1	884	934.0	50	100	Pass	
21.2	Area - Electrical and Control Building : 3 rd floor : Up-down Way (Exit Way)	1 Jun 2020	Day time	2	984					
22.1	Area - Electrical and Control Building : 3 rd floor : Utility Room	1 Jun 2020	Day time	1	283	243.5	100	200	Pass	
22.2	Area - Electrical and Control Building : 3 rd floor : Utility Room	1 Jun 2020	Day time	2	204					

Measurement by : Phisaphong Thongkhunpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 350 dated February 21 B.E.2561 (2018)

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S. Meenakshyapriya



Analysis / Test Report

Lot ID: 2065397

Client : Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nakorn Nangket, Muang Chachoengsao, Chachoengsao Thailand 24000
P/O :
Project Name : Monitoring EIA
Project Location : GNNK
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1694871-1

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)	Spot	Average	Spot/Min	Guideline Limit	Comment
1	Spot - Water Laboratory : Balance	1 Jun 2020	Day time	1	989	-	400-500	-	Pass	
2	Spot - Water Laboratory : Computer	1 Jun 2020	Day time	1	994	-	400-500	-	Pass	
3.1	Area - Water Laboratory : Restroom (T-02)	1 Jun 2020	Day time	1	360	300.5	50	100	Pass	
3.2	Area - Water Laboratory : Restroom (T-02)	1 Jun 2020	Day time	2	241					
4.1	Area - Water Laboratory : Rise Floor#1 (Water Treatment)	1 Jun 2020	Day time	1	240	315.0	100	200	Pass	
4.2	Area - Water Laboratory : Rise Floor#1 (Water Treatment)	1 Jun 2020	Day time	2	390					
5	Spot - Water Laboratory : Rise Floor#2 (Water Treatment)	1 Jun 2020	Day time	1	992	-	400-500	-	Pass	

Measurement by : Phisaphong Thongkhunpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 350 dated February 21 B.E.2561 (2018)

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P/O :
Project Name : Monitoring EIA
Project Location : GNNK

Lot ID: 2065399
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1694899-1

Page 1 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux) Spot	Average	Spot/Min	Guideline Limit	Comment
1	Spot - Workshop & Warehouse : 2nd floor : C & I Staff Office #1	1 Jun 2020	Day time	1	513	-	400-500	-	Pass
2	Spot - Workshop & Warehouse : 2nd floor : C & I Staff Office #2	1 Jun 2020	Day time	1	831	-	400-500	-	Pass
3	Spot - Workshop & Warehouse : 2nd floor : C & I Staff Office #3	1 Jun 2020	Day time	1	670	-	400-500	-	Pass
4.1	Area - Workshop & Warehouse : 2nd floor : Canteen	1 Jun 2020	Day time	1	449	435.0	150	300	Pass
4.2	Spot - Workshop & Warehouse : 2nd floor : Document Center	1 Jun 2020	Day time	1	506	478.0	150	300	Pass
5.1	Spot - Workshop & Warehouse : 2nd floor : Electronic Staff Office	1 Jun 2020	Day time	1	463	-	400-500	-	Pass
5.2	Spot - Workshop & Warehouse : 2nd floor : Information Technology (IT)	1 Jun 2020	Day time	1	621	-	400-500	-	Pass
6	Area - Workshop & Warehouse : 2nd floor : Maids Room	1 Jun 2020	Day time	1	462	467.5	50	100	Pass
8.1	Spot - Workshop & Warehouse : 2nd floor : Maintenance Manager	1 Jun 2020	Day time	1	499	-	400-500	-	Pass
8.2	Spot - Workshop & Warehouse : 2nd floor : Mechanical Staff Office	1 Jun 2020	Day time	1	520	-	400-500	-	Pass
9	Area - Workshop & Warehouse : 2nd floor : Meeting Room	1 Jun 2020	Day time	1	865	890.5	150	300	Pass
10	Area - Workshop & Warehouse : 2nd floor : Restroom-Gentlemen (T-03)	1 Jun 2020	Day time	1	320	302.0	50	100	Pass
11.1	Spot - Workshop & Warehouse : 2nd floor : Restroom-Lady (T-04)	1 Jun 2020	Day time	1	361	301.0	50	100	Pass
11.2	Spot - Workshop & Warehouse : 2nd floor : Restroom-Lady (T-04)	1 Jun 2020	Day time	1	361	301.0	50	100	Pass
12.1	Spot - Workshop & Warehouse : 2nd floor : Restroom-Lady (T-04)	1 Jun 2020	Day time	1	361	301.0	50	100	Pass
12.2	Spot - Workshop & Warehouse : 2nd floor : Restroom-Lady (T-04)	1 Jun 2020	Day time	1	361	301.0	50	100	Pass
13.1	Spot - Workshop & Warehouse : 2nd floor : Restroom-Lady (T-04)	1 Jun 2020	Day time	1	361	301.0	50	100	Pass
13.2	Spot - Workshop & Warehouse : 2nd floor : Restroom-Lady (T-04)	1 Jun 2020	Day time	1	361	301.0	50	100	Pass

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S.Usenat/Vatirak



Analysis / Test Report

Client : Gulf JP NKK Co., Ltd.
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P/O :
Project Name : Monitoring EIA
Project Location : GNNK

Lot ID: 2065399
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1694899-1

Page 2 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux) Spot	Average	Spot/Min	Guideline Limit	Comment
14.1	Area - Workshop & Warehouse : 2nd floor : Spare Part Electrical	1 Jun 2020	Day time	1	446	480.5	50	100	Pass
14.2	Spot - Workshop & Warehouse : 2nd floor : Spare Part Electrical	1 Jun 2020	Day time	2	515	-	-	-	Pass

Measurement by : Phetraraphong Thongkumpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 390 dated February 21 B.E.2561 (2018)

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P/O :
Project Name : Monitoring EIA
Project Location : GNKK

Lot ID: 2051286
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1668684-1

Page 1 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)	Spot	Average	Spot/Min	Average	Comment
Area - Administration Building : Broom Closet										
1.1	2051286-1	1 Jun 2020	Day time	1	709	724.5	50	100		Pass
1.2	2051286-2	1 Jun 2020	Day time	2	740					
Area - Administration Building : Canteen & Pantry										
2.1	2051286-3	1 Jun 2020	Day time	1	785	774.5	150	300		Pass
2.2	2051286-4	1 Jun 2020	Day time	2	764					
Area - Administration Building : Corridors										
3.1	2051286-5	1 Jun 2020	Day time	1	668	635.0	50	100		Pass
3.2	2051286-6	1 Jun 2020	Day time	2	602					
Spot - Administration Building : EHS										
4	2051286-7	1 Jun 2020	Day time	1	617	-	400-500	-		Pass
Area - Administration Building : First Aid Room										
5.1	2051286-8	1 Jun 2020	Day time	1	639	653.0	25	50		Pass
5.2	2051286-9	1 Jun 2020	Day time	2	667					
Spot - Administration Building : General Office #1										
6	2051286-10	1 Jun 2020	Day time	1	480	-	400-500	-		Pass
Spot - Administration Building : General Office #2										
7	2051286-11	1 Jun 2020	Day time	1	470	-	400-500	-		Pass
Spot - Administration Building : General Office #3										
8	2051286-12	1 Jun 2020	Day time	1	560	-	400-500	-		Pass
Spot - Administration Building : General Office #4										
9	2051286-13	1 Jun 2020	Day time	1	450	-	400-500	-		Pass
Spot - Administration Building : General Office #5										
10	2051286-14	1 Jun 2020	Day time	1	610	-	400-500	-		Pass
Area - Administration Building : Lan Sever Room										
11.1	2051286-15	1 Jun 2020	Day time	1	404	432.0	100	200		Pass
11.2	2051286-16	1 Jun 2020	Day time	2	460					
Area - Administration Building : Master Document Room										
12.1	2051286-17	1 Jun 2020	Day time	1	543	561.5	150	300		Pass
12.2	2051286-18	1 Jun 2020	Day time	2	580					

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Analysis / Test Report

Client : Gulf JP NKK Co., Ltd.
99 Moo 17, Klong Nalam Reangjet, Muang Chachoengsao, Chachoengsao Thailand 24000
P/O :
Project Name : Monitoring EIA
Project Location : GNKK

Lot ID: 2051286
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1668684-1

Page 2 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)	Spot	Average	Spot/Min	Average	Comment
Area - Administration Building : Meeting Room 1										
13.1	2051286-19	1 Jun 2020	Day time	1	1,320	968.3	150	300		Pass
13.2	2051286-20	1 Jun 2020	Day time	2	924					
13.3	2051286-21	1 Jun 2020	Day time	3	661					
Area - Administration Building : Meeting Room 2										
14.1	2051286-22	1 Jun 2020	Day time	1	621	580.5	150	300		Pass
14.2	2051286-23	1 Jun 2020	Day time	2	540					
Area - Administration Building : Office Supply Area										
15.1	2051286-24	1 Jun 2020	Day time	1	478	451.5	50	100		Pass
15.2	2051286-25	1 Jun 2020	Day time	2	425					
Spot - Administration Building : Plant Manager										
16	2051286-26	1 Jun 2020	Day time	1	483	-	400-500	-		Pass
Area - Administration Building : Reception Area										
17.1	2051286-27	1 Jun 2020	Day time	1	412	361.0	150	300		Pass
17.2	2051286-28	1 Jun 2020	Day time	2	310					
Area - Administration Building : Restroom-Gentlemen										
18.1	2051286-29	1 Jun 2020	Day time	1	559	526.0	50	100		Pass
18.2	2051286-30	1 Jun 2020	Day time	2	493					
Area - Administration Building : Restroom-Lady										
19.1	2051286-31	1 Jun 2020	Day time	1	404	481.0	50	100		Pass
19.2	2051286-32	1 Jun 2020	Day time	2	558					
Spot - Administration Building : Spare Office										
20	2051286-33	1 Jun 2020	Day time	1	717	-	400-500	-		Pass
Area - Administration Building : Utility Room										
21.1	2051286-34	1 Jun 2020	Day time	1	917	886.0	100	200		Pass
21.2	2051286-35	1 Jun 2020	Day time	2	855					

Measurement by : Phetrachong Thongphimkha Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 35D dated February 21 B.E.2561 (2018)

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Analysis / Test Report

Lot ID: 2065395

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P/O :
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1694664-1

Project Name : Monitoring EIA
Project Location : GNNK

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux) Spot	Average	Guideline Limit Spot/Min	Average	Comment
Area - Guard Room									
1.1	2065395-1	1 Jun 2020	Day time	1	3,440	3,490	-	100	Pass
1.2	2065395-2	1 Jun 2020	Day time	2	3,540				
Area - Guard Room : Restroom (Logger Room)									
2.1	2065395-3	1 Jun 2020	Day time	1	399	417.5	50	100	Pass
2.2	2065395-4	1 Jun 2020	Day time	2	436				
Area - Guard Room : Restroom (T-01)									
3.1	2065395-5	1 Jun 2020	Day time	1	472	469.0	50	100	Pass
3.2	2065395-6	1 Jun 2020	Day time	2	466				

Measurement by : Pheeraphong Thongkhunpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 390 dated February 21 B.E.2561 (2018)

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Analysis / Test Report

Lot ID: 2065396

Client : Gulf JP NKK Co., Ltd.
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P/O :
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1694667-1

Project Name : Monitoring EIA
Project Location : GNNK

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux) Spot	Average	Guideline Limit Spot/Min	Average	Comment
Area - Switchyard Control Building : Battery Room									
1.1	2065396-1	1 Jun 2020	Day time	1	210	211.5	50	100	Pass
1.2	2065396-2	1 Jun 2020	Day time	2	213				
Area - Switchyard Control Building : Control Room #1									
2.1	2065396-3	1 Jun 2020	Day time	1	332	301.0	100	200	Pass
2.2	2065396-4	1 Jun 2020	Day time	2	270				
Area - Switchyard Control Building : Control Room #2									
3.1	2065396-5	1 Jun 2020	Day time	1	203	267.5	100	200	Pass
3.2	2065396-6	1 Jun 2020	Day time	2	332				
Area - Switchyard Control Building : Switchyard Room									
4.1	2065396-7	1 Jun 2020	Day time	1	718	854.0	100	200	Pass
4.2	2065396-8	1 Jun 2020	Day time	2	990				

Measurement by : Pheeraphong Thongkhunpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 390 dated February 21 B.E.2561 (2018)

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P/O :
Project Name : Monitoring EIA
Project Location : GNKK

Lot ID: 2065400
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1694903-1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Terminal Substation : Control Room									
1.1	2065400-1	1 Jun 2020	Day time	1	721	723.0	100	200	Pass
1.2	2065400-2	1 Jun 2020	Day time	2	725				
Area - Terminal Substation : Battery Room									
2.1	2065400-3	1 Jun 2020	Day time	1	320	271.0	50	100	Pass
2.2	2065400-4	1 Jun 2020	Day time	2	222				

Measurement by : Pleraphong Thongkumpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 390 dated February 21 B.E.2561 (2018)



Analysis / Test Report

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99 Moo 17, Klong Nakorn Nangket, Muang Chachoengsao, Chachoengsao Thailand 24000
P/O :
Project Name : Monitoring EIA
Project Location : GNKK

Lot ID: 2065398
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1694895-1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Workshop & Warehouse : 1st floor : C & I Lab Room									
1.1	2065398-1	1 Jun 2020	Day time	1	516	568.0	50	100	Pass
1.2	2065398-2	1 Jun 2020	Day time	2	620				
Area - Workshop & Warehouse : 1st floor : Control Temp Spare Part									
2.1	2065398-3	1 Jun 2020	Day time	1	300	273.0	50	100	Pass
2.2	2065398-4	1 Jun 2020	Day time	2	246				
Area - Workshop & Warehouse : 1st floor : Helper Room									
3.1	2065398-5	1 Jun 2020	Day time	1	557	562.5	50	100	Pass
3.2	2065398-6	1 Jun 2020	Day time	2	568				
Area - Workshop & Warehouse : 1st floor : MDB Electrical Control Room									
4.1	2065398-7	1 Jun 2020	Day time	1	409	410.5	50	100	Pass
4.2	2065398-8	1 Jun 2020	Day time	2	412				
Area - Workshop & Warehouse : 1st floor : Restroom-Gentlemen (T-02)									
5.1	2065398-9	1 Jun 2020	Day time	1	406	425.0	50	100	Pass
5.2	2065398-10	1 Jun 2020	Day time	2	444				
Area - Workshop & Warehouse : 1st floor : Spare Part Mechanical Room									
6.1	2065398-11	1 Jun 2020	Day time	1	301	297.0	50	100	Pass
6.2	2065398-12	1 Jun 2020	Day time	2	293				
Area - Workshop & Warehouse : 1st floor : Storage Room									
7.1	2065398-13	1 Jun 2020	Day time	1	267	281.5	50	100	Pass
7.2	2065398-14	1 Jun 2020	Day time	2	296				
Area - Workshop & Warehouse : 1st floor : Unsecured Heavy/Bulky A-B									
8.1	2065398-15	1 Jun 2020	Day time	1	298	285.5	50	100	Pass
8.2	2065398-16	1 Jun 2020	Day time	2	273				
Area - Workshop & Warehouse : 1st floor : Unsecured Heavy/Bulky C-D									
9.1	2065398-17	1 Jun 2020	Day time	1	255	286.0	50	100	Pass
9.2	2065398-18	1 Jun 2020	Day time	2	317				
Area - Workshop & Warehouse : 1st floor : Unsecured Heavy/Bulky E-F									
10.1	2065398-19	1 Jun 2020	Day time	1	208	218.5	50	100	Pass
10.2	2065398-20	1 Jun 2020	Day time	2	229				

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Analysis / Test Report

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P/O :
Project Name : Monitoring EIA
Project Location : GNNK

Lot ID: 2065398
Date Received : Jun 02, 2020
Date Reported : Jun 15, 2020
Report Number : 1694895-1

Page 2 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux) Average	Spot / Min Average	Guideline Limit	Comment
Area - Workshop & Warehouse : 1st floor : Unsecured Warehouse Area								
11.1	2065398-21	1 Jun 2020	Day time	1	688	684.0	50	100
11.2	2065398-22	1 Jun 2020	Day time	2	680			Pass
Area - Workshop & Warehouse : 1st floor : Warehouse Room								
12.1	2065398-23	1 Jun 2020	Day time	1	255	385.5	50	100
12.2	2065398-24	1 Jun 2020	Day time	2	516			Pass

Measurement by : Pheeraphong Thongkhunpida Personnel of ALS Laboratory Group (Thailand) Co., Ltd.
Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

Technical Management

The above results are valid only for the unaltered/undisturbed sample(s) as indicated in this report. No part of this report or certificate may be reproduced in any form without written consent from the Laboratory. ALS Laboratory Group (Thailand) Company Limited. For this report is not responsible for errors in the data.

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ภาคผนวก ง

เอกสารการสอบเทียบเครื่องมือตรวจวิเคราะห์



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รายการเครื่องมือที่ใช้ในการวิเคราะห์/ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Ambient	Total Suspended Particulate	High Volume	BKK_F50362	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	BKK_F50364	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	BKK_F50367	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	BKK_F51059	-	-	On site Calibration
Ambient	Total Suspended Particulate	Analytical Balance 5 D	BKK_EN0004	25-Mar-20	25-Mar-21	12
Ambient	Particulate Matter (PM-10)	High Volume	BKK_F50378	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	High Volume	BKK_F50380	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	High Volume	BKK_F50381	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	High Volume	BKK_F50382	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	Analytical Balance 5 D	BKK_EN0004	25-Mar-20	25-Mar-21	12
Ambient	Nitrogen Dioxide	NO2 Analyzer	BKK_F50762	3-Jan-20	3-Jul-20	6
Ambient	Nitrogen Dioxide	NO2 Analyzer	BKK_F50767	3-Jan-20	3-Jul-20	6
Ambient	Nitrogen Dioxide	NO2 Analyzer	BKK_F50800	3-Jan-20	3-Jul-20	6
Ambient	Nitrogen Dioxide	NO2 Analyzer	RYG_F50455	4-Jan-20	4-Jul-20	6
Ambient	Sulfur Dioxide	SO2 Analyzer	BKK_F50777	2-Jan-20	2-Jul-20	6
Ambient	Sulfur Dioxide	SO2 Analyzer	BKK_F50788	3-Jan-20	3-Jul-20	6
Ambient	Sulfur Dioxide	SO2 Analyzer	BKK_F50789	3-Jan-20	3-Jul-20	6
Ambient	Sulfur Dioxide	SO2 Analyzer	RYG_F50454	4-Jan-20	4-Jul-20	6
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_F50159	17-Sep-19	17-Mar-21	18
Stack (CEMS)	Oxides of Nitrogen	Analyzer, System calibration, Standard gas	-	-	-	-
Stack (CEMS)	Sulfur Dioxide	Analyzer, System calibration, Standard gas	-	-	-	-
Stack	Total Suspended Particulate	Console Control Unit 55	BKK_F50621	7-Jan-20	7-Jul-20	6
Stack	Total Suspended Particulate	Analytical Balance 4 D	BKK_EN0001	24-Mar-20	24-Mar-21	12
Noise	Leq 24 hrs	Acoustic Calibrator	BKK_F50631	15-Oct-19	15-Oct-20	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_F50622	14-Aug-19	14-Aug-20	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_F50623	14-Aug-19	14-Aug-20	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_F50624	13-Aug-19	13-Aug-20	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_F50625	19-Jul-19	19-Jul-20	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_F50626	19-Jun-19	19-Jun-20	12
Noise	Leq 8 hrs	Acoustic Calibrator	BKK_F50633	13-Jan-20	13-Jan-21	12
Noise	Leq 8 hrs	Acoustic Calibrator	BKK_F50616	12-Sep-19	12-Sep-20	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_F50663	13-Jan-20	13-Jan-21	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_F50668	13-Jan-20	13-Jan-21	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_F50671	13-Jan-20	13-Jan-21	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_F50696	25-Jul-19	25-Jul-20	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_F50698	26-Jul-19	26-Jul-20	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_F50699	26-Jul-19	26-Jul-20	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_F50703	3-Oct-19	3-Oct-20	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_F50875	2-Sep-19	2-Sep-20	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_F50880	12-Sep-19	12-Sep-20	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_F50876	4-Sep-19	4-Sep-20	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_F50925	13-Aug-19	13-Aug-20	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_F50930	12-Sep-19	12-Sep-20	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50687	8-Feb-20	8-Feb-21	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50688	18-Apr-19	18-Apr-20	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50673	2-Oct-19	2-Oct-20	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50676	2-Oct-19	2-Oct-20	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50677	20-Feb-20	20-Feb-21	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50678	8-Feb-20	8-Feb-21	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50690	8-Feb-20	8-Feb-21	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50681	8-Feb-20	8-Feb-21	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50692	8-Feb-20	8-Feb-21	12
Illuminance	Illuminance	Lux Meter	BKK_F50666	11-Jun-19	11-Jun-20	12
Illuminance	Illuminance	Lux Meter	BKK_F51089	10-Apr-20	10-Apr-21	12

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รายการเครื่องมือที่ใช้ในการวิเคราะห์/ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Water Lab	pH at 25 °C	pH meter	BKK_EN0072	18-Oct-19	18-Apr-21	18
Water Lab	Residual Free Chlorine	Chlorine Meter	BKK_LG0021	31-Mar-20	31-Mar-21	12
Water Lab	Dissolved Oxygen	Burette	BKK_EN0171	25-Oct-19	25-Apr-21	18
Water Lab	Dissolved Oxygen	Chamber (Cold Room)	BKK_EN0167	25-Dec-19	25-Jun-21	18
Water Lab	Oil & Grease	Electronic Top-Loading Balance	BKK_EN0003	10-Feb-18	10-Aug-20	18
Water Lab	Oil & Grease	Oven	BKK_EN0010	11-Dec-19	11-Jun-21	18
Water Lab	Oil & Grease	Water Bath	BKK_EN0148	4-Apr-19	4-Oct-20	18
Water Lab	Total Suspended Solids	Electronic Top-Loading Balance	BKK_EN0005	10-Feb-19	10-Aug-20	18
Water Lab	Total Suspended Solids	Oven	BKK_EN0007	11-Jan-19	11-Jul-20	18
Water Lab	Total Dissolved Solids 180 °C	Electronic Top-Loading Balance	BKK_EN0003	10-Feb-19	10-Aug-20	18
Water Lab	Total Dissolved Solids 180 °C	Oven	BKK_EN0007	11-Jan-19	11-Jul-20	18
Water Lab	Conductivity	Conductivity meter	BKK_EN0005	18-Oct-19	18-Apr-21	18
Water Lab	BOD (5 days at 20 °C)	DO Meter	BKK_EN0017	18-Jun-19	18-Dec-20	18
Water Lab	BOD (5 days at 20 °C)	Incubator	BKK_EN0272	5-Aug-19	5-Aug-20	12
Water Lab	Temperature	pH Meter	BKK_LG0012	3-Jan-20	3-Jan-21	12
Water Lab	Calcium	ICP-OES	BKK_EL0037	28-Feb-20	28-Feb-21	12
Water Lab	Calcium	Hot Block	BKK_EL0054	25-Jun-19	25-Dec-20	18
Water Lab	Calcium	Chamber (Cold Room)	BKK_EN0187	25-Dec-19	25-Jun-21	18
Water Lab	Magnesium	ICP-OES	BKK_EL0037	28-Feb-20	28-Feb-21	12
Water Lab	Magnesium	Hot Block	BKK_EL0054	25-Jun-19	25-Dec-20	18
Water Lab	Magnesium	Chamber (Cold Room)	BKK_EN0187	25-Dec-19	25-Jun-21	18
Water Lab	Sodium	ICP-OES	BKK_EL0037	28-Feb-20	28-Feb-21	12
Water Lab	Sodium	Hot Block	BKK_EL0054	25-Jun-19	25-Dec-20	18
Water Lab	Sodium	Chamber (Cold Room)	BKK_EN0187	25-Dec-19	25-Jun-21	18
Water Lab	SAR	ICP-MS	BKK_EL0043	1-Apr-20	1-Apr-21	12
Water Lab	SAR	Hot Block	BKK_EL0054	25-Jun-19	25-Dec-20	18
Water Lab	SAR	Chamber (Cold Room)	BKK_EN0187	25-Dec-19	25-Jun-21	18
Water Lab	Total Chlorine	Ion Selective Electrode	BKK_EN0102	13-Sep-19	13-Mar-21	18

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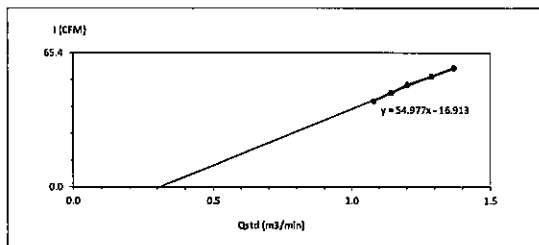
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High Volume Air Sampler Calibration Worksheet

Project Site:	Gulf PPK Co., Ltd.	Barometric Pressure (mm Hg):	758
Calibrate Location:	บ้านบ่อปลา	Temperature (°C):	34
Calibrate Date:	29-May-20	High Volume ID:	BKK_F50362
Calibration Sheet No.:	C-190520-BKK_F50362	High Volume Model:	G1051
Calibrator ID:	BKK_F50625	High Volume S/N:	1452
Calibrator Model:	TE-5028A	Calibrator Slope:	1.67275
Calibrator S/N:	2585	Calibrator Intercept:	-0.02758

Test No.	Delta H ₂ O (Inch)	Q _{std} (m ³ /min)	I: Chart (CFM)	Linear Regression
1	3.2	1.0798	42	Slope: 54.9774
2	3.6	1.1436	46	Intercept: -16.9130
3	4.0	1.2040	50	Correlation Coefficient: 0.9974
4	4.6	1.2892	54	
5	5.2	1.3689	58	



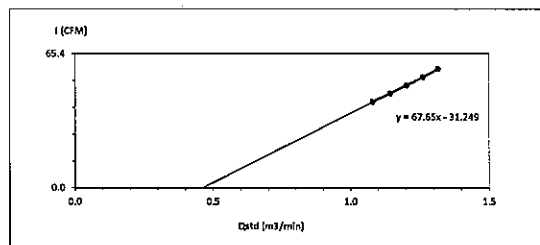
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High Volume Air Sampler Calibration Worksheet

Project Site:	Gulf PPK Co., Ltd.	Barometric Pressure (mm Hg):	758
Calibrate Location:	บ้านบ่อปลา	Temperature (°C):	34
Calibrate Date:	29-May-20	High Volume ID:	BKK_F50364
Calibration Sheet No.:	C-190520-BKK_F50364	High Volume Model:	TE-5009X
Calibrator ID:	BKK_F50625	High Volume S/N:	4154
Calibrator Model:	TE-5028A	Calibrator Slope:	1.67275
Calibrator S/N:	2585	Calibrator Intercept:	-0.02758

Test No.	Delta H ₂ O (Inch)	Q _{std} (m ³ /min)	I: Chart (CFM)	Linear Regression
1	3.2	1.0798	42	Slope: 67.5497
2	3.6	1.1436	46	Intercept: -31.2491
3	4.0	1.2040	50	Correlation Coefficient: 0.9996
4	4.6	1.2614	54	
5	4.8	1.3163	58	

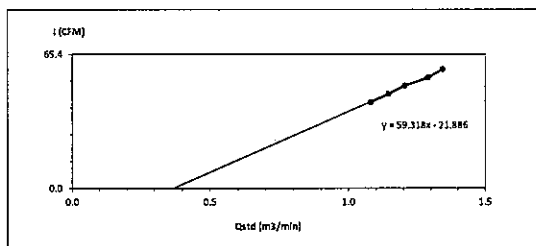


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High Volume Air Sampler Calibration Worksheet

Project Site:	Gulf PNK Co., Ltd.	Barometric Pressure (mm Hg):	758
Calibrate Location:	THUABABOY	Temperature (°C):	34
Calibrate Date:	29-May-20	High Volume ID:	BKK_F50367
CalibrationSheet No.:	C-290520-BKK_F50367	High Volume Model:	TS-5009X
Calibrator ID:	BKK_F50425	High Volume S/N:	4152
Calibrator Model:	TS-5028A	Calibrator Slope:	1.67275
Calibrator S/N:	2585	Calibrator Intercept:	-0.02758

Test No.	Delta H ₂ O (Inch)	Q _{air} (m ³ /min)	1: Chart (CFM)	Linear Regression	
1	3.2	1.0798	42	Slope:	59.3175
2	3.6	1.1436	46	Intercept:	-21.8063
3	4.0	1.2040	50	Correlation Coefficient:	0.9980
4	4.6	1.2892	54		
5	5.0	1.3429	58		



Calibrated by

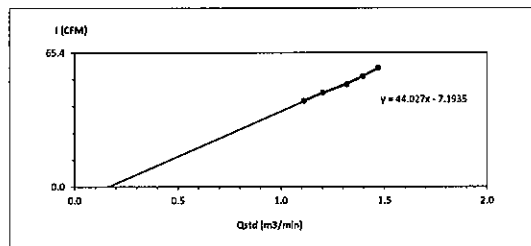
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High Volume Air Sampler Calibration Worksheet

Project Site:	Gulf IP NKK Co., Ltd	Barometric Pressure (mm Hg):	758
Calibrate Location:	ฉะเชิงเทรา	Temperature (°C):	34
Calibrate Date:	29-May-20	High Volume ID:	BKK_FS1059
Calibration Sheet No.:	C-290520-BKK_FS1059	High Volume Model:	TE5009X
Calibrator ID:	BKK_FS0625	High Volume S/N:	5093
Calibrator Model:	TE5028A	Calibrator Slope:	1.67275
Calibrator S/N:	2585	Calibrator Intercept:	-0.02758

Test No.	Delta H ₂ O (Inch)	Q _{vis} (m ³ /min)	I: Chart (CFM)	Linear Regression	
1	3.4	1.1122	42	Slope:	44.0266
2	4.0	1.2040	46	Intercept:	-7.1935
3	4.8	1.3163	50	Correlation Coefficient:	0.9949
4	5.4	1.3945	54		
5	6.0	1.4684	58		



Calibrated by

FORM NO: F06-073 REVISION NO: • ISSUE DATE: 14/03/16

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129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2643 8351-6, e-mail: service.thailand@sartorius.com



SARTORIUS

REVIEW BY Sinluk P.
APPROVED BY VL AL
NEXT CAL. DATE 25/03/21
25/03/21

Certificate of Calibration

Model Number:	XP105DU	Certificate No.:	ST2003073
Description:	Semi-micro Balance	Issued Date:	Friday, March 27, 2020
Serial Number:	1123091884	Reference No.:	500923
Manufacturer:	Mettler Toledo	Page No.:	1 of 3

Customer Name: ALS Laboratory Group (Thailand)Co., Ltd.
104 Phatthanakan 40,Phatthanakan Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250.

Calibrated Place : Lab Room

Calibrated By: Mr. Chonchal Inthana Calibration
Calibration Date: Wednesday, March 25, 2020 Procedure No.: This calibration was conducted by

Metrological data : Capacity: 41/120 g Readability: 0.01/0.1 mg

Ambients Conditions: Temperature : 24.4 °C ± 5.0 °C

Reasons for calibration

☐ New Installation ☐ Service / Required ☒ Re-calibration/ Maintenance

Measurement Method UKAS Publication Ref :Lab 14

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor ($k=2$) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI).

Traceability

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 200g E2 YCS011-522-00	Sartorius	119934 D-K-19398-01	10-Sep-2021
608H1	Thermo-Hygrometer, Testo 608-H1	SPCC	C19190674	9-Dec-2020

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ISO17025-RE-015 01/11/2018 81

Mr.Chonchai Inthana(Technical Manager)

BKK-EN0004
8/9/11



Sartorius (Thailand) Co., Ltd.
125 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2643 8361-6 Fax: +66 2643-8367, e-mail: service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

Model Number:	XP105DU	Certificate No.:	572030373
Description:	Semi-micro Balance	Issued Date:	Friday, March 27, 2020
Serial Number:	1123091884	Reference No.:	500923
Manufacturer:	Mettler Toledo	Page No.:	2 of 3

Calibration Results : Without Adjustment

Repeatability			Eccentricity (Off-center loading error)		
<p>The reproducibility is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement range is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.</p>			<p>The off-center loading error is yielded by the difference between the readout of the load in 1/2 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of five additional measurement points (1) positioned defined according to OIML R110.</p>		
Nominal Value : (Low Load)	2.00001	20.00001	Nominal value :	20	g
2 g	2.00003	20.00001	Tolerance	N/A	g
Tolerance	2.00002	20.00000			
N/A g	2.00002	20.00000			
	2.00002	20.00001			
Nominal Value : (High Load)	2.00001	20.00001			
20 g	2.00001	20.00001			
Tolerance	2.00002	20.00001			
N/A g	2.00002	20.00001			
	2.00001	19.99999			
Standard Deviation			0.000007	0.000007	

Linearity

The *linearity*, also called *linearity error*. Describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance				
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
0.1	0.10000	0.10000	0.00000	0.000018
0.5	0.50050	0.50000	0.00000	0.000019
1	1.00050	1.00000	0.00000	0.000020
2	2.00051	2.00001	0.00000	0.000022
5	5.00052	5.00001	-0.00001	0.000025
10	10.00053	10.00002	-0.00001	0.000030
20	20.00054	20.00001	-0.00003	0.000040
25	25.00053	25.00002	-0.00001	0.000045
30	30.00054	30.00003	-0.00001	0.000048
40	40.00055	40.00000	-0.00001	0.000055

ISO17025-RF-015 01/11/2018 B1



High Volume Air Sampler Calibration Worksheet

Certificate of Calibration

Model Number: **XP105DU** Certificate No.: **ST2003073**
Description: **Semi-micro Balance** Issued Date: **Friday, March 27, 2020**
Serial Number: **1123091884** Reference No.: **500923**
Manufacturer: **Mettler Toledo** Page No.: **3 of 3**

Calibration Results: Without Adjustment

Repeatability		Eccentricity (Off-center loading error)	
The repeatability is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.		The off-center loading error is plotted by the difference between the readout of the load, i.e. 1/2 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R110).	
Nominal Value: (Low Load)	100.0001	Nominal value:	g
Tolerance	100.0001	Tolerance	N/A
N/A	100.0001		
Nominal Value: (High Load)	100.0001		
100 g	100.0001		
Tolerance	100.0001		
N/A	100.0001		
Standard Deviation	0.00003		

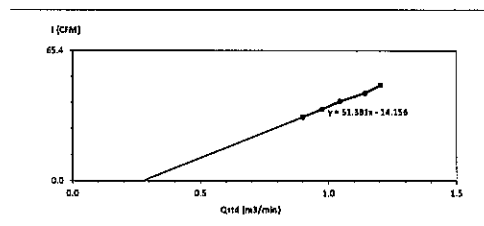
Linearity				
The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.				
Tolerance	N/A	g		
Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
50	50.0001	50.0001	0.0000	0.00015
55	55.0001	55.0001	0.0000	0.00015
60	60.0001	60.0001	0.0000	0.00015
65	65.0001	65.0001	0.0000	0.00015
70	70.0001	70.0001	0.0000	0.00015
80	80.0001	80.0001	0.0000	0.00015
90	90.0001	90.0001	0.0000	0.00016
100	100.0001	100.0001	0.0000	0.00017
110	110.0001	110.0001	0.0000	0.00026
120	120.0001	120.0001	0.0000	0.00026

End of Report.

ISO17025-RZ-015 01/11/2018 R1

Project Site: **Gulf JP NKK Co., Ltd** Barometric Pressure (mm Hg): **758**
Calibrate Location: **สุพรรณบุรี** Temperature (°C): **34**
Calibrate Date: **29-May-20** High Volume ID: **BKK PS0378**
Calibration Sheet No: **C-290520-BKK PS0378** High Volume Model: **TE-5009X**
Calibrator ID: **BKK PS0625** High Volume S/N: **4155**
Calibrator Model: **TE-5028A** Calibrator Slope: **1.67275**
Calibrator S/N: **2585** Calibrator Intercept: **-0.02758**

Test No.	Delta H ₂ O (inch)	Q _{avg} (m ³ /min)	1:1 Chart (CFM)	Linear Regression
1	2.2	0.9000	32	Slope: 51.3808
2	2.6	0.9760	36	Intercept: -14.1564
3	3.0	1.0464	40	Correlation Coefficient: 0.9901
4	3.6	1.1436	44	
5	4.0	1.2040	48	



Calibrated by

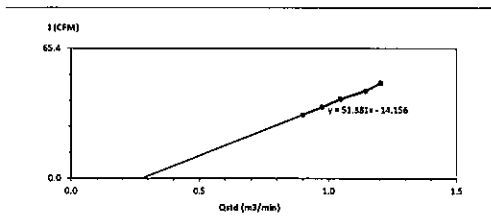
FORM NO: F 06-074 REVISION NO: ISSUE DATE: 14/03/14



High Volume Air Sampler Calibration Worksheet

Project Site: **Gulf JP NKK Co., Ltd** Barometric Pressure (mm Hg): **758**
Calibrate Location: **สุพรรณบุรี** Temperature (°C): **34**
Calibrate Date: **29-May-20** High Volume ID: **BKK PS0380**
Calibration Sheet No: **C-290520-BKK PS0380** High Volume Model: **TE-5009X**
Calibrator ID: **BKK PS0625** High Volume S/N: **4163**
Calibrator Model: **TE-5028A** Calibrator Slope: **1.67275**
Calibrator S/N: **2585** Calibrator Intercept: **-0.02758**

Test No.	Delta H ₂ O (inch)	Q _{avg} (m ³ /min)	1:1 Chart (CFM)	Linear Regression
1	2.2	0.9000	32	Slope: 51.3808
2	2.6	0.9760	36	Intercept: -14.1564
3	3.0	1.0464	40	Correlation Coefficient: 0.9901
4	3.6	1.1436	44	
5	4.0	1.2040	48	



Calibrated by

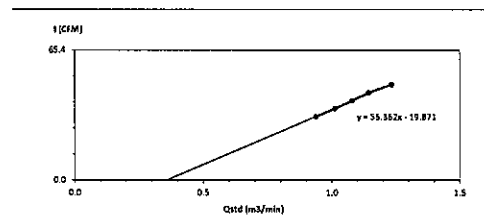
FORM NO: F 06-074 REVISION NO: ISSUE DATE: 14/03/14



High Volume Air Sampler Calibration Worksheet

Project Site: **Gulf JP NKK Co., Ltd** Barometric Pressure (mm Hg): **758**
Calibrate Location: **สุพรรณบุรี** Temperature (°C): **34**
Calibrate Date: **29-May-20** High Volume ID: **BKK PS0381**
Calibration Sheet No: **C-290520-BKK PS0381** High Volume Model: **TE-5009X**
Calibrator ID: **BKK PS0625** High Volume S/N: **4161**
Calibrator Model: **TE-5028A** Calibrator Slope: **1.67275**
Calibrator S/N: **2585** Calibrator Intercept: **-0.02758**

Test No.	Delta H ₂ O (inch)	Q _{avg} (m ³ /min)	1:1 Chart (CFM)	Linear Regression
1	2.4	0.9388	32	Slope: 55.3623
2	2.8	1.0118	36	Intercept: -19.8706
3	3.2	1.0798	40	Correlation Coefficient: 0.9984
4	3.6	1.1436	44	
5	4.2	1.2331	48	



Calibrated by

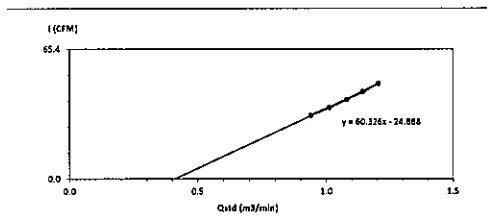
FORM NO: F 06-074 REVISION NO: ISSUE DATE: 14/03/14



High Volume Air Sampler Calibration Worksheet

Project Site: Gulf P. NKK Co. Ltd Barometric Pressure (mm Hg): 758
 Calibrate Location: W308833 Temperature (°C): 34
 Calibrate Date: 29-Mar-20 High Volume ID: RKS_F50382
 Calibration Sheet No.: C-290510-BKK_F50382 High Volume Model: TE-5009X
 Calibrator ID: BKK_F50625 High Volume S/N: 4765
 Calibrator Model: TE-5028A Calibrator Slope: 1.67275
 Calibrator S/N: 2585 Calibrator Intercept: -0.02758

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I: Chart (CFM)	Linear Regression
1	2.4	0.9388	32	Slope: 60.3262 Intercept: -24.8882 Correlation Coefficient: 0.9993
2	2.8	1.0116	36	
3	3.2	1.0798	40	
4	3.6	1.1436	44	
5	4.0	1.2040	48	



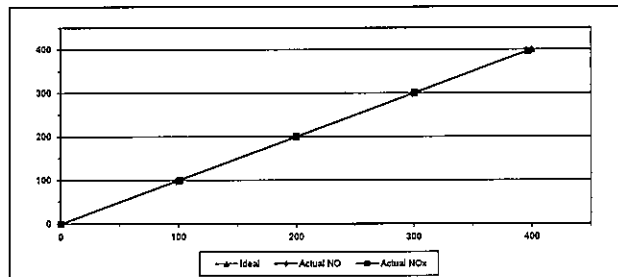
FORM NO.: F 06-074 REVISION NO.: 15 ISSUE DATE: 14/03/14



MULTIPOINT CALIBRATION REPORT

Calibration Date: 3-Jan-20 Equipment Name: NOx Analyzer
 Manufacturer: HORIBA Model: APNA-370
 Serial No.: WPY0JMW0 Equipment ID: BKK_F80782
 Calibrator Manufacturer: Teledyne API Model: 700
 Serial No.: 847
 Std. Gas Concentration (PPM): 51.33 Cylinder No.: LL36833
 Cylinder Pressure (psi): 1200 Certified By: Airgas Inc.
 Certified Date: 18-Mar-14 Expired Date: 18-Mar-22

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	98.20	-1.80	-1.80	100.80	0.80	0.80
2	200.00	199.00	-1.00	-0.50	199.80	-0.20	-0.10
3	300.00	298.60	-1.40	-0.47	300.70	0.70	0.23
4	400.00	399.50	-0.50	-0.13	399.50	-3.50	-0.88
AVERAGE (%)				-0.58			0.03



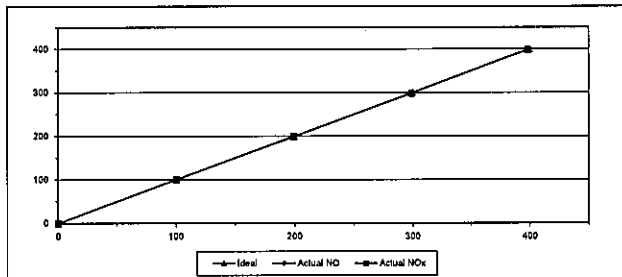
FORM NO.: F 06-056 REVISION NO.: 15 ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date: 3-Jan-20 Equipment Name: NOx Analyzer
 Manufacturer: HORIBA Model: APNA-370
 Serial No.: H73KYD1M Equipment ID: BKK_F80787
 Calibrator Manufacturer: Teledyne API Model: 700
 Serial No.: 847
 Std. Gas Concentration (PPM): 51.33 Cylinder No.: LL36833
 Cylinder Pressure (psi): 1200 Certified By: Airgas Inc.
 Certified Date: 18-Mar-14 Expired Date: 18-Mar-22

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	99.00	-1.00	-1.00	100.20	0.20	0.20
2	200.00	198.50	-1.50	-0.75	199.00	-1.00	-0.50
3	300.00	298.30	-1.70	-0.57	298.60	-1.20	-0.40
4	400.00	398.10	-1.90	-0.47	398.00	-2.00	-0.50
AVERAGE (%)				-0.54			-0.22



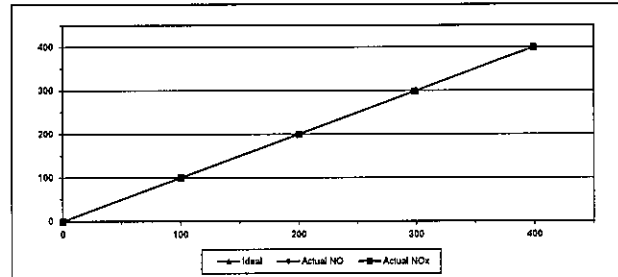
FORM NO.: F 06-056 REVISION NO.: 15 ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date: 3-Jan-20 Equipment Name: NOx Analyzer
 Manufacturer: HORIBA Model: APNA-370
 Serial No.: HCWSR881 Equipment ID: BKK_F80800
 Calibrator Manufacturer: Teledyne API Model: 700
 Serial No.: 847
 Std. Gas Concentration (PPM): 51.33 Cylinder No.: LL36833
 Cylinder Pressure (psi): 1200 Certified By: Airgas Inc.
 Certified Date: 18-Mar-14 Expired Date: 18-Mar-22

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	99.30	-0.70	-0.70	100.20	0.20	0.20
2	200.00	199.00	-1.00	-0.50	200.30	0.30	0.15
3	300.00	298.90	-1.10	-0.37	298.40	-1.60	-0.53
4	400.00	398.80	-1.20	-0.30	399.00	-1.00	-0.25
AVERAGE (%)				-0.35			-0.07



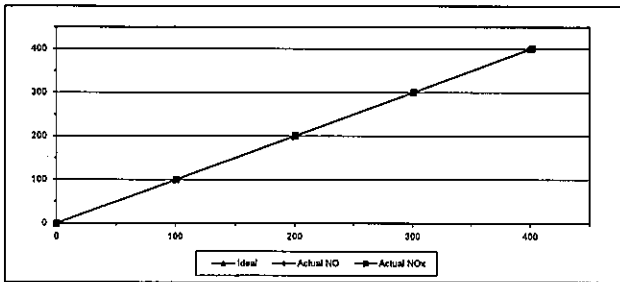
FORM NO.: F 06-056 REVISION NO.: 15 ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	4-Jan-20	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	ALPCOVOWY	Equipment ID	RYQ_FB0455
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	51.33	Cylinder No.	LL36833
Cylinder Pressure (psi)	1200	Certified By	Algas Inc.
Certified Date	18-Mar-14	Expired Date	18-Mar-22

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	98.80	-1.20	-1.20	100.80	0.80	0.80
2	200.00	198.50	-1.50	-0.75	200.50	0.50	0.25
3	300.00	300.20	0.20	0.07	300.90	0.90	0.30
4	400.00	399.00	-1.00	-0.25	401.70	1.70	0.42
AVERAGE (%)				-0.41			0.37



Calibrated By

Approved By

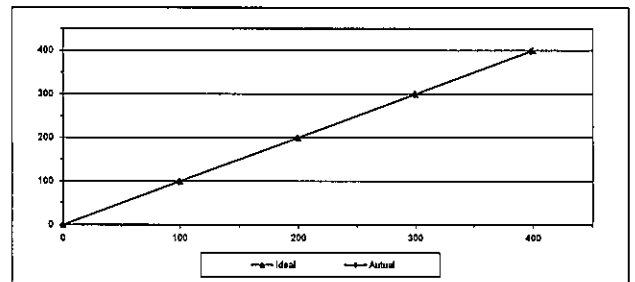
FORM NO.: F 06-056 REVISION NO.: ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	2-Jan-20	Equipment Name	SO2 Analyzer
Manufacturer	Teledyne API	Model	T100
Serial No.	1808	Equipment ID	BKK_FB0727
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	50.87	Cylinder No.	LL36833
Cylinder Pressure (psi)	1200	Certified By	Algas Inc.
Certified Date	18-Mar-14	Expired Date	18-Mar-22

Point	Ideal	Actual	Error	%Error
ZERO	0.00	0.00	0.00	0.00
1	100.00	99.10	-0.90	-0.90
2	200.00	198.50	-1.50	-0.75
3	300.00	299.10	-0.90	-0.30
4	400.00	398.20	-1.80	-0.45
AVERAGE (%)				-0.48



Calibrated By

Approved By

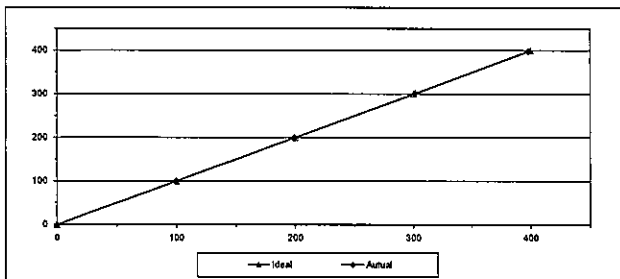
FORM NO.: F 08-056 REVISION NO.: ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	3-Jan-20	Equipment Name	SO2 Analyzer
Manufacturer	HORIBA	Model	APSA-370
Serial No.	G2CH438B	Equipment ID	BKK_FB0798
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	50.87	Cylinder No.	LL36833
Cylinder Pressure (psi)	1200	Certified By	Algas Inc.
Certified Date	18-Mar-14	Expired Date	18-Mar-22

Point	Ideal	Actual	Error	%Error
ZERO	0.00	0.10	0.10	0.10
1	100.00	99.70	-0.30	-0.30
2	200.00	199.00	-1.00	-0.50
3	300.00	301.50	1.50	0.50
4	400.00	398.10	-1.90	-0.47
AVERAGE (%)				-0.13



Calibrated By

Approved By

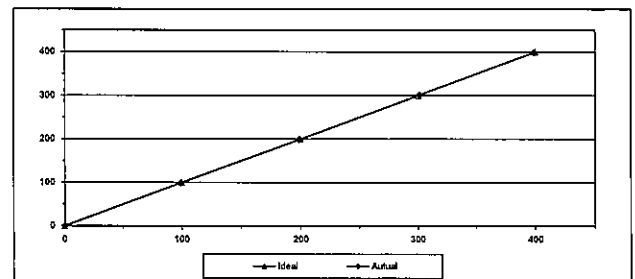
FORM NO.: F 06-056 REVISION NO.: ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	3-Jan-20	Equipment Name	SO2 Analyzer
Manufacturer	HORIBA	Model	APSA-370
Serial No.	YUSBYIF9	Equipment ID	BKK_FB0799
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	50.87	Cylinder No.	LL36833
Cylinder Pressure (psi)	1200	Certified By	Algas Inc.
Certified Date	18-Mar-14	Expired Date	18-Mar-22

Point	Ideal	Actual	Error	%Error
ZERO	0.00	0.20	0.20	0.20
1	100.00	99.10	-0.90	-0.90
2	200.00	198.50	-1.50	-0.75
3	300.00	301.30	1.30	0.43
4	400.00	398.50	-1.50	-0.38
AVERAGE (%)				-0.28



Calibrated By

Approved By

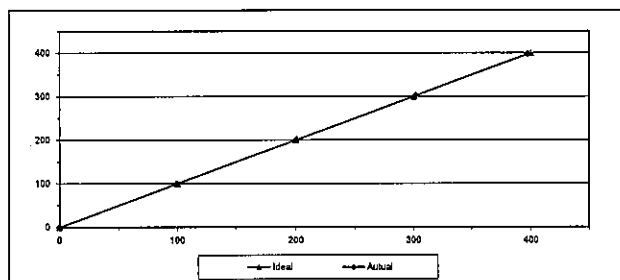
FORM NO.: F 08-056 REVISION NO.: ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	4-Jan-20	Equipment Name	SO2 Analyzer
Manufacturer	HORIBA	Model	APSA-370
Serial No.	H053D9FA	Equipment ID	RYG_FS0454
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	847		
Sf ₆ Gas Concentration (PPM)	50.87	Cylinder No.	LL36833
Cylinder Pressure (psi)	1200	Certified By	Algae Inc.
Certified Date	18-Mar-14	Expired Date	18-Mar-22

Point	CALIBRATION RESULTS			
	Ideal	Actual	Error	%Error
ZERO	0.00	0.10	0.10	0.10
1	100.00	99.10	-0.90	-0.90
2	200.00	200.80	0.80	0.40
3	300.00	302.00	2.00	0.67
4	400.00	397.20	-2.80	-0.70
AVERAGE (%)				-0.09



Calibrated By

Approved By

FORM NO.: F 05-056 REVISION NO.: 1 ISSUE DATE: 02/04/12

Jiranatee Associates Co., Ltd.

63/14-15, 67/35-36 Soi Pathakham 7, 21, Pathakham Rd., Watthana,
Bangkok, Bangkok 10600 Thailand
Tel: (66) 02-8690812/13 Fax: (66) 02-8690900 www.jiranatee.com

Calibration No.: 06092019

Page: 1 of 3

Issued by: Velocity Laboratory

CALIBRATION REPORT

Equipment Name : Data Logger with wind sensor
 Manufacturer : Novalynx
 Model : 200-WS-25LB
 Serial No. : A4596
 ID No. : -

Customer Name : ALS laboratory group (thailand) co., ltd.
 Address : 104 Phatthanakan 40, Phatthanakan Rd.,
 Khwaeng Suan Luang, Khet Suan Luang,
 Bangkok 10250, Thailand
 Received Date : 17 Sep 2019
 Calibration Date : 17 Sep 2019
 Date of issue : 17 Sep 2019

REVIEW BY: W. Pookrish
 APPROVED BY: [Signature]
 NEXT CAL. DATE: 11/2/21

Calibrated by

Mr. Sorawit Thachalad
 Calibration Technician



Approved by

Mr. Parinya Booncharoen
 Calibration Section Manager

Jiranatee Associates Co., Ltd.

63/14-15, 67/35-36 Soi Pathakham 7, 21, Pathakham Rd., Watthana,
 Bangkok, Bangkok 10600 Thailand
 Tel: (66) 02-8690812/13 Fax: (66) 02-8690900 www.jiranatee.com

Calibration No.: 06092019

Page: 2 of 3

REFERENCES USED DURING TEMPERATURE CALIBRATION:

WIND SPEED

1. Wind Tunnel Model: MP330D, Serial number: 16371
2. Standard Pilot Tube Model: 166-12, Due Date: 2 Aug 2020
3. Precision Digital Pressure Transmitter Model: DT20, Due Date: 2 Aug 2020

WIND DIRECTION

1. Vane Angle Base Stand

CALIBRATION PROCEDURE:

WIND SPEED

1. The wind velocity calibration was done by In-house calibration method as WI-CL-002 according to comparison method with standard pilot tube and precision digital pressure transmitter.

WIND DIRECTION

1. The wind direction calibration was done by In-house calibration method as WI-CL-003 according to comparison method with standard Vane Angle Base Stand.

CALIBRATION CONDITION:

Temperature (25±3)°C
 Relative Humidity (50±15)%

TRACEABILITY:

The measurement results are traceable to the international system of units (SI) and National Institute Metrology (Thailand) through Certificate number: 3723, Certificate number: L1907-393



Jiranatee Associates Co., Ltd.

63/14-15, 67/35-36 Soi Pathakham 7, 21, Pathakham Rd., Watthana,
 Bangkok, Bangkok 10600 Thailand
 Tel: (66) 02-8690812/13 Fax: (66) 02-8690900 www.jiranatee.com

Calibration No.: 06092019

Page: 3 of 3

Results of Calibration: ☒ Without Adjustment ☐ With Adjustment

Table 1 Wind Speed Sensor Accuracy Test (Model: WS-02F)

Wind Tunnel Generated (m/s)	Standard Reading (m/s)	UUC Reading (m/s)	Error (m/s)
3	1.27	1.2	-0.07
7	3.92	3.8	-0.12
12	7.21	7.2	-0.01
18	11.18	11.3	0.12
23	15.72	15.6	-0.12

Results of Calibration: ☐ Without Adjustment ☒ With Adjustment

Table 2 Wind Direction Sensor Accuracy Test (Model: WS-02F)

Test Point Degree (°)	Before Reading (°)	After Reading (°)	Error (°)
0/360	357	359	-2
90	75	87	-12
180	167	179	-12
270	261	273	-12

End of Calibration Report





Lot No. 2022924-1

ANALYZER CALIBRATION DATA

Client : Gulf JP NNK Co., Ltd Location : HRBQ 11
Date : 03 Jun 20 Test Operator : Usamee N.
O₂ ANALYZER :
Model : Teledyne 200EH Serial No. : 726
Span (%) : 25

	Cylinder Value (%)	Initial Analyzers Calibration Response (%)	Final Analyzers Calibration Response (%)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	6.04	6.07	6.05	0.04
Span Gas	15.00	15.06	15.06	0.00

NO_x ANALYZER :
Model : Teledyne 200EH Serial No. : 726
Span (ppm) : 500

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	50.50	49.40	49.50	0.04
Span Gas	150.00	150.30	150.00	0.04

SO₂ ANALYZER :
Model : Teledyne 100EH Serial No. : 410
Span (ppm) : 500

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	49.50	48.00	49.10	0.02
Span Gas	150.00	150.70	150.00	0.06

CO ANALYZER :
Model : Teledyne 300EM Serial No. : 426
Span (ppm) : 1000

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	87.60	87.20	87.00	0.02
Span Gas	806.00	802.00	802.00	0.00

Calibrated by

ALS Laboratory Group



Lot No. 2022924-1

SYSTEM CALIBRATION BIAS AND DRIFT DATA

Client : Gulf JP NNK Co., Ltd Location : HRBQ 11
Date : 03 Jun 20 Test Operator : Usamee N.
O₂ ANALYZER :
Cylinder Conc. (%) : 16.00 Span (%) : 25

	O ₂ Analyzer Calibration Response	Initial Values System Calibration Response System Cal Bias (% of Span)	Final Values System Calibration Response System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00
Upscale Gas	16.00	16.10	16.10	0.16

NO_x ANALYZER :
Cylinder Conc. (ppm) : 180.00 Span (ppm) : 500

	NO _x Analyzer Calibration Response	Initial Values System Calibration Response System Cal Bias (% of Span)	Final Values System Calibration Response System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00
Upscale Gas	180.00	180.50	180.00	0.06

SO₂ ANALYZER :
Cylinder Conc. (ppm) : 150.00 Span (ppm) : 500

	SO ₂ Analyzer Calibration Response	Initial Values System Calibration Response System Cal Bias (% of Span)	Final Values System Calibration Response System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00
Upscale Gas	150.00	150.30	150.00	0.14

CO ANALYZER :
Cylinder Conc. (ppm) : 806.00 Span (ppm) : 1000

	CO Analyzer Calibration Response	Initial Values System Calibration Response System Cal Bias (% of Span)	Final Values System Calibration Response System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00
Upscale Gas	802.00	800.00	801.00	0.10

Calibrated by

ALS Laboratory Group



EMISSION TEST RESULT

Client : Gulf JP NNK Co., Ltd Run # 1
Date : 03 Jun 20 Location : HRBQ 11
Start Time : 10:00 Test Operator : Usamee N.
Finish Time : 10:20
SO₂ Analyzer Model : Teledyne 100EH Serial No. : 410
NO_x/O₂ Analyzer Model : Teledyne 200EH Serial No. : 726
CO/CO₂ Analyzer Model : Teledyne 300EM Serial No. : 426

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)	Remark
10:00	14.19	3.89	6.39	0.19	1.86	
10:01	14.21	3.94	6.39	0.20	2.04	
10:02	14.21	3.87	6.41	0.21	1.95	
10:03	14.20	3.91	6.47	0.19	1.86	
10:04	14.20	3.90	6.48	0.08	1.66	
10:05	14.21	3.88	6.48	0.14	1.77	
10:06	14.22	3.90	6.39	0.14	1.66	
10:07	14.20	3.88	6.38	0.15	1.77	
10:08	14.19	3.91	6.44	0.11	1.58	
10:09	14.18	3.86	6.50	0.16	1.67	
10:10	14.18	3.86	6.49	0.14	1.58	
10:11	14.18	3.88	6.48	0.14	1.55	
10:12	14.19	3.89	6.41	0.15	1.67	
10:13	14.19	3.86	6.39	0.14	1.58	
10:14	14.19	3.82	6.42	0.15	1.49	
10:15	14.19	3.84	6.44	0.18	1.58	
10:16	14.20	3.84	6.41	0.15	1.59	
10:17	14.22	3.80	6.40	0.17	1.49	
10:18	14.21	3.86	6.41	0.19	1.49	
10:19	14.19	3.88	6.47	0.17	1.49	
10:20	14.20	3.89	6.52	0.19	1.40	
Average	14.20	3.88	6.44	0.16	1.66	



EMISSION TEST RESULT

Client : Gulf JP NNK Co., Ltd Run # 2
Date : 03 Jun 20 Location : HRBQ 11
Start Time : 10:21 Test Operator : Usamee N.
Finish Time : 10:41
SO₂ Analyzer Model : Teledyne 100EH Serial No. : 410
NO_x/O₂ Analyzer Model : Teledyne 200EH Serial No. : 726
CO/CO₂ Analyzer Model : Teledyne 300EM Serial No. : 426

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)	Remark
10:21	14.19	3.88	6.52	0.18	1.40	
10:22	14.19	3.88	6.47	0.18	1.30	
10:23	14.18	3.89	6.48	0.18	1.40	
10:24	14.19	3.88	6.43	0.22	1.40	
10:25	14.20	3.88	6.39	0.19	1.40	
10:26	14.10	3.91	6.34	0.20	1.21	
10:27	14.19	3.88	6.30	0.19	1.40	
10:28	14.19	3.89	6.27	0.14	1.21	
10:29	14.19	3.90	6.31	0.17	1.21	
10:30	14.18	3.82	6.34	0.17	1.21	
10:31	14.20	3.81	6.36	0.18	1.12	
10:32	14.18	3.89	6.39	0.17	1.21	
10:33	14.18	3.89	6.37	0.13	1.12	
10:34	14.18	3.86	6.33	0.12	0.93	
10:35	14.19	3.89	6.32	0.07	0.93	
10:36	14.19	3.89	6.34	0.12	1.02	
10:37	14.19	3.89	6.34	0.07	1.02	
10:38	14.21	3.87	6.34	0.08	1.02	
10:39	14.19	3.87	6.45	0.08	0.93	
10:40	14.18	3.88	6.54	0.10	1.02	
10:41	14.18	3.88	6.52	0.08	1.02	
Average	14.19	3.86	6.38	0.14	1.17	



EMISSION TEST RESULT

Client	Gulf JP NKK Co., Ltd	Run #	3
Date	04 Jun 20	Location	HRSG 11
Start Time	10:42	Test Operator	Usanee N.
End Time		Finish Time	11:02
SO ₂ Analyzer Model	Teddyne 100EH	Serial No.	419
NO _x /O ₂ Analyzer Model	Teddyne 300EH	Serial No.	725
CO/CO ₂ Analyzer Model	Teddyne 300EH	Serial No.	425

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)	Remark
10:42	14.19	3.86	6.48	0.09	0.53	
10:43	14.20	3.85	6.45	0.08	0.53	
10:44	14.19	3.86	6.42	0.11	0.53	
10:45	14.19	3.81	6.42	0.09	1.02	
10:46	14.20	3.89	6.42	0.13	0.84	
10:47	14.20	3.83	6.44	0.11	0.84	
10:48	14.20	3.89	6.43	0.09	0.84	
10:49	14.18	3.89	6.43	0.12	0.84	
10:50	14.19	3.86	6.41	0.10	0.84	
10:51	14.19	3.86	6.36	0.12	0.74	
10:52	14.18	3.87	6.37	0.12	0.84	
10:53	14.18	3.83	6.40	0.10	1.02	
10:54	14.18	3.85	6.39	0.09	0.84	
10:55	14.16	3.85	6.41	0.13	0.84	
10:56	14.17	3.85	6.51	0.13	0.84	
10:57	14.17	3.86	6.58	0.15	0.74	
10:58	14.17	3.87	6.51	0.12	0.84	
10:59	14.18	3.87	6.43	0.12	0.84	
11:00	14.17	3.86	6.38	0.14	0.53	
11:01	14.16	3.88	6.47	0.13	0.93	
11:02	14.16	3.87	6.54	0.14	0.74	
Average	14.18	3.87	6.44	0.12	0.88	

FORM NO. F-06-01 REVISION NO. 1 ISSUE DATE 01/02/11

ALS Laboratory Group



Lot No. 2022025-1

ANALYZER CALIBRATION DATA

Client	Gulf JP NKK Co., Ltd	Location	HRSG 12
Date	04 Jun 20	Test Operator	Usanee N.
SO ₂ ANALYZER			
Model	Teddyne 200EH	Serial No.	725
Span (%)	26		

	Cylinder Value (%)	Initial Analyzers Calibration Response (%)	Final Analyzers Calibration Response (%)	Difference (Percent of Span)
Zero Gas	0.00	0.50	0.03	0.03
Low-Level Gas	8.04	8.05	8.08	0.03
Span Gas	16.00	16.04	16.08	0.08

NO _x ANALYZER			
Model	Teddyne 200EH	Serial No.	725
Span (ppm)	600		

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	50.00	49.60	49.60	0.00
Span Gas	160.00	159.00	159.00	0.00

SO ₂ ANALYZER			
Model	Teddyne 100EH	Serial No.	419
Span (ppm)	600		

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	49.50	48.10	48.10	0.00
Span Gas	158.00	157.10	157.00	0.02

CO ANALYZER			
Model	Teddyne 300EH	Serial No.	425
Span (ppm)	1000		

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	87.60	87.20	87.20	0.00
Span Gas	800.00	803.00	802.00	0.10

Calibrated by

FORM NO. F-06-02 REVISION NO. 2 ISSUE DATE 30/01/19

ALS Laboratory Group



Lot No. 2022025-1

SYSTEM CALIBRATION BIAS AND DRIFT DATA

Client	Gulf JP NKK Co., Ltd	Location	HRSG 12
Date	04 Jun 20	Test Operator	Usanee N.

O ₂ ANALYZER			
Cylinder Conc. (%)	18.00	Span (%)	35

	O ₂ Analyzer Calibration Response	Initial Values	System Calibration Response	System Cal Bias (% of Span)	Final Values	System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	16.04	16.08	0.16	0.16	16.10	0.24	0.08	0.08

NO _x ANALYZER			
Cylinder Conc. (ppm)	180.00	Span (ppm)	500

	NO _x Analyzer Calibration Response	Initial Values	System Calibration Response	System Cal Bias (% of Span)	Final Values	System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	159.00	158.30	0.14	0.14	158.20	0.16	0.02	0.02

SO ₂ ANALYZER			
Cylinder Conc. (ppm)	168.00	Span (ppm)	500

	SO ₂ Analyzer Calibration Response	Initial Values	System Calibration Response	System Cal Bias (% of Span)	Final Values	System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	157.10	156.10	0.20	0.20	156.00	0.22	0.02	0.02

CO ANALYZER			
Cylinder Conc. (ppm)	806.00	Span (ppm)	1000

	CO Analyzer Calibration Response	Initial Values	System Calibration Response	System Cal Bias (% of Span)	Final Values	System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	805.00	801.00	0.20	0.20	800.00	0.30	0.10	0.10

Calibrated by

ALS Laboratory Group

FORM NO. F-06-01 REVISION NO. 1 ISSUE DATE 01/02/11

ALS Laboratory Group



EMISSION TEST RESULT

Client	Gulf JP NKK Co., Ltd	Run #	1
Date	04 Jun 20	Location	HRSG 12
Start Time	10:00	Test Operator	Usanee N.
End Time		Finish Time	10:30
SO ₂ Analyzer Model	Teddyne 100EH	Serial No.	419
NO _x /O ₂ Analyzer Model	Teddyne 300EH	Serial No.	725
CO/CO ₂ Analyzer Model	Teddyne 300EH	Serial No.	425

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)	Remark
10:00	14.16	3.86	6.71	0.21	2.70	
10:01	14.21	3.89	6.66	0.22	2.70	
10:02	14.21	3.92	6.70	0.22	2.70	
10:03	14.19	3.88	6.74	0.21	2.60	
10:04	14.19	3.87	6.72	0.21	2.51	
10:05	14.19	3.90	6.69	0.25	2.51	
10:06	14.18	3.87	6.73	0.24	2.51	
10:07	14.19	3.89	6.70	0.24	2.51	
10:08	14.20	3.86	6.69	0.24	2.51	
10:09	14.21	3.88	6.66	0.22	2.50	
10:10	14.21	3.85	6.65	0.25	2.51	
10:11	14.20	3.88	6.70	0.25	2.42	
10:12	14.21	3.88	6.75	0.08	2.51	
10:13	14.20	3.86	6.75	0.07	2.42	
10:14	14.21	3.86	6.71	0.07	2.51	
10:15	14.21	3.60	6.67	0.08	2.42	
10:16	14.20	3.80	6.73	0.10	2.42	
10:17	14.21	3.80	6.75	0.08	2.42	
10:18	14.22	3.88	6.72	0.09	2.42	
10:19	14.23	3.87	6.68	0.09	2.33	
10:20	14.23	3.86	6.64	0.07	2.42	
Average	14.20	3.88	6.70	0.17	2.62	

EMISSION TEST RESULT

Client	Gulf JP NNK Co., Ltd
Date	04 Jun 20
Start Time	10:21
SO ₂ Analyzer Model	Teledyne 100EH
NO ₂ /O ₃ Analyzer Model	Teledyne 200EH
CO/CO ₂ Analyzer Model	Teledyne 300EH

Run #	2
Location	HR89 12
Test Operator	Umarus N.
Finish Time	10:41
Serial No.	410
Serial No.	726
Serial No.	426

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	OD (ppm)	Remark
10:21	14.21	3.89	5.67	0.07	2.42	
10:22	14.22	3.87	5.68	0.08	2.33	
10:23	14.22	3.86	5.68	0.08	2.23	
10:24	14.22	3.88	5.64	0.08	2.23	
10:25	14.21	3.88	5.65	0.08	2.23	
10:26	14.22	3.88	5.69	0.08	2.23	
10:27	14.22	3.89	5.68	0.07	2.14	
10:28	14.23	3.86	5.65	0.11	2.14	
10:29	14.22	3.87	5.62	0.09	2.14	
10:30	14.22	3.86	5.58	0.06	2.23	
10:31	14.22	3.83	5.66	0.09	2.33	
10:32	14.21	3.88	5.62	0.04	2.23	
10:33	14.23	3.83	5.64	0.09	2.05	
10:34	14.22	3.87	5.64	0.08	2.14	
10:35	14.21	3.90	5.62	0.03	2.14	
10:36	14.22	3.86	5.62	0.02	2.23	
10:37	14.22	3.87	5.63	0.08	2.23	
10:38	14.22	3.88	5.61	0.04	2.23	
10:39	14.22	3.86	5.67	0.06	2.14	
10:40	14.23	3.86	5.59	0.05	2.14	
10:41	14.22	3.82	5.54	0.06	2.14	
Average	14.22	3.86	5.63	0.07	2.21	

FORM NO. F-04-01 REVISION NO. - 1 ISSUE DATE 01/03/13

ALS Laboratory Group



EMISSION TEST RESULT

Client	Gulf J.P. NKK Co., Ltd
Date	04 Jun 20
Start Time	10:42
CO ₂ Analyzer Model	Teddygyn 100EH
NO ₂ /O ₃ Analyzer Model	Teddygyn 200EH
CO/CO ₂ Analyzer Model	Teddygyn 300EH

Run #	3
Location	HR60 12
Test Operator	UENAGA N.
Finish Time	11:02
Serial No.	410
Serial No.	725
Serial No.	425

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	ΔO ₂ (ppm)	CO (ppm)	Remarks
10:42	14.22	3.63	5.65	0.02	2.14	
10:43	14.23	3.87	5.62	0.01	2.14	
10:44	14.22	3.87	5.67	0.00	2.14	
10:45	14.22	3.88	5.69	0.04	2.05	
10:46	14.22	3.89	5.72	0.01	2.14	
10:47	14.23	3.89	5.71	0.02	2.05	
10:48	14.21	3.90	5.67	0.02	2.14	
10:49	14.23	3.87	5.66	0.01	2.05	
10:50	14.23	3.66	5.62	0.02	2.14	
10:51	14.22	3.89	5.67	0.03	2.14	
10:52	14.23	3.87	5.76	0.02	2.14	
10:53	14.24	3.81	5.86	0.01	2.05	
10:54	14.22	3.68	5.86	0.03	2.05	
10:55	14.26	3.83	5.94	0.01	1.96	
10:56	14.22	3.58	5.07	0.02	1.95	
10:57	14.23	3.81	5.94	0.01	1.77	
10:58	14.22	3.64	5.82	0.02	1.88	
10:59	14.21	3.90	5.84	0.01	2.05	
11:00	14.18	3.58	5.61	0.02	2.05	
11:01	14.20	3.64	5.99	0.01	1.86	
11:02	14.23	3.58	5.85	0.01	1.95	
Average	14.22	3.87	5.78	0.02	2.02	

FORM NO. E-06-001 REVISION NO. 1 ISSUE DATE 01/03/13

At-S Laboratory Group



Certificate Of Analysis
Special Gases Mixture

Customer Details		
Name:	Address:	Customer Tag No.:
ALS Laboratory Group (Thailand)	House No.104, Soi Phattarakarn 40, Phattarakarn Rd., Phattarakarn, Suan Luang, Bangkok 10250.	

Certificate Details Number:	4615/18	Date of Issue:	18-Jan-2019	Expired date:	18-Jan-2021
Material Details					
Production Order:	90151864	Material Code:	471000-AL-34	Cylinder No.:	D595126
Gas content:	6.540 M ³	Filling pressure:	137.0 Bar	Valve:	CGA 660.55
Cylinder Owner:	LINDE	Filling Material:	Aluminum	Cylinder Size:	50 L

Laboratory Report		Analytical Result			
Component	Normal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	Assay Date
Sulphur Dioxide	160 ppm	158 ppm	± 1% relative	(5) 1-PB-352	24-Dec-2018 & 16-Jan-2019
Nitric Acid	160 ppm	150 ppm	± 1% relative	(5) 1-PB-352	24-Dec-2018 & 16-Jan-2019
Carbon Monoxide	800 ppm	805 ppm	± 1% relative	(5) 1-PB-352	24-Dec-2018
Other NOx Impurity Nitrogen	Balance	Less than 8.0 ppm			

Reference Standard	Cylinder number	Concentration
Sulphur Dioxide	DB32504	199 ± 1 ppm
Nitric Oxide	DB32504	203 ± 1 ppm
Carbon Monoxide	DB32504	802 ± 3 ppm

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-SO2	11-Dec-2018 & 18-Jan-2019
FTIR Spectrometers Nicolet iS50	FTIR-NO	11-Dec-2018 & 18-Jan-2019
FTIR Spectrometers Nicolet iS50	FTIR-CO	12-Dec-2018

Recommend usage condition
Minimum utilization: 5% of actual content or before expire date whichever comes first.

Storage condition: keep in well ventilation and
Comments
When reordering, please note the material number.

Notes:

1. All results expressed in this report are on a mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA (acealdehyde) Protocol EPA-800/9-7-12/7331 for the Assay and Certification of Gaseous (aldehyde) Standards using procedure 61.
2. 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%.
3. The assigned value of this material is traceable to the SI through the reference gas standard which is traceable to two National Standards of Mass or other recognized national metrology institutes.
4. SI: Gas Chromatography; 1) Para-magnetic Oxygen Analyzers; 2) Electrochemical; 3) Total Hydrocarbon Analyzers; 6) Diffusion - Some Diffusion.

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Certificate Of Analysis
Special Gases Mixture

Customer Details		
Name:	Address:	Customer Tag No.:
ALS Laboratory Group (Thailand)	104, Soi Phatthanakan 40, Phatthanakan Rd., Phatthanakan, Suan Luang, Bangkok, 10250	

Certificate Details	2669/19	Date of Issue:	16-Aug-2019	Expiry date:	15-Aug-2021
Number					
Material Details					
Production Order	90155224	Material Code:	473100-SX-34	Cylinder No.	A009765K
Gas content:	5.230 M ³	Filling pressure:	137.0 Bar	Valve:	AGA 660 SS
Cylinder Owner:	UNDE	Filling Material:	Synthetic Air	Cylinder Size:	60L

Laboratory Report		Analytical Result			Assay Date
Component	Normal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	Assay Date
Sulphur Dioxide	50.0 ppm	49.5 ppm	± 1% relative	(6) P18-352	5-Aug-8 15-Aug-19
Nitric Dioxide	50.0 ppm	50.0 ppm	± 1% relative	(6) P18-352	5-Aug-8 15-Aug-19
Other NOx Impurity		Less than 2.5 ppm			
Carbon Monoxide	96.0 ppm	87.6 ppm	± 1% relative	(6) P18-352	5-Aug-2019
Nitrogen	96.0 ppm				

Reference Standard	Cylinder number	Concentration
Sulphur Dioxide	D022358	68.1 ± 0.3 ppm
Carbon Monoxide	D022358	68.6 ± 0.3 ppm
Nitric Oxide	D022358	70.8 ± 0.33 ppm

Analytical Instruments used in Assay		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-ISO2	6-Jul-18-Aug-19
FTIR Spectrometers Nicolet iS50	FTIR-INO	6-Jul-18-Aug-19
FTIR Spectrometers Nicolet iS50	FTIR-CO	6-Jul-2019

Recommend usage condition
Minimum utilization: 5% of actual content or before expire date whichever comes first

Comments
When reordering, please quote the material number

Note:
 (1) All results expressed in this report are on male/male basis, unless otherwise specified. The assay of this standard has been performed in accordance with the EPA Hachbible protocol EPA 600/5-87-123/31 for Arsenic and Cadmium and German Calibration Standards using procedure 1.2. The reported expanded uncertainty is reliably based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95% measurement at this interval in the range of 10 to 1000 µg/kg. The reference gas standard used is traceable to Swiss National Institute of Metrology and other recognized national metrology institutes.
 (2) Gas chromatography, (3) Plasma Atomic Fluorescence Analyzer, (4) Electrodeless
 (5) Total Hydrocarbon Analysis, (6) Total Petroleum Hydrocarbon
 (7) Total Hydrocarbon Analysis, (8) Total Petroleum Hydrocarbon

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บริษัท อีซี (ประเทศไทย) จำกัด (มหาชน)
 15 ถนนพหลโยธิน 27/3 หมู่ 14 ตำบลบางนาบอน เขต นวมินทร์
 กรุงเทพมหานคร 10260 โทรศัพท์ (66) 2330-6100 โทรสาร (66) 2330-6533
 E-mail:esee@esee.com, 105 หมู่ 5 ตำบลคลองสวนเคด อำเภอบางบาล จังหวัดพระนครศรีอยุธยา 24100

15th floor, Bangna Tower A, 2/3 Moo 54, Bangna Fried KM. 4.5 Road, Bangna
Bangkok, Samutprakan 10540. Tel (66) 2338-4100 Fax (66) 2338-4333
Webpage: <http://www.125moo5.com>

CERTIFICATE OF ANALYSIS

Customer Detail: ALS Laboratory Group (Thailand)		Production Order Number: 90145553 Material Number: 478100-J-44 Certification Date: 07-Dec-2017 Expiry Date: 07-Dec-2018	
Cylinder Description: STEEL 47 L			
The measurement of this reference material is traceable to SI through the reference standard which is traceable to Swiss National Standard of Mass. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocol EPA 800 B-12531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1. The results are expressed on a mole mole basis, unless otherwise specified. The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k=2, providing a level of confidence of approximately 95%.			
Certificate Number: 398217	Analyst: Arissae T.	ARISSARA THONGNIRU	
Cylinder Number: 14465	Approve:		
Nominal Cylinder Content: 4.520 M³		SUKANYA KAMUTHARAT	
Nominal Pressure: 145.0 Bar			
Valve Outlet: CGA 590 BRASS	To Re-Order Please Quote: 478100-J-44		
Comment:	<ul style="list-style-type: none"> It is recommended that this product be not used below 5% of actual contents or should not be used when its gas pressure is below 150psig. Other impurities that detect by analytical condition of this mixture shall be report if it is more than 10% of minimum minor component. Keep and use in well-ventilated and secure area. 		

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บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)
 15 หมู่ 14 ถนนพหลโยธิน กม. 6.5 แขวง
 บางพลีใหญ่ เขตภาษีเจริญ กรุงเทพฯ 10140
 โทรศัพท์: 02-570-4781 โทรสาร: 02-570-4782
 โทรสาร: 02-570-4783 โทรสาร: 02-570-4784

Linde (Thailand) Public Company Limited
 15 หมู่ 14 ถนนพหลโยธิน กม. 6.5 แขวง
 บางพลีใหญ่ เขตภาษีเจริญ กรุงเทพฯ 10140
 โทรศัพท์: 02-570-4781 โทรสาร: 02-570-4782
 โทรสาร: 02-570-4783 โทรสาร: 02-570-4784

CERTIFICATE OF ANALYSIS

Analytical Result					
Component	Request Concentration	Certified Concentration	Certified Uncertainty	Method	Assay Date
Oxygen in Nitrogen	8.00 %	8.04 %	± 1% relative	(3) I-PD-354	04-Dec-2017
Reference Standard used in Assay					
Reference Standard	Cylinder No.	Concentration	Expiry Date		
Oxygen in Nitrogen	113555SG	9.976±0.02 %	24-Mar-2018		
Analytical Instruments used in Assay					
Instrument/Model	Analytical Principle	Last Multipoint Calibration			
Servomex 4100 O2 Analyzer	Paramagnetic	04-Dec-2017			
Method of Analysis: 1. Gas Chromatograph 2. Paramagnetic Oxygen Analyzer 3. Paramagnetic Oxygen Analyzer 4. Electrochemical Moisture Analyzer 5. Total Hydrocarbon Analyzer 6. Other specified					
Cylinder Number 14465 Production Order Number 90145553			Certification Date: 07-Dec-2017 Expiration Date: 07-Dec-2018		

Page 2 of 2

บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)
 15 หมู่ 14 ถนนพหลโยธิน กม. 6.5 แขวง
 บางพลีใหญ่ เขตภาษีเจริญ กรุงเทพฯ 10140
 โทรศัพท์: 02-570-4781 โทรสาร: 02-570-4782
 โทรสาร: 02-570-4783 โทรสาร: 02-570-4784

Linde (Thailand) Public Company Limited
 15 หมู่ 14 ถนนพหลโยธิน กม. 6.5 แขวง
 บางพลีใหญ่ เขตภาษีเจริญ กรุงเทพฯ 10140
 โทรศัพท์: 02-570-4781 โทรสาร: 02-570-4782
 โทรสาร: 02-570-4783 โทรสาร: 02-570-4784

CERTIFICATE OF ANALYSIS

Customer Detail: ALS Laboratory Group (Thailand)		Production Order Number: 90137389 Material Number: 557200-J-44 Certification Date: 24-Sep-2016 Expiry Date: 24-Sep-2016	
Cylinder Description: STEEL 47 L			
The measurement of this reference material is traceable to SI through the reference standard which is traceable to Swiss National Standard of Mass. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocol EPA 800 B-12531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1. The results are expressed on a mole mole basis, unless otherwise specified. The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k=2, providing a level of confidence of approximately 95%.			
Certificate Number: 363075	Analyst: THITAT LOYRAT	THITAT LOYRAT	
Cylinder Number: 363075	Approve:		
Nominal Cylinder Content: 4.560 M³		SUKANYA KAMUTHARAT	
Nominal Pressure: 145.0 Bar			
Valve Outlet: CGA 590 BRASS	To Re-Order Please Quote: 557200-J-44		
Comment:	<ul style="list-style-type: none"> It is recommended that this product be not used below 5% of actual contents or should not be used when its gas pressure is below 150psig. Other impurities that detect by analytical condition of this mixture shall be report if it is more than 10% of minimum minor component. Keep and use in well-ventilated and secure area. 		

Page 1 of 2

บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)
 15 หมู่ 14 ถนนพหลโยธิน กม. 6.5 แขวง
 บางพลีใหญ่ เขตภาษีเจริญ กรุงเทพฯ 10140
 โทรศัพท์: 02-570-4781 โทรสาร: 02-570-4782
 โทรสาร: 02-570-4783 โทรสาร: 02-570-4784

Linde (Thailand) Public Company Limited
 15 หมู่ 14 ถนนพหลโยธิน กม. 6.5 แขวง
 บางพลีใหญ่ เขตภาษีเจริญ กรุงเทพฯ 10140
 โทรศัพท์: 02-570-4781 โทรสาร: 02-570-4782
 โทรสาร: 02-570-4783 โทรสาร: 02-570-4784

CERTIFICATE OF ANALYSIS

Analytical Result					
Component	Request Concentration	Certified Concentration	Certified Uncertainty	Method	Assay Date
Oxygen in Nitrogen	16.0 %	16.0 %	± 1% relative	(3) I-PB-354	24-Sep-2016
Reference Standard used in Assay					
Reference Standard	Cylinder No.	Concentration	Expiry Date		
Oxygen in Nitrogen	243625SG	25.08±0.13 %	19-Aug-2017		
Analytical Instruments used in Assay					
Instrument/Model	Analytical Principle	Last Multipoint Calibration			
Servomex 4100 O2 Analyzer	Paramagnetic	24-Sep-2016			
Method of Analysis: 1. Gas Chromatograph 2. Paramagnetic Oxygen Analyzer 3. Paramagnetic Oxygen Analyzer 4. Electrochemical Moisture Analyzer 5. Total Hydrocarbon Analyzer 6. Other specified					
Cylinder Number 363075 Production Order Number 90137389			Certification Date: 24-Sep-2016 Expiration Date: 24-Sep-2016		

Page 2 of 2

บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)
 15 หมู่ 14 ถนนพหลโยธิน กม. 6.5 แขวง
 บางพลีใหญ่ เขตภาษีเจริญ กรุงเทพฯ 10140
 โทรศัพท์: 02-570-4781 โทรสาร: 02-570-4782
 โทรสาร: 02-570-4783 โทรสาร: 02-570-4784

Linde (Thailand) Public Company Limited
 15 หมู่ 14 ถนนพหลโยธิน กม. 6.5 แขวง
 บางพลีใหญ่ เขตภาษีเจริญ กรุงเทพฯ 10140
 โทรศัพท์: 02-570-4781 โทรสาร: 02-570-4782
 โทรสาร: 02-570-4783 โทรสาร: 02-570-4784



CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Calibration of Date : 7 Jan 20
 Next Cal. Date : 7 Jul 20
 Barometric Pressure (mm.Hg) : 758
 Relative Humidity (%) : 72.0
 Temperature (C°) : 32.0
 Balance Dry Gas Meter Data
 Serial No. : 1607009
 Model No. : SK2BESR-QC5
 Calibration No. : C-070120-228-2-55-01
 Dry Gas Meter No. : 228-2-55-01
 Serial No. : 1706090
 Model No. : XC-572-V
 Correction Factor (F) : 1.038
 Next Calibration Date : 15 Sep 20

ΔH (mm H ₂ O)	⊖ Minutes	Reference Dry Gas Meter Calibration				Console Control Dry Gas Meter								Dry Gas Meter Correction Factor (F)	Office Calibration Factor ΔH _g
		Vr (Liters)		Tr (°C)	Total	Vm (Liters)		Ti (°C)	Total	To (°C)	Avg. Tm (°C)				
		Final	Initial			Final	Initial								
15	12.35	150.00	0.00	32.0	150.00	1194752.8	1194655.0	32.0	32.0	33.0	33.0	1.0480	46.9383		
25	9.50	150.00	0.00	32.0	150.00	1194609.6	1194522.8	34.0	34.0	34.0	34.0	1.0484	46.4425		
50	6.50	150.00	0.00	32.0	150.00	1195064.6	1194977.8	35.0	35.0	35.0	35.0	1.0493	43.2423		
80	5.15	150.00	0.00	32.0	150.00	1195220.6	1195133.8	36.0	36.0	36.0	36.0	1.0497	43.3321		
100	4.15	150.00	0.00	32.0	150.00	1195377.2	1195290.4	36.0	36.0	36.0	36.0	1.0498	42.5544		
										Avg.	Avg.	1.0498	44.4782		

Y Ratio of reading of reference to dry gas meter; tolerance for individual values ± 0.02 from average.
 ΔHg Office pressure differential that equates to 21.24 in. of air @ 25 C and 760 mm of mercury, standard; tolerance for individual values ± 5.08 from average.
 Reproducibility of test results as a useful reference.

Cal



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date : 7 Jan 20		Ambient Temperature (°C): 32		
Calibration sheet No.: C-070120-228-2-55-02		Relative Humidity (%): 72		
Digital Temperature ID : 228-2-55-02		Reference Temperature ID : 256-1-05-01		
Console Serial No. 1705090		Serial No.: 7688004		
Console Model: XC-572-V		Model: 714		
		Last Calibrate: 8 Jan 19		
Location	Reference Temperature °C	Digital Temperature °C	Error °C	Remark
Stick	0	1	1	
	25	28	3	
	50	51	1	
	100	101	1	
	150	151	1	
	200	201	1	
	250	251	1	
	300	301	1	
	500	501	1	
	1000	1001	1	
Probe	1200	1201	1	
	100	100	0	
	125	125	0	
Oven	150	150	0	
	100	100	0	
	125	125	0	
Filter	150	150	0	
	100	100	0	
	125	125	0	
Exh	150	150	0	
	0	0	0	
	10	10	0	
Meter	20	20	0	
	0	1	1	
	25	26	1	
AUX	50	51	1	
	0	0	0	
	25	25	0	
	50	50	0	

Calibrated by



Pitot Tube Calibration Data

Pitot Tube Identification Number : 228-2-55-05
 Calibration Date : 7 Jan 20
 Lab test duct Number : 258-1-13-01
 Standard Pitot ID : 228-3-12-01
 Calibration Sheet No. : C-070120-228-2-55-05
 Cp Standard : 0.99

Type S Pitot Tube Coefficient Data					
	Type s pitot tube Leg A,B	Standard pitot tube (ΔP, mm.H ₂ O)	Type s pitot tube (ΔP, mm.H ₂ O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
Test 2	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
Test 3	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
			Cp	0.842	0.842

$$C_{p(S)} = C_p \sqrt{\frac{\Delta P_{(std)}}{\Delta P_{(s)}}}$$

$$C_{p(A)} - C_{p(B)} \text{ must BE } \leq 0.01$$

$$\sum [C_p (s) - C_p (A \text{ or } B)]$$

$$\text{Average deviation(A or B)} = \frac{\sum [C_p (s) - C_p (A \text{ or } B)]}{3} \text{ must BE } \leq 0.01$$

Calibrated by



Pitot Tube Calibration Data

Pitot Tube Identification Number : 228-2-55-05
 Calibration Date : 7 Jan 20
 Lab test duct Number : 258-1-13-01
 Standard Pitot ID : 228-3-12-01
 Calibration Sheet No. : C-070120-228-2-55-06
 Cp Standard : 0.99

Type S Pitot Tube Coefficient Data					
	Type s pitot tube Leg A,B	Standard pitot tube (ΔP, mm.H ₂ O)	Type s pitot tube (ΔP, mm.H ₂ O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
Test 2	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
Test 3	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
			Cp	0.842	0.842

$$C_{p(S)} = C_p \sqrt{\frac{\Delta P_{(std)}}{\Delta P_{(s)}}}$$

$$C_{p(A)} - C_{p(B)} \text{ must BE } \leq 0.01$$

$$\sum [C_p (s) - C_p (A \text{ or } B)]$$

$$\text{Average deviation(A or B)} = \frac{\sum [C_p (s) - C_p (A \text{ or } B)]}{3} \text{ must BE } \leq 0.01$$

Calibrated by



PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

Calibration Sheet No.: C-070120-228-2-55-07

Calibration Date: 7 Jan 20

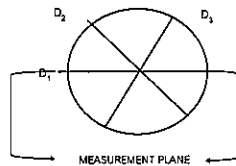
Nozzle ID #	Nozzle Diameter (mm.)			HI-Lo ΔD	$(D_1 + D_2 + D_3) / 3$ D_{avg}
	D_1	D_2	D_3		
1	0.300	0.300	0.300	0	0.300
2	0.460	0.460	0.450	0	0.450
3	0.630	0.630	0.630	0	0.630
4	0.780	0.780	0.780	0	0.780
5	0.950	0.950	0.950	0	0.950
6	1.090	1.090	1.090	0	1.090
7	1.250	1.250	1.250	0	1.250

Where:

D_1, D_2, D_3 = Three different nozzle diameters at 60 degrees to each other, each measured the nearest 0.025 mm.

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

D_{avg} = $(D_1 + D_2 + D_3) / 3$



Form No. 08 281-025 (12/01/20)

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaywang, Huaywang, Bangkok 10310
Tel: +66 2543 8541-4, e-mail: service@thailand.sartorius.com



SARTORIUS

Certificate of Calibration

REVIEW BY: Siriluk P.
APPROVED BY: L. A.
NEXT CAL. DATE: 2021

Model Number: LA130S-F

Certificate No.: SI2003071

Description: Analytical Balance

Issued Date: Friday, March 27, 2020

Serial Number: 25409690

Reference No.: 500923

Manufacturer: Sartorius

Page No.: 1 of 2

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

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

Calibrated Place: Lab Room

Calibrated By: Mr. Chonchai Inthana

Calibration

Calibration Date: Tuesday, March 24, 2020

Procedure No.: This calibration was conducted by

Using in-house calibration procedure number (WI-003)

Based on UKAS LAB 14

Metrological data:

Capacity: 150 g Readability: 0.0001 g

Ambients Conditions:

Temperature: 23.8 °C \pm 5.0 °CHumidity: 55.0 % RH \pm 10.0 % RHPressure: \pm

Reasons for calibration

☐ New Installation ☐ Service / Repaired ☒ Re-calibration / Maintenance
Equipment Condition: ☒ Good Operate ☐ Fail

Measurement Method UKAS Publication Ref: Lab 14

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor ($k=2$) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came form list of Sartorius Metrological Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 200g E2 YCS011-522-00	Sartorius	119934 D-K-19388-01	10-Sep-2021
608H1	Thermo-Hygrometer, Testo 608-H1	SPCC	C19190574	9-Dec-2020

This certificate relate and apply this equipment only.

This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division Sartorius (Thailand) Co., Ltd.

ISO/IEC 17025, 01/11/2018, R1

Mr. Chonchai Inthana (Technical Manager)

S
T
A
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P

BKK_FS0631

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaywang, Huaywang, Bangkok 10310
Tel: +66 2543 8541-4 Fax: +66 2642 4367, e-mail: service@thailand.sartorius.com

SARTORIUS

Certificate of Calibration

Model Number: LA130S-F

Certificate No.: SI2003071

Description: Analytical Balance

Issued Date: Friday, March 27, 2020

Serial Number: 25409690

Reference No.: 500923

Manufacturer: Sartorius

Page No.: 2 of 2

Calibration Results: Without Adjustment

Repeatability			Eccentricity (Off-center loading error)		
The repeatability is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.			The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/2 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R110).		
Nominal Value: (Low Load)	10.0000	100.0000	Nominal value:	50	g
10 g	10.0001	100.0001	Tolerance	0.0004	g
Tolerance	0.0001 g	0.0001 g	Difference		
	10.0000	100.0001	1	-	
	9.9999	100.0002	2	0.0000	
Nominal Value: (High Load)	10.0001	100.0001	3	-0.0001	
100 g	10.0001	100.0002	4	0.0001	
Tolerance	0.0001 g	0.0001 g	5	-0.0001	
	10.0001	100.0002	6	-	
	10.0001	100.0000			
Standard Deviation	0.00007	0.00008			
Linearity					
The linearity, also called nonlinearity, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.					
Tolerance	0.0002 g				
Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)	
0.1	0.1000	0.1000	0.0000	0.00019	
0.2	0.2000	0.2000	0.0000	0.00019	
0.5	0.5000	0.5000	0.0000	0.00019	
1	1.0000	1.0000	0.0000	0.00019	
2	2.0000	2.0001	0.0001	0.00020	
5	5.0000	5.0000	0.0000	0.00020	
10	10.0000	10.0001	0.0001	0.00019	
50	50.0001	50.0001	0.0000	0.00020	
100	100.0001	100.0002	0.0001	0.00023	
150	150.0001	150.0003	0.0002	0.00027	

End of Report.

ISO/IEC 17025, 01/11/2018, R1

SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

451-451/1 Sithiporn Rd., Bangbunru, Banglud Bangkok 10700 THAILAND.
Tel: 0-2435-8800 Fax: 0-2433-1679 e-mail: cal-center@sithiporn.com http://www.sithiporn.com



Cert. No.: ACC19011
Pages: 1 of 3

Calibration Certificate

Equipment: SOUND CALIBRATOR
Manufacturer: RION
Model: NC-74
Serial No.: 34178118
ID No.: -

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

REVIEW BY: W. B.
APPROVED BY: W. B.
NEXT CAL. DATE: 15/10/20

Received Date: 10 OCTOBER 2019
Calibration Date: 15 OCTOBER 2019
Date of Issue: 15 OCTOBER 2019

Calibrated by: Nathakorn Pisutpaisan

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.

OF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACC19011
Job No. : VC63AC0004
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

This equipment was calibrated by based 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	MY52302742	EF-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL.BP. 13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL.BP. 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL.BP. 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EF-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KAI	34560495	AA-3008-19	13-May-20
Audio Analyzer	AVR-3360A	V744B6069	EF-0015-19	04-Mar-20

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).

QF-TS12-04-03-051060

T. P.T.A.

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY

451-451/3 Sinitphorn Rd., Bangkumru, Bangkok Bangkok 10700 THAILAND.
Tel.0-2435-8850 Fax.0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com

BKK_FS0922



Cert. No. : ACL19056
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/Microphone UC-52 / Pre-amplifier NH-24
Serial No. : 00572452 / 171618 / 72790
ID No. : -

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 JULY 2019
Calibration Date : 14 AUGUST 2019
Date of Issue : 15 AUGUST 2019

Calibrated by : Nethakorn Pisutpaisan

Approved by :

T. P.T.A.
(Thanakul Peichurai)

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.

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACC19011
Job No. : VC63AC0004
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit (dB)
94	94.14	0.14	0.12	0.4

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1001.5	0.2	1.0	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
1.82	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

QF-TS12-04-03-051060

T. P.T.A.

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19056
Job No. : VC62AC0015
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EF-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL.BP. 13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL.BP. 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL.BP. 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EF-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KAI	34560495	AA-3008-19	13-May-20

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).

QF-TS12-04-03-051060

T. P.T.A.

Continuation of Calibration Certificate

Cert. No. : ACL19056
Job No. : VC62AC0015
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19056
Job No. : VC62AC0015
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (91.97)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
13.8

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

Frequency Weighting	Measured value (dB)
A - weight	9.9
C - weight	16.6
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)			Acceptance Limits
	Flat	C-weight	A-weight	
125	0.2	0.3	0.3	± 1.5
1000	-0.1	-0.2	-0.1	± 1.0
8000	-0.4	-0.3	-0.3	± 5.0

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19056
Job No. : VC62AC0015
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	-0.1	± 2.0
125	0.0	0.0	0.0	± 1.5
250	0.0	-0.1	-0.1	± 1.5
500	0.0	0.0	-0.1	± 1.5
1000	0.0	0.0	0.0	± 1.0
2000	0.0	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	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

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

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19056
Job No. : VC62AC0015
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	136.1	0.1	± 1.1
135.0	135.1	0.1	± 1.1
134.0	134.1	0.1	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.1	0.1	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.1	0.1	± 1.1
114.0	114.1	0.1	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.1	0.1	± 1.1
99.0	99.1	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	29.0	0.0	± 1.1
28.0	28.0	0.0	± 1.1
27.0	27.0	0.0	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.1	0.1	± 1.1

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19056
Job No. : VC62AC0015
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)
Auto	94.0	94.0	0.0	±0.5

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	116.9	-0.1	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.8
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

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	-
One	136.4	135.8	-0.6	±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	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

QP-TS12-04-03-051060

BKK_FS0923

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY451-451/1 Srinthorn Rd.,Bangbunru, Bangkok Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL19058
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00572457 / 170214 / 72795
ID No. : -

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KHWAENO 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 JULY 2019
Calibration Date : 14 AUGUST 2019
Date of Issue : 15 AUGUST 2019

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchai
(Thanakul Petchai)

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.

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19056
Job No. : VC62AC0015
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle	-0.1	±1.5
89.7	89.6		

12. High level stability

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

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

End of Calibration Certificate

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19058
Job No. : VC62AC0015
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EF-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL-BP-13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL-BP-12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL-BP-14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EF-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KA1	34560495	AA-3008-19	13-May-20

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).

QP-TS12-04-03-051060

Cert. No. : ACL19058
Job No. : VC62AC0015
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QF-TS12-04-03-051060

Cert. No. : ACL19058
Job No. : VC62AC0015
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.97)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
13.8

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

Frequency Weighting	Measured value (dB)
A-weight	10.8
C-weight	17.2
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)			Acceptance Limits
	Flat	C-weight	A-weight	
125	0.2	0.2	0.2	±1.5
1000	-0.2	-0.2	-0.2	±1.0
8000	-0.1	-0.1	-0.1	±5.0

QF-TS12-04-03-051060

Cert. No. : ACL19058
Job No. : VC62AC0015
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	-0.1	±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	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	0.0	-
C-weight	94.0	0.0	±0.2
Flat	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

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

QF-TS12-04-03-051060

Cert. No. : ACL19058
Job No. : VC62AC0015
Pages : 6 of 8

7. Level linearity on the reference level range

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

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19058
Job No. : VC62AC0015
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits
Auto	94.0	94.0	0.0	±0.5

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
SBL	2	8	108.0	108.0	0.0	1.0; -2.5
	200	800	128.0	128.0	0.0	±1.0

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	-
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	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

QF-TS12-04-03-051060

BKK_FS0924

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY451-451/1 Sindhorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2435-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL19055
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No. : 00572609 / 170133 / 72947
ID No. : -

Condition As Found : GOOD

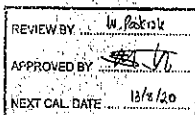
Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHUWAENG PHATTHANAKAN, KHUET SUAN LUANG,
BANGKOK, 10250 THAILAND.

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

Received Date : 23 JULY 2019
Calibration Date : 13 AUGUST 2019
Date of Issue : 15 AUGUST 2019

Calibrated by : Nathakorn Pisutpaisan

Approved by :



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.

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19058
Job No. : VC62AC0015
Pages : 8 of 8

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19055
Job No. : VC62AC0015
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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 instrument's 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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EP-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL_BP_13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL_BP_12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL_BP_14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EP-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KAI	34560495	AA-3008-19	13-May-20

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).

QF-TS12-04-03-051060

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QP-TS12-04-03-051060

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.97)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.6

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

Frequency Weighting	Measured value (dB)
A-weight	11.6
C-weight	17.9
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)			Acceptance Limits
	Flat	C-weight	A-weight	
125	0.0	0.0	0.0	±1.5
1000	-0.2	-0.2	-0.2	±1.0
8000	2.1	2.2	2.3	±5.0

QP-TS12-04-03-051060

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	0.1	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	0.1	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	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	0.0	-
C-weight	94.0	0.0	±0.2
Flat	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

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

QP-TS12-04-03-051060

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.1	0.1	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	29.0	0.0	±1.1
28.0	28.0	0.0	±1.1
27.0	27.0	0.0	±1.1
26.0	26.0	0.0	±1.1
25.0	25.1	0.1	±1.1

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19055
Job No. : VC62AC0015
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)
Auto	94.0	94.0	0.0	±0.5

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
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

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	-
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	133.1	0.1	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

QF-TS12-04-03-051060

T. Petch...

BKK_FS0925

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY451-451/1 Sirinthorn Rd, Bangbunru, Bangkok Bangkok 10700 THAILAND.
Tel: 2435-8800 Fax: 2433-1679 e-mail: cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL19036
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Pre-amplifier NH-24
Serial No. : 00584982 / 175176 / 85721
ID No. : -

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KHUANG 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 : 10 JULY 2019
Calibration Date : 19 JULY 2019
Date of Issue : 19 JULY 2019

Calibrated by : Natasorn Pisutpaisan

Approved by :

T. Petch...
(Thanakul Petchumri)

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.

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19055
Job No. : VC62AC0015
Pages : 8 of 8

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-03-051060

T. Petch...

Continuation of Calibration Certificate

Cert. No. : ACL19036
Job No. : VC62AC0013
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EF-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL-BP, 13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL-BP, 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL-BP, 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EP-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-Mar-20
Measuring Amplifier	NA-42KAI	34563495	AA-3008-19	13-May-20

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).

QF-TS12-04-03-051060

T. Petch...

Continuation of Calibration Certificate

Cert. No. : ACL19036
Job No. : VC62AC0013
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QF-TS12-04-03-051060

T. Pich...

Continuation of Calibration Certificate

Cert. No. : ACL19036
Job No. : VC62AC0013
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.97)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.6

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

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

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			Acceptance Limits
	Flat	C-weight	A-weight	
125	0.4	0.4	0.4	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	1.9	2.0	2.0	± 5.0

QF-TS12-04-03-051060

T. Pich...

Continuation of Calibration Certificate

Cert. No. : ACL19036
Job No. : VC62AC0013
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)			Acceptance Limits
	Flat	C-weight	A-weight	
63	0.0	0.0	-0.1	± 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	0.0	0.1	± 5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

QF-TS12-04-03-051060

T. Pich...

Continuation of Calibration Certificate

Cert. No. : ACL19036
Job No. : VC62AC0013
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	33.9	-0.1	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.0	0.0	± 1.1

QF-TS12-04-03-051060

T. Pich...

Continuation of Calibration Certificate

Cert. No. : ACL19036
Job No. : VC62AC0013
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)
Auto	94.0	94.0	0.0	±0.5

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	128.0	0.0	±1.0

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	-
One	136.4	135.7	-0.7	±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	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

QF-TS12-04-03-051060

T. Peth...

BKK_F50926

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY

451-451/1 Srinithorn Rd.,Banghumnu, Bangplud Bangkok 10700 THAILAND.
Tel.0-2435-8800 Fax.0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL19010
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00584983/ 175177 / 85722
ID No. : -

Condition As Found : GOOD

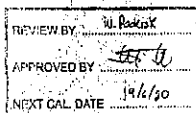
Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40,PHATTANAKAN ROAD,
KHWAENG PHATTANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

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

Received Date : 17 JUNE 2019
Calibration Date : 19 JUNE 2019
Date of Issue : 19 JUNE 2019

Calibrated by : Nathakorn Pisurpaisan

Approved by :



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QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19036
Job No. : VC62AC0013
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.7	89.6	-0.1	±1.5

12. High level stability

Frequency	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

QF-TS12-04-03-051060

T. Peth...

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

Continuation of Calibration Certificate

Cert. No. : ACL19010
Job No. : VC62AC0006
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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	BP-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EP-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL.BP.13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL.BP.12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL.BP.14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EP-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KA1	34560495	AA-0008-19	13-May-20

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).

QF-TS12-04-03-051060

T. Peth...

Continuation of Calibration Certificate

Cert. No. : ACL19010
Job No. : VC62AC0006
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19010
Job No. : VC62AC0006
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.97	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
13.8

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

Frequency Weighting	Measured value (dB)
A - weight	9.9
C - weight	16.4
Flat	22.1

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	-0.1	-0.1	-0.1	± 1.0
8000	-0.1	0.0	0.0	± 5.0

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19010
Job No. : VC62AC0006
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	-0.2	-0.1	±2.0
125	0.0	0.0	-0.1	±1.5
250	-0.1	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	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	± 0.2
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

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

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19010
Job No. : VC62AC0006
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	135.9	-0.1	± 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	128.9	-0.1	± 1.1
124.0	123.9	-0.1	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.0	0.0	± 1.1
27.0	27.0	0.0	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.0	0.0	± 1.1

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19010
Job No. : VC62AC0006
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)
Auto	94.0	94.0	0.0	±0.5

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

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	-
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	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

QF-TS12-04-03-051060

T. Roth

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY451-451/1 Sithiporn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACC20001
Pages : 1 of 3

Calibration Certificate

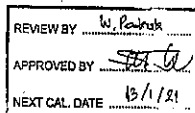
Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No. : 34178120
ID No. : -

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KJWAENG PHATTANAKAN, KJHET SUAN LUANG,
BANGKOK, 10250 THAILAND.Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %Received Date : 25 DECEMBER 2019
Calibration Date : 13-17 JANUARY 2020
Date of Issue : 17 JANUARY 2020

Calibrated by : Nadekorn Pisutpaisan

Approved by :



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QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19010
Job No. : VC62AC0006
Pages : 8 of 8

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-03-051060

T. Roth

SITHIPORN / SITHIPORN ASSOCIATES CO.,LTD.
associates CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACC20001
Job No. : VC63AC0017
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

This equipment was calibrated by based 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	MY52302742	EF-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL-BP. 12/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL-BP. 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL-BP. 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EF-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KA1	34560495	AA-1008-19	13-May-20
Audio Analyzer	AVR-3360A	V744B6069	EF-0015-19	04-Mar-20

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. : ACC20001
Job No. : VC63AC0017
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit (dB)
94	94.06	0.06	0.12	0.4

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1001.3	0.1	1.0	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
1.16	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

QF-TS12-04-03-051060

451-451/1 Sirinthorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel: 0-2435-8800 Fax: 0-2433-1679 e-mail: cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACC19006
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No. : 34425567
ID No. : -

REVIEW BY	W. Petch
APPROVED BY	SETU
NEXT CAL. DATE	12/9/20

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.Location :
Ambient Temperature : (23.0 \pm 3) °C
Pressure : (101.3 \pm 3) kPa
Relative Humidity : (50.0 \pm 20) %Received Date : 27 AUGUST 2019
Calibration Date : 10 - 12 SEPTEMBER 2019
Date of Issue : 13 SEPTEMBER 2019

Calibrated by : Nuthakorn Pisuapaisan

Approved by :

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QF-TS12-04-03-051060

Cert. No. : ACC19006
Job No. : VC62AC0023
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

This equipment was calibrated by based 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	MY52302742	EP-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL.BP. 13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL.BP. 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL.BP. 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EF-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KAI	34560495	AA-3008-19	13-May-20
Audio Analyzer	AVR-3360A	V744B6069	EP-0015-19	04-Mar-20

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. : ACC19006
Job No. : VC62AC0023
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit (dB)
94	94.07	0.07	0.12	0.4

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1002.3	0.2	1.0	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
1.81	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

QF-TS12-04-03-051060

QF-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sirinthorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com

BKK FS0968



Cert. No. : ACL20011
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00296511 / 179112 / 87520
ID No.:

Condition As Found : GOOD

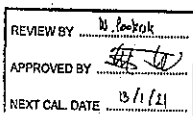
Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KJWAENG PHATTANAKAN, KJHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

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

Received Date : 25 DECEMBER 2019
Calibration Date : 13-17 JANUARY 2020
Date of Issue : 17 JANUARY 2020

Calibrated by : Nakhorn Pisutpaisan

Approved by :



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QF-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL20011
Job No. : VC63AC0017
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EF-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL.BP. 13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL.BP. 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL.BP. 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EF-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KAJ	34560495	AA-3008-19	13-May-20

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

Continuation of Calibration Certificate

Cert. No. : ACL20011
Job No. : VC63AC0017
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

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SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL20011
Job No. : VC63AC0017
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.97)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
13.8

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

Frequency Weighting	Measured value (dB)
A-weight	9.9
C-weight	16.4
Flat	21.8

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.4	0.4	±1.5
1000	-0.1	-0.1	-0.1	±1.0
8000	-1.3	-1.2	-1.2	±5.0

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL20011
Job No. : VC63AC0017
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	-0.1	0.1	-0.1	±1.5
1000	0.0	0.1	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	0.0	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL20011
Job No. : VC63AC0017
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	134.1	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	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.1	0.1	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	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

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL20011
Job No. : VC63AC0017
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)
Auto	94.0	94.0	0.0	±0.5

9. Tone burst response

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

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	-
One	136.4	136.4	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	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL20011
Job No. : VC63AC0017
Pages : 8 of 8

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

QP-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sirinthorn Rd, Bangbunru, Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com

BKK_FS0969



Cert. No. : ACL20012
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00296512 / 179113 / 87521
ID No. :

Condition As Found : GOOD

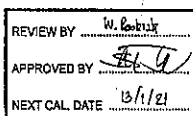
Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KITWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

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

Received Date : 25 DECEMBER 2019
Calibration Date : 13-17 JANUARY 2020
Date of Issue : 17 JANUARY 2020

Calibrated by : Nithakorn Pisutpaisan

Approved by :



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QF-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL20012
Job No. : VC63AC0017
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EF-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL-BP, 13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL-BP, 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL-BP, 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EF-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KAI	34560495	AA-3008-19	13-May-20

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).

QF-TS12-04-03-051060

T. P.T.L.

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL20012
Job No. : VC63AC0017
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QF-TS12-04-03-051060

T. P.T.L.

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL20012
Job No. : VC63AC0017
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.97)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
13.8

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

Frequency Weighting	Measured value (dB)
A-weight	9.9
C-weight	16.5
Flat	22.1

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	-0.1	-0.1	-0.1	± 5.0

QF-TS12-04-03-051060

T. P.T.L.

Continuation of Calibration Certificate

Cert. No. : ACL20012
Job No. : VC63AC0017
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	-0.1	±2.0
125	-0.1	0.0	-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	0.0	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

QF-TS12-04-03-051060

T. P.L.

Continuation of Calibration Certificate

Cert. No. : ACL20012
Job No. : VC63AC0017
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	136.9	-0.1	±1.1
136.0	135.9	-0.1	±1.1
135.0	134.9	-0.1	±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	128.9	-0.1	±1.1
124.0	123.9	-0.1	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	29.0	0.0	±1.1
28.0	28.0	0.0	±1.1
27.0	27.0	0.0	±1.1
26.0	26.0	0.0	±1.1
25.0	25.1	0.1	±1.1

QF-TS12-04-03-051060

T. P.L.

Continuation of Calibration Certificate

Cert. No. : ACL20012
Job No. : VC63AC0017
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)
Auto	94.0	94.0	0.0	±0.5

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

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	-
One	136.4	135.8	-0.6	±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	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

QF-TS12-04-03-051060

T. P.L.

Continuation of Calibration Certificate

Cert. No. : ACL20012
Job No. : VC63AC0017
Pages : 8 of 8

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

QF-TS12-04-03-051060

T. P.L.

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sirinthorn Rd., Bangbunru, Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com

BKK_FS0971



Cert. No. : ACL20014
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00296514 / 179116 / 87523
ID No.:

Condition As Found : GOOD

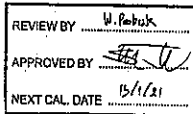
Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHUANG PHATTHANAKAN, KHUANG SUAN LUANG,
BANGKOK, 10250 THAILAND.

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

Received Date : 25 DECEMBER 2019
Calibration Date : 13-17 JANUARY 2020
Date of Issue : 17 JANUARY 2020

Calibrated by : Nadekom Pisupaisan

Approved by :



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.

QF-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL20014
Job No. : VC63AC0017
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EF-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL-BP. 13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL-BP. 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL-BP. 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EF-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KA1	34560495	AA-3008-19	13-May-20

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).

QF-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL20014
Job No. : VC63AC0017
Pages : 3 of 8

Summary of Measurement Result:

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QF-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL20014
Job No. : VC63AC0017
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.97)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
13.8

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

Frequency Weighting	Measured value (dB)
A-weight	9.9
C-weight	16.4
Flat	22.1

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.5	0.5	0.5	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	-1.0	-0.9	-0.9	± 5.0

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL20014
Job No. : VC63AC0017
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	0.0	±1.5
250	0.0	0.0	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL20014
Job No. : VC63AC0017
Pages : 6 of 8

7. Level linearity on the reference level range

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

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL20014
Job No. : VC63AC0017
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)
Auto	94.0	94.0	0.0	±0.5

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

10. Peak C sound level

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

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL20014
Job No. : VC63AC0017
Pages : 8 of 8

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

QF-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sirdhorn Rd, Bangbunru, Bangkok Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL19041
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-12/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00597161 / 180404 / 88174
ID No. : -

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHUWAING 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 : 18 JULY 2019
Calibration Date : 25 JULY 2019
Date of Issue : 26 JULY 2019

REVIEW BY: W. Pichah
APPROVED BY: [Signature]
NEXT CAL DATE: 16/1/20

Calibrated by : Nathakorn Pisutpaisan

Approved by :

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QF-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19041
Job No. : VC62AC0014
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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	EP-0012-19	01-Mar-20
Waveform Generator	33511D	MY52302742	EP-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL-BP, 13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL-BP, 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL-BP, 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EP-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-12KAI	34560495	AA-3008-19	13-May-20

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

Continuation of Calibration Certificate

Cert. No. : ACL19041
Job No. : VC62AC0014
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QF-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19041
Job No. : VC62AC0014
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.97)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.7

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

Frequency Weighting	Measured value (dB)
A-weight	10.8
C-weight	17.2
Flat	23.1

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			Acceptance Limits
	Flat	C-weight	A-weight	
125	0.0	0.0	0.1	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	0.5	0.5	0.5	± 5.0

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19041
Job No. : VC62AC0014
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	±0.1
Leq	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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T. R. R.

Continuation of Calibration Certificate

Cert. No. : ACL19041
Job No. : VC62AC0014
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7. Level linearity on the reference level range

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

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T. R. R.

Continuation of Calibration Certificate

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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)
Auto	94.0	94.0	0.0	±0.5

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

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	-
One	136.4	135.7	-0.7	±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	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

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11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-03-051060

T. R. R.

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sirdhorn Rd., Bangbunru, Bangplad Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL19042
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00597163 / 180406 / 88176
ID No. :

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 : 18 JULY 2019
Calibration Date : 26 JULY 2019
Date of Issue : 26 JULY 2019

Calibrated by : Nathakorn Pisurpaian

Approved by :

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.

QP-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19042
Job No. : VC62AC0014
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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 instrument's 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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EP-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL-BP, 13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL-BP, 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL-BP, 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EP-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KA1	34560495	AA-3008-19	13-May-20

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 as :

3.1 National Institute of Metrology (Thailand).

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

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19042
Job No. : VC62AC0014
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QP-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19042
Job No. : VC62AC0014
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.57)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.7

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

Frequency Weighting	Measured value (dB)
A-weight	10.8
C-weight	17.0
Flat	22.8

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.3	±1.5
1000	0.0	0.0	0.0	±1.0
8000	0.2	0.3	0.3	±5.0

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Continuation of Calibration Certificate

Cert. No. : ACL19042
Job No. : VC62AC0014
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	-0.1	±2.0
125	0.0	0.1	-0.1	±1.5
250	0.0	0.0	-0.1	±1.5
500	0.0	0.1	-0.1	±1.5
1000	0.0	0.0	-0.1	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.1	0.1	0.0	±3.0
8000	0.1	0.1	0.0	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	±0.1
Leq	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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T. Rtl.

Continuation of Calibration Certificate

Cert. No. : ACL19042
Job No. : VC62AC0014
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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)
Auto	94.0	94.0	0.0	±0.5

9. Tone burst response

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

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	-
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	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

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T. Rtl.

Continuation of Calibration Certificate

Cert. No. : ACL19042
Job No. : VC62AC0014
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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	135.1	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	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.1	0.1	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.1	0.1	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	29.0	0.0	±1.1
28.0	28.0	0.0	±1.1
27.0	27.0	0.0	±1.1
26.0	26.0	0.0	±1.1
25.0	25.0	0.0	±1.1

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T. Rtl.

Continuation of Calibration Certificate

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11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

QP-TS12-04-03-051060

T. Rtl.

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Srinthom Rd.,Bangbunru, Bangkok 10700 THAILAND.
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Cert. No. : ACL19043
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00597164 / 180407 / 88177
ID No.:

Condition As Found : GOOD

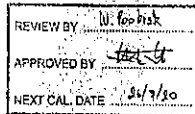
Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 THATTANAKAN 40, PHATTANAKAN ROAD,
KHWAENG PHATTANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

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

Received Date : 18 JULY 2019
Calibration Date : 26 JULY 2019
Date of Issue : 26 JULY 2019

Calibrated by : Nithakorn Pisutpaen

Approved by :



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SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19043
Job No. : VC62AC0014
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on JEC-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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EF-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL-BP. 13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL-BP. 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL-BP. 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EF-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KA1	34560495	AA-3008-19	13-May-20

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).

QF-TS12-04-03-051060

T. PTL.

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19043
Job No. : VC62AC0014
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QF-TS12-04-03-051060

T. PTL.

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19043
Job No. : VC62AC0014
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.97)	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	Measured value (dB)
A-weight	10.8
C-weight	17.2
Flat	23.0

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	0.1	0.1	0.1	±1.5
1000	0.0	0.0	0.0	±1.0
8000	0.7	0.8	0.8	±5.0

QF-TS12-04-03-051060

T. PTL.

Continuation of Calibration Certificate

Cert. No. : ACL19043
Job No. : VC62AC0014
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	-0.1	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±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	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	0.0	-
C-weight	94.0	0.0	±0.2
Flat	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

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

QP-TS12-04-03-051060

T. Pth...

Continuation of Calibration Certificate

Cert. No. : ACL19043
Job No. : VC62AC0014
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	89.1	0.1	±1.1
84.0	84.1	0.1	±1.1
79.0	79.0	0.0	±1.1
74.0	74.1	0.1	±1.1
69.0	69.1	0.1	±1.1
64.0	64.0	0.0	±1.1
59.0	59.1	0.1	±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	30.0	0.0	±1.1
29.0	29.0	0.0	±1.1
28.0	28.0	0.0	±1.1
27.0	27.0	0.0	±1.1
26.0	26.0	0.0	±1.1
25.0	25.1	0.1	±1.1

QP-TS12-04-03-051060

T. Pth...

Continuation of Calibration Certificate

Cert. No. : ACL19043
Job No. : VC62AC0014
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)
Auto	94.0	94.0	0.0	±0.5

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	5	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

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	-
One	136.4	136.1	-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	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

QP-TS12-04-03-051060

T. Pth...

Continuation of Calibration Certificate

Cert. No. : ACL19043
Job No. : VC62AC0014
Pages : 8 of 8

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

QP-TS12-04-03-051060

T. Pth...

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sitrintherm Rd., Bangbunru, Bangkok 10700 THAILAND.
Tel: 0-2435-8800 Fax: 0-2433-1679 e-mail: cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL19103
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Pre-amplifier NH-24
Serial No. : 00858513 / 158772 / 58773
ID No. : -

Condition As Found : GOOD

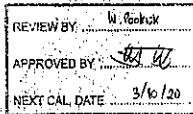
Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHUET SUAN LUANG,
BANGKOK, 10250 THAILAND.

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

Received Date : 02 OCTOBER 2019
Calibration Date : 03-04 OCTOBER 2019
Date of Issue : 04 OCTOBER 2019

Calibrated by : Nathakorn Pisurpaian

Approved by :



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.

QP-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19103
Job No. : VC63AC0001
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EF-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EHL-01-13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL-01-12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL-01-14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EF-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KAI	34560495	AA-3008-19	13-May-20

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).

QP-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19103
Job No. : VC63AC0001
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	-1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QP-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19103
Job No. : VC63AC0001
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.97)	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	Measured value (dB)
A-weight	10.8
C-weight	17.2
Flat	22.5

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.4	±1.5
1000	0.0	0.0	0.0	±1.0
8000	-0.7	-0.6	-0.6	±5.0

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19103
Job No. : VC63AC0001
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

QF-TS12-04-03-051060

T. Peth...

Continuation of Calibration Certificate

Cert. No. : ACL19103
Job No. : VC63AC0001
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	±1.5
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	±1.2
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

QF-TS12-04-03-051060

T. Peth...

Continuation of Calibration Certificate

Cert. No. : ACL19103
Job No. : VC63AC0001
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)
Auto	94.0	94.0	0.0	±0.5

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	124.0	124.1	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	128.0	0.0	±1.0

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	-
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	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

QF-TS12-04-03-051060

T. Peth...

Continuation of Calibration Certificate

Cert. No. : ACL19103
Job No. : VC63AC0001
Pages : 8 of 8

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

QF-TS12-04-03-051060

T. Peth...

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Srinthorn Rd., Bangumru, Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL19054
Pages : 1 of 8

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19054
Job No. : VC62AC0015
Pages : 2 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00672789 / 170666 / 73129
ID No. : -

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO.,LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KHUANG 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 JULY 2019
Calibration Date : 13 AUGUST 2019
Date of Issue : 15 AUGUST 2019

REVIEW BY : W. Boonkit
APPROVED BY :
NEXT CAL. DATE : 13/8/10

Calibrated by : Nathakorn Pinitpison

Approved by :

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.

QP-TS12-04-03-051060

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EF-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL-BP, 13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL-BP, 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL-BP, 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EF-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KAI	34560495	AA-3008-19	13-May-20

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

Continuation of Calibration Certificate

Cert. No. : ACL19054
Job No. : VC62AC0015
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QP-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19054
Job No. : VC62AC0015
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.5 (93.97)	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	Measured value (dB)
A-weight	11.3
C-weight	17.7
Flat	23.5

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	±1.5
1000	-0.2	-0.2	-0.2	±1.0
8000	-0.1	-0.1	-0.1	±5.0

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19054
Job No. : VC62AC0015
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

QP-TS12-04-03-051060

T. Pth.

Continuation of Calibration Certificate

Cert. No. : ACL19054
Job No. : VC62AC0015
Pages : 6 of 8

7. Level linearity on the reference level range

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

QP-TS12-04-03-051060

T. Pth.

Continuation of Calibration Certificate

Cert. No. : ACL19054
Job No. : VC62AC0015
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)
Auto	94.0	94.0	0.0	±0.5

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

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	-
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	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

QP-TS12-04-03-051060

T. Pth.

Continuation of Calibration Certificate

Cert. No. : ACL19054
Job No. : VC62AC0015
Pages : 8 of 8

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

QP-TS12-04-03-051060

T. Pth.

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sirinthorn Rd., Bangburm, Bangkok 10700 THAILAND.
Tel: 0-2435-6800 Fax: 0-2433-1679 e-mail: cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL19068
Pages : 1 of 8

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19068
Job No. : VC62AC0020
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Pre-amplifier NH-24
Serial No. : 00572563 / 170400 / 72901
ID No. :

Condition As Found : GOOD

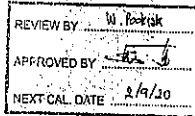
Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTIANAKAN 40, PHATTIANAKAN ROAD,
KHIWAENG PHATTIANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

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

Received Date : 07 AUGUST 2019
Calibration Date : 02 SEPTEMBER 2019
Date of Issue : 04 SEPTEMBER 2019

Calibrated by : Nathakorn Pisutpaisan

Approved by :



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.

QP-TS12-04-03-051060

Calibration Method :

This equipment was calibrated by based 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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EF-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL-BP_13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL-BP_12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL-BP_14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EF-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KAI	34560495	AA-3008-19	13-May-20

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

Continuation of Calibration Certificate

Cert. No. : ACL19068
Job No. : VC62AC0020
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QP-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19068
Job No. : VC62AC0020
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.97)	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	Measured value (dB)
A-weight	10.8
C-weight	17.3
Flat	23.0

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	0.1	0.1	0.1	±1.5
1000	-0.2	-0.2	-0.2	±1.0
8000	-1.1	-1.0	-1.0	±5.0

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19068
Job No. : VC62AC0020
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	-0.1	±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	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	0.0	-
C-weight	94.0	0.0	±0.2
Flat	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

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

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19068
Job No. : VC62AC0020
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	89.1	0.1	±1.1
84.0	84.1	0.1	±1.1
79.0	79.1	0.1	±1.1
74.0	74.1	0.1	±1.1
69.0	69.1	0.1	±1.1
64.0	64.0	0.0	±1.1
59.0	59.1	0.1	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.1	0.1	±1.1
30.0	30.1	0.1	±1.1
29.0	29.1	0.1	±1.1
28.0	28.1	0.1	±1.1
27.0	27.2	0.2	±1.1
26.0	26.2	0.2	±1.1
25.0	25.2	0.2	±1.1

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Continuation of Calibration Certificate

Cert. No. : ACL19068
Job No. : VC62AC0020
Pages : 7 of 8

Continuation of Calibration Certificate

Cert. No. : ACL19068
Job No. : VC62AC0020
Pages : 8 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±0.5

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

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	132.9	-0.1	-
One	136.4	135.5	-0.9	±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	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

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11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.7	0.2	±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

QF-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

BKK_FS0880

451-451/1 Sindhorn Rd, Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel:0-2433-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL19077
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-32 / Preamplifier NH-24
Serial No.: 00572564 / 170401 / 72902
ID No.: -

Condition As Found : GOOD

Customer : AIS 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 : 27 AUGUST 2019
Calibration Date : 10 - 12 SEPTEMBER 2019
Date of Issue : 13 SEPTEMBER 2019

Calibrated by : Nathakorn Pisutpaisan

Approved by :

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.

QP-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19077
Job No. : VC62AC0023
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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	EP-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EP-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL-BP-13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL-BP-12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL-BP-14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EP-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KAI	34560495	AA-3008-19	13-May-20

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

Continuation of Calibration Certificate

Cert. No. : ACL19077
Job No. : VC62AC0023
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QP-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19077
Job No. : VC62AC0023
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.97)	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	Measured value (dB)
A-weight	12.0
C-weight	18.6
Flat	24.1

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.4	0.4	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	-0.9	-0.8	-0.8	± 5.0

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19077
Job No. : VC62AC0023
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	-0.1	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±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	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	0.0	-
C-weight	94.0	0.0	±0.2
Flat	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

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

QF-TS12-04-03-051060

T. Peth...

Continuation of Calibration Certificate

Cert. No. : ACL19077
Job No. : VC62AC0023
Pages : 6 of 8

7. Level linearity at 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	89.1	0.1	±1.1
84.0	84.1	0.1	±1.1
79.0	79.0	0.0	±1.1
74.0	74.1	0.1	±1.1
69.0	69.1	0.1	±1.1
64.0	64.0	0.0	±1.1
59.0	59.1	0.1	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.1	0.1	±1.1
30.0	30.1	0.1	±1.1
29.0	29.1	0.1	±1.1
28.0	28.1	0.1	±1.1
27.0	27.1	0.1	±1.1
26.0	26.2	0.2	±1.1
25.0	25.2	0.2	±1.1

QF-TS12-04-03-051060

T. Peth...

Continuation of Calibration Certificate

Cert. No. : ACL19077
Job No. : VC62AC0023
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)
Auto	94.0	94.0	0.0	±0.5

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
SBL	2	8	108.0	108.0	0.0	1.0; -2.5
	200	800	128.0	128.0	0.0	±1.0

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	-
One	136.4	135.5	-0.9	±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	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

QF-TS12-04-03-051060

T. Peth...

Continuation of Calibration Certificate

Cert. No. : ACL19077
Job No. : VC62AC0023
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.7	89.5	-0.2	±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

QF-TS12-04-03-051060

T. Peth...

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sirinthorn Rd.,Bangbunru, Bangkok Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL19080
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Pre-amplifier NH-24
Serial No.: 00873053 / 171587 / 73329
ID No.:

Condition As Found : GOOD

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

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

Received Date : 27 AUGUST 2019
Calibration Date : 10 - 12 SEPTEMBER 2019
Date of Issue : 13 SEPTEMBER 2019

Calibrated by : Nathakorn Pinitpaisan

Approved by :

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.

QP-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19080
Job No. : VC62AC0023
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	EP-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EELBP. 13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EELBP. 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EELBP. 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EP-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KA1	34560495	AA-3008-19	13-May-20

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

Continuation of Calibration Certificate

Cert. No. : ACL19080
Job No. : VC62AC0023
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QP-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19080
Job No. : VC62AC0023
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.97)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.6

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

Frequency Weighting	Measured value (dB)
A-weight	12.6
C-weight	19.3
Flat	24.9

3. Acoustical signal tests of frequency weightings

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

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

QP-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19080
Job No. : VC62AC0023
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	0.0	±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	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	0.0	-
C-weight	94.0	0.0	±0.2
Flat	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

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

QF-TS12-04-03-051060

T. Reth...

Continuation of Calibration Certificate

Cert. No. : ACL19080
Job No. : VC62AC0023
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	38.9	-0.1	±1.1
34.0	34.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	29.0	0.0	±1.1
28.0	28.1	0.1	±1.1
27.0	27.1	0.1	±1.1
26.0	26.1	0.1	±1.1
25.0	25.1	0.1	±1.1

QF-TS12-04-03-051060

T. Reth...

Continuation of Calibration Certificate

Cert. No. : ACL19080
Job No. : VC62AC0023
Pages : 7 of 8

Continuation of Calibration Certificate

Cert. No. : ACL19080
Job No. : VC62AC0023
Pages : 8 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±0.5

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	128.0	0.0	±1.0

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	-
One	136.4	135.8	-0.6	±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	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

QF-TS12-04-03-051060

T. Reth...

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-03-051060

T. Reth...

BKK FS0667

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-2000-34 FAX. 0-2719-9454

NOCT 15175-15186
CALIBRATION 15186

Certificate of Calibration

Certificate No.: 20H384
Page: 1 of 2

Equipment: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD 32.2
Serial No.: 15006309
ID No.:
Condition As-Received: Used Item
Received Date: 30 January 2020
Calibration Date: 06 February 2020
Reference: 2001-1175WGC
Ambient Temperature: (25 ± 3) °C
Relative Humidity: (50 ± 20) %

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250
Thailand

Procedure used: Calibration was conducted using in-house calibration procedure CP-H03 according to comparison with standard temperature probe for temperature measurement function into humidity / temperature chamber.

Condition of this result of calibration

1. Reference standards Instruments:

Instruments	Model	Serial No.	Certificate No.	Due Date
1) Standard Humidity/Temperature Meter	400	10240757	TH-0058-19	11 Dec 2020

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

3. This Calibration is traceable to the International System of Unit maintained at:-
-National Institute of Metrology Thailand (NIMT)

REVIEW BY: *W. Pongk*

APPROVED BY: *[Signature]*

NEXT CAL. DATE: 6/2/21

Calibrated by: Pitsak Srirongkol
Issue Date: 19 February 2020

Approved Signatory: *[Signature]*
() Chakrit Wawwanjua
() Pornthippsa Temeyakul
() Pitsak Srirongkol

B 0224615

Cert. No.: 20H384
Page: 2 of 2

This instrument was connected with humidity/temperature probe Serial No.15017683.

Result of Calibration: Without Adjustment

Function: Temperature measurement for Tn

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
25.00	25.2	0.20	0.42
30.01	30.1	0.09	0.42
34.99	35.1	0.11	0.42
40.00	40.2	0.20	0.42

This instrument was connected with humidity/temperature probe Serial No.15009222.

Result of Calibration: Without Adjustment

Function: Temperature measurement for Tg

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
25.00	25.1	0.10	0.42
30.01	29.9	-0.11	0.42
34.99	35.0	0.01	0.42
40.00	40.0	0.00	0.42

This instrument was connected with humidity/temperature probe Serial No.15015508.

Result of Calibration: Without Adjustment

Function: Temperature measurement for T

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
25.00	25.1	0.10	0.42
30.01	30.0	-0.01	0.42
34.99	34.9	-0.09	0.42
40.00	39.8	-0.10	0.42

UUC* : Unit Under Calibration
The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k = 2.00, providing confidence level approximately 95%.

B 0985816

BKK_FS0668

BKK_FS0668

JIRANATE ASSOCIATES CO., LTD.
บริษัท จิราเนต แอสโซซิเอตส์ จำกัด (สำนักงานใหญ่)
121/4-15/25-36 ถนนพหลโยธิน 7/1 แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10000 โทร: (02-806-0812) โทรสาร: (02-806-0812) Fax: (02-806-0812)

NOCT 15175-15186
CALIBRATION 15186

Certificate of Calibration

Cert. No.: 20190409
Page: 1 of 2

Equipment: Heat Stress Monitor with Sensor
Manufacturer: Deltaohm
Model: HD 32.2
Serial No.: 15006310
Received date: 12/4/2562
Customer name: Als Laboratory Group (Thailand) Co. Ltd
Customer address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250, Thailand

Calibration condition: Ambient Temperature (25 ± 3) °C
Relative Humidity (50 ± 20) %

Reference standard

☒ Compact Temperature Calibrator (Dry Block) Certificate no: T18-312
Manufacturer: Ametek Jofra, Model: CTC-350 A, Serial number: 645223-00016

☐ Refrigerated/Heat Calibration Bath Certificate no: T17-231
Manufacturer: Polyscience, Model: PD15RCAL-A12E, Serial number: JH1570656

Calibration Procedure & Traceability

1. This calibration was conducted using in-house Standard Operation Procedure according to comparison method with Temperature Block calibrator & Unit Under Calibration

2. This Certificate is traceable to the National Institute of Standard and Technology (NIST) through AMETEK Denmark through Certificate no.: T18-312

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

Issued person: Kanchaporn Khongkhanol
Issued date: 18/4/2562

Calibrated By: *[Signature]* Date: 18/4/21

Approved By: *[Signature]* Date: 18/4/21

B 0224615

Cert. No.: 20190409
Page: 2 of 2

Result of Calibration: () Without Adjustment () After Adjustment

Natural wet bulb: T_w Model: HP320L2 Serial No.: 15017685

Function: Accuracy Performance & Evaluation Performance Test

Standard Setting °C	Standard Reading (STD)* °C	Unit Under Calibration Reading (UUC)* °C	Error °C	Uncertainty (±°C)
20.00	20.00	20.0	0.00	0.158
30.00	30.00	30.0	0.00	0.158
40.00	40.00	40.0	0.00	0.158
50.00	50.00	50.0	0.00	0.158

Globe Temperature: T_g Model: TP3276.2 Serial No.: 15015968

Function: Accuracy Performance & Evaluation Performance Test

Standard Setting °C	Standard Reading (STD)* °C	Unit Under Calibration Reading (UUC)* °C	Error °C	Uncertainty (±°C)
20.00	20.00	20.0	0.00	0.158
30.00	30.00	30.0	0.00	0.158
40.00	40.00	40.0	0.00	0.158
50.00	50.00	50.0	0.00	0.158

Air Temperature: T_a Model: TP3207.2 Serial No.: 15015495

Function: Accuracy Performance & Evaluation Performance Test

Standard Setting °C	Standard Reading (STD)* °C	Unit Under Calibration Reading (UUC)* °C	Error °C	Uncertainty (±°C)
20.00	20.00	20.0	0.00	0.158
30.00	30.00	30.0	0.00	0.158
40.00	40.00	39.9	-0.10	0.158
50.00	50.00	49.8	-0.20	0.158

Note: *** This result of calibration was found accurate as shown on date and place of calibration only
*** UUC = Unit Under Calibration
*** The temperature scale used was based on ITS-90
*** This result of calibration was found accurate for type of media only

B 0985816



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTAKARN ROAD SOI 18, SUANLUANG, SUKHUWIT, BANGKOK 10250
TEL. 0-2717-3090-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No.: 18H2580
Page: 1 of 2

Equipment: Heat Stress Monitor

Manufacturer: Deltaohm

Model: HD 32.2

Serial No.: 15036012

ID No.:

Condition As-Received: Used item

Received Date: 27 September 2019

Calibration Date: 02 October 2019

to 04 October 2019

Reference: 1909-1217WTC

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

This certificate may not be reproduced other than in full,
except with the prior written approval of the head of
Calibration Services and environmental analysis department.

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanaikan 40, Phatthanaikan Rd.,
Khwaeng Phatthanaikan, Khet Suan Luang, Bangkok 10250
Thailand

Procedure used: Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with
standard temperature probe for temperature measurement function into humidity / temperature chamber.

Condition of this result of calibration

1. Reference standards Instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Humidity/Temperature Meter	400	10240757	TT-0144-19	30 Nov 2019

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

3. This Certification is traceable to the International System of Unit maintained at:
- National Institute of Metrology Thailand (NIMT)

REVIEW BY	W. Rodong
APPROVED BY	[Signature]
NEXT CAL. DATE	1/10/20

Calibrated by: Pitak Srirongkol
Issue Date: 16 October 2019

Approved Signatory:

[Signature]
[Signature]
[Signature]

B 0214099

Cert. No.: 18H2580
Page: 2 of 2



This instrument was connected with temperature probe Serial No. 18008211.

Result of Calibration: Without Adjustment

Function:	Temperature measurement Tn			Uncertainty of Measurement (±°C)
	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	
	24.98	24.8	-0.08	0.42
	35.00	34.9	-0.10	0.42
	45.01	44.7	-0.31	0.42

This instrument was connected with temperature probe Serial No. 18008199.

Result of Calibration: Without Adjustment

Function:	Temperature measurement Tn			Uncertainty of Measurement (±°C)
	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	
	24.08	25.1	0.12	0.42
	35.00	35.2	0.20	0.42
	45.01	45.1	0.09	0.42

This instrument was connected with temperature probe Serial No. 18008354.

Result of Calibration: Without Adjustment

Function:	Temperature measurement Tn			Uncertainty of Measurement (±°C)
	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	
	24.86	25.0	0.02	0.42
	35.00	34.9	-0.10	0.42
	45.01	44.8	-0.41	0.42

* Not NSC-ONSC Accredited

UUC* : Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied
by coverage factor k = 2.00, providing confidence level approximately 95%.

-o-o-

a 0966105



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTAKARN ROAD SOI 18, SUANLUANG, SUKHUWIT, BANGKOK 10250
TEL. 0-2717-3090-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No.: 19H2581
Page: 1 of 2

Equipment: Heat Stress Monitor

Manufacturer: Deltaohm

Model: HD 32.2

Serial No.: 15036016

ID No.:

Condition As-Received: Used item

Received Date: 27 September 2019

Calibration Date: 02 October 2019

to 04 October 2019

Reference: 1909-1217WTC

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

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except with the prior written approval of the head of
Calibration Services and environmental analysis department.

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanaikan 40, Phatthanaikan Rd.,
Khwaeng Phatthanaikan, Khet Suan Luang, Bangkok 10250
Thailand

Procedure used: Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with
standard temperature probe for temperature measurement function into humidity / temperature chamber.

Condition of this result of calibration

1. Reference standards Instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Humidity/Temperature Meter	400	10240757	TT-0144-18	30 Nov 2019

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

3. This Certification is traceable to the International System of Unit maintained at:
- National Institute of Metrology Thailand (NIMT)

REVIEW BY	W. Rodong
APPROVED BY	[Signature]
NEXT CAL. DATE	1/10/20

Calibrated by: Pitak Srirongkol
Issue Date: 16 October 2019

Approved Signatory:

[Signature]
[Signature]
[Signature]

B 0214100

Cert. No.: 19H2581
Page: 2 of 2

This instrument was connected with temperature probe Serial No. 18008222.

Result of Calibration: Without Adjustment

Function:	Temperature measurement Tn			Uncertainty of Measurement (±°C)
	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	
	24.99	25.0	0.01	0.42
	35.00	35.0	0.00	0.42
	45.01	44.8	-0.21	0.42

This instrument was connected with temperature probe Serial No. 18008595.

Result of Calibration: Without Adjustment

Function:	Temperature measurement Tn			Uncertainty of Measurement (±°C)
	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	
	25.00	25.1	0.10	0.42
	34.88	35.1	0.12	0.42
	45.00	45.0	0.00	0.42

This instrument was connected with temperature probe Serial No. 18009383.

Result of Calibration: Without Adjustment

Function:	Temperature measurement Tn			Uncertainty of Measurement (±°C)
	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	
	25.00	25.0	0.00	0.42
	34.98	34.9	-0.08	0.42
	45.00	44.5	-0.50	0.42

* Not NSC-ONSC Accredited


UUC* : Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied
by coverage factor k = 2.00, providing confidence level approximately 95%.


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a 0966104

BKK-FS0677



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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5344 PATTANAKARN ROAD SOI 11, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No.: 20H472
Page: 1 of 2

Equipment: Heat Stress Monitor with Sensor
Manufacturer: Deltaohm
Model: HD 32.2
Serial No.: 15035019
ID No.: -

Condition As-Received: Used Item
Received Date: 18 February 2020
Calibration Date: 20 February 2020 to 21 February 2020
Reference: 2002-068WSC
Ambient Temperature: (25 ± 3) °C
Relative Humidity: (50 ± 20) %

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwang Phatthanakan, Khet Suan Luang, Bangkok 10250
Thailand

Procedure used: Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with standard temperature probe for temperature measurement function: Into humidity / temperature chamber.

Condition of this result of calibration

1. Reference standards instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Handheld Thermometer With Sensor	1521	ASA333	191857	17 Jul 2020

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

3. This Certification is traceable to the International System of Unit maintained at:-
-National Institute of Metrology Thailand (NIMT)

REVIEW BY: W. Pochak

APPROVED BY: [Signature]

NEXT CAL DATE: 20/2/21

Calibrated by: Surasil Phansudnoi
Issue Date: 24 February 2020

Approved Signatory: [Signature]
[] Chakrit Waeenja
[] Pornthippa Tameyakul
[] Pitak Srimongkol

B 0224848

Cert. No.: 20H472
Page: 2 of 2

This instrument was connected with temperature probe Model HP3201.2 Serial No.16008219

Result of Calibration: (*) Without Adjustment

Function: Temperature measurement for T_n

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
25.057	25.1	0.043	0.42
29.995	30.1	0.105	0.42
35.023	35.1	0.077	0.42
39.955	40.0	0.045	0.42

This instrument was connected with temperature probe Model TP3276.2 Serial No.16008602

Result of Calibration: (*) Without Adjustment

Function: Temperature measurement for T_g

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
25.057	25.1	0.043	0.42
29.995	30.1	0.105	0.42
35.023	35.1	0.077	0.42
39.955	40.0	0.045	0.42

This instrument was connected with temperature probe Model TP3207.2 Serial No.15037318

Result of Calibration: (*) Without Adjustment


Function: Temperature measurement for T_n

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
25.057	25.1	0.043	0.42
29.995	30.0	0.005	0.42
35.023	35.0	-0.023	0.42
39.955	39.8	-0.055	0.42


UUC* : Unit Under Calibration
The reported uncertainty of measurement was base on standard uncertainty multiplied by coverage factor k = 2.00, providing confidence level approximately 95%.

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BKK FS0678



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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Certificate of Calibration

Certificate No.: 20H305
Page: 1 of 2

Equipment: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD 32.2
Serial No.: 15035019
ID No.: -

Condition As-Received: Used Item
Received Date: 30 January 2020
Calibration Date: 06 February 2020 to 14 February 2020
Reference: 2001-1175WSC
Ambient Temperature: (25 ± 3) °C
Relative Humidity: (50 ± 20) %

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwang Phatthanakan, Khet Suan Luang, Bangkok 10250
Thailand

Procedure used: Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with standard temperature probe for temperature measurement function: Into humidity / temperature chamber.

Condition of this result of calibration

1. Reference standards instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Humidity/Temperature Meter	400	10240757	TH-0035-19	11 Dec 2020

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

3. This Certification is traceable to the International System of Unit maintained at:-
-National Institute of Metrology Thailand (NIMT)

REVIEW BY: W. Pochak

APPROVED BY: [Signature]

NEXT CAL DATE: 6/2/21

Calibrated by: Pitak Srimongkol
Issue Date: 19 February 2020

Approved Signatory: [Signature]
[] Chakrit Waeenja
[] Pornthippa Tameyakul
[] Pitak Srimongkol

B 0224617

Cert. No.: 20H305
Page: 2 of 2

This instrument was connected with humidity/temperature probe Serial No.16008206.

Result of Calibration: Without Adjustment

Function: Temperature measurement for T_n

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
24.98	25.0	0.02	0.42
30.01	30.1	0.09	0.42
35.00	35.0	0.00	0.42
40.00	40.0	0.00	0.42

This instrument was connected with humidity/temperature probe Serial No.16008185.

Result of Calibration: Without Adjustment

Function: Temperature measurement for T_g

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
24.98	25.0	0.02	0.42
30.01	30.1	0.09	0.42
35.00	35.2	0.20	0.42
40.00	40.1	0.10	0.42

This instrument was connected with humidity/temperature probe Serial No.16010555.

Result of Calibration: Without Adjustment

Function: Temperature measurement for T_n

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
24.98	25.0	0.02	0.42
30.01	30.1	0.09	0.42
35.00	34.7	-0.30	0.42
40.00	39.8	-0.20	0.42

UUC* : Unit Under Calibration
The reported uncertainty of measurement was base on standard uncertainty multiplied by coverage factor k = 2.00, providing confidence level approximately 95%.

a 0985814



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 14, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3690-24 FAX. 0-2719-9414



Certificate of Calibration

Certificate No.: 20H387
Page: 1 of 2

Equipment: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD 32.2
Serial No.: 15036132
ID No: -

This certificate may not be reproduced other than in full,
except with the prior written approval of the head of
Calibration Services and environmental analysis department.

Condition As-Received: Used Item
Received Date: 30 January 2020
Calibration Date: 06 February 2020
Reference: 2001-1175WSC
Ambient Temperature: (25 ± 3) °C
Relative Humidity: (50 ± 20) %

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250
Thailand

Procedure used: Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with
standard temperature probe for temperature measurement function into humidity / temperature chamber.

Condition of this result of calibration

1. Reference standards Instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Humidity/Temperature Meter	400	10240757	TH-0058-19	11 Dec 2020

2. This result of calibration was found accurate as shown on date and place of calibration only.
3. This Certification is traceable to the International System of Unit maintained at:-
-National Institute of Metrology Thailand (NIMT)

REVIEW BY	N. Pochak
APPROVED BY	<i>[Signature]</i>
NEXT CAL. DATE	6/2/21

Calibrated by: Pitak Srirongkoi
Issue Date: 19 February 2020

Approved Signatory:
[Signature]
(✓) Chakrit Waevarjua
[] Pornhippa Tameysakul
[] Pitak Srirongkoi

B 0224618

Cert. No.: 20H387
Page: 2 of 2

This instrument was connected with humidity/temperature probe Serial No.15015846.

Result of Calibration: Without Adjustment				
Function: Temperature measurement for Tn.				
Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement	
(°C)	(°C)	(°C)	(°C)	(°C)
24.98	25.1	0.12	0.42	
30.01	30.0	-0.01	0.42	
35.00	35.1	0.10	0.42	
40.00	40.1	0.10	0.42	

This instrument was connected with humidity/temperature probe Serial No.15016972.

Result of Calibration: Without Adjustment				
Function: Temperature measurement for Tg.				
Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement	
(°C)	(°C)	(°C)	(°C)	(°C)
24.98	25.0	0.02	0.42	
30.01	30.0	-0.01	0.42	
35.00	35.1	0.10	0.42	
40.00	40.1	0.10	0.42	

This instrument was connected with humidity/temperature probe Serial No.14002352.

Result of Calibration: Without Adjustment				
Function: Temperature measurement for T.				
Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement	
(°C)	(°C)	(°C)	(°C)	(°C)
24.98	25.1	0.12	0.42	
30.01	30.0	-0.01	0.42	
35.00	35.0	0.00	0.42	
40.00	39.8	-0.20	0.42	

UUC*: Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k = 2.00, providing confidence level approximately 95%.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL. 0-2717-3690-24 FAX. 0-2719-9414



Certificate of Calibration

Certificate No.: 20H385
Page: 1 of 2

Equipment: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD 32.2
Serial No.: 1502004
ID No: -

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except with the prior written approval of the head of
Calibration Services and environmental analysis department.

Condition As-Received: Used Item
Received Date: 30 January 2020
Calibration Date: 09 February 2020
Reference: 2001-1175WSC
Ambient Temperature: (25 ± 3) °C
Relative Humidity: (50 ± 20) %

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250
Thailand

Procedure used: Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with
standard temperature probe for temperature measurement function into humidity / temperature chamber.

Condition of this result of calibration

1. Reference standards Instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Humidity/Temperature Meter	400	10240757	TH-0058-19	11 Dec 2020

2. This result of calibration was found accurate as shown on date and place of calibration only.
3. This Certification is traceable to the International System of Unit maintained at:-
-National Institute of Metrology Thailand (NIMT)

REVIEW BY	N. Pochak
APPROVED BY	<i>[Signature]</i>
NEXT CAL. DATE	6/2/21

Calibrated by: Pitak Srirongkoi
Issue Date: 19 February 2020

Approved Signatory:
[Signature]
(✓) Chakrit Waevarjua
[] Pornhippa Tameysakul
[] Pitak Srirongkoi

B 0224616

Cert. No.: 20H385
Page: 2 of 2

This instrument was connected with humidity/temperature probe Serial No.16008207.

Result of Calibration: Without Adjustment				
Function: Temperature measurement for Tn.				
Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement	
(°C)	(°C)	(°C)	(°C)	(°C)
24.98	24.9	-0.08	0.42	
30.01	30.0	-0.01	0.42	
35.00	35.0	0.00	0.42	
40.00	39.9	-0.10	0.42	

This instrument was connected with humidity/temperature probe Serial No.16006594.

Result of Calibration: Without Adjustment				
Function: Temperature measurement for Tg.				
Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement	
(°C)	(°C)	(°C)	(°C)	(°C)
24.98	24.9	-0.08	0.42	
30.01	30.0	-0.01	0.42	
35.00	35.0	0.00	0.42	
40.00	40.0	0.00	0.42	

This instrument was connected with humidity/temperature probe Serial No.16010559.

Result of Calibration: Without Adjustment				
Function: Temperature measurement for T.				
Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement	
(°C)	(°C)	(°C)	(°C)	(°C)
24.98	25.0	0.02	0.42	
30.01	30.0	-0.01	0.42	
35.00	34.9	-0.10	0.42	
40.00	39.9	-0.10	0.42	

UUC*: Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k = 2.00, providing confidence level approximately 95%.

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a 0985815

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sirlinthorn Rd.,Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com

BKK_FS0876



Cert. No. : ACL19065
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NLF-24
Serial No.: 00572551 / 170383 / 72889
ID No.:

Condition As Found : GOOD

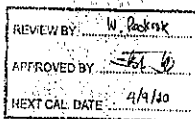
Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PIATTTHANAKAN 40, PIATTTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

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

Received Date : 07 AUGUST 2019
Calibration Date : 04 SEPTEMBER 2019
Date of Issue : 06 SEPTEMBER 2019

Calibrated by : Natthakorn Pisutpaisan

Approved by :



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.

QF-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19065
Job No. : VC62AC0020
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based 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-0012-19	01-Mar-20
Waveform Generator	33511B	MY52302742	BF-0013-19	28-Feb-20
Digital Multimeter	33461A	MY53220104	EEL-0P, 13/0362	08-Mar-20
Digital Multimeter	33461A	MY53220076	EEL-0P, 12/0362	11-Mar-20
Digital Multimeter	33461A	MY53220116	EEL-0P, 14/0362	08-Mar-20
Programmable Attenuator	MAT-1070	00119	EF-0014-19	01-Mar-20
Condenser Microphone	4180	2977900	AA-1003-19	07-May-20
Measuring Amplifier	NA-42KAI	34360495	AA-3008-19	13-May-20

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

Continuation of Calibration Certificate

Cert. No. : ACL19065
Job No. : VC62AC0020
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.3	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	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.1	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	✓	-	0.1	0.3
10. Peak C sound level	✓	-	0.1	0.35
11. Overload indication	✓	-	0.1	0.25
12. High level stability	✓	-	0.1	0.1

QF-TS12-04-03-051060

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL19065
Job No. : VC62AC0020
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.97)	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	Measured value (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)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.4	0.4	0.4	±1.5
1000	-0.1	-0.1	-0.1	±1.0
8000	-1.2	-1.1	-1.1	±5.0

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19065
Job No. : VC62AC0020
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	-0.1	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±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	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	0.0	-
C-weight	94.0	0.0	±0.2
Flat	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	±0.1
Leq	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	±0.2

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19065
Job No. : VC62AC0020
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	89.1	0.1	±1.1
84.0	84.1	0.1	±1.1
79.0	79.0	0.0	±1.1
74.0	74.1	0.1	±1.1
69.0	69.1	0.1	±1.1
64.0	64.0	0.0	±1.1
59.0	59.1	0.1	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.1	0.1	±1.1
30.0	30.1	0.1	±1.1
29.0	29.1	0.1	±1.1
28.0	28.2	0.2	±1.1
27.0	27.2	0.2	±1.1
26.0	26.2	0.2	±1.1
25.0	25.3	0.3	±1.1

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19065
Job No. : VC62AC0020
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)
Auto	94.0	94.0	0.0	±0.5

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

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	-
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	133.1	0.1	-
Positive half cycle	135.4	135.3	-0.1	±2.0
Negative half cycle	135.4	135.3	-0.1	±2.0

QF-TS12-04-03-051060

Continuation of Calibration Certificate

Cert. No. : ACL19065
Job No. : VC62AC0020
Pages : 8 of 8

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-03-051060



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3008-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No.: 20H388
Page: 1 of 2

Equipment: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD 32.2
Serial No.: 16002005
ID No.: -

This certificate may not be reproduced other than in full,
except with the prior written approval of the head of
Calibration Services and environmental analysis department.

Condition As-Received: Used item
Received Date: 30 January 2020
Calibration Date: 06 February 2020
Reference: 2001-1175/WSC
Ambient Temperature: $(25 \pm 3) ^\circ\text{C}$
Relative Humidity: $(50 \pm 20) \%$

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250
Thailand

Procedure used: Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with standard temperature probe for temperature measurement function. Into humidity / temperature chamber.

Condition of this result of calibration

1. Reference standards Instruments:

- | Instrument | Model | Serial No. | Certificate No. | Due Date |
|--|-------|------------|-----------------|-------------|
| 1) Standard Humidity/Temperature Meter | 400 | 10240757 | TH-0058-19 | 11 Dec 2020 |
2. This result of calibration was found accurate as shown on date and place of calibration only.
3. This Calibration is traceable to the International System of Unit maintained at:-
National Institute of Metrology Thailand (NIMT)

REVIEW BY	W. Pongthip
APPROVED BY	<i>[Signature]</i>
NEXT CAL DATE	6/2/21

Calibrated by: Pitek Srimongkol
Issue Date: 19 February 2020

Approved Signatory: *[Signature]*
☒ Chakrit Wasewanjua
☐ Pongthip Tamsayakul
☐ Pitek Srimongkol

B 0224619

Cert. No.: 20H388
Page: 2 of 2

This instrument was connected with humidity/temperature probe Serial No. 16008205.

Result of Calibration:

Without Adjustment

Function:

Temperature measurement for Tn.

Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement
(°C)	(°C)	(°C)	(±°C)
24.98	24.9	-0.08	0.42
30.01	29.8	-0.21	0.42
35.00	34.6	-0.10	0.42
40.00	39.9	-0.10	0.42

This instrument was connected with humidity/temperature probe Serial No. 16008196.

Result of Calibration:

Without Adjustment

Function:

Temperature measurement for Tg.

Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement
(°C)	(°C)	(°C)	(±°C)
24.98	25.0	0.02	0.42
30.01	30.0	-0.01	0.42
35.00	35.1	0.10	0.42
40.00	40.1	0.10	0.42

This instrument was connected with humidity/temperature probe Serial No. 16009355.

Result of Calibration:

Without Adjustment

Function:

Temperature measurement for T.

Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement
(°C)	(°C)	(°C)	(±°C)
24.98	24.9	-0.08	0.42
30.01	29.8	-0.21	0.42
35.00	34.8	-0.20	0.42
40.00	39.8	-0.20	0.42

UUC* : Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor $k = 2.00$, providing confidence level approximately 95%.

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TEL. 0-2717-3008-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No.: 19PH307
Page: 1 of 2

Equipment: Lux Meter
Manufacturer: Tenmars
Model: TM-201L
Serial No.: 190800252
ID No.: -

This certificate may not be reproduced other than in full,
except with the prior written approval of the head of
Calibration Services and environmental analysis department.

Condition As-Received: New item
Received Date: 10 June 2019
Calibration Date: 11 June 2019

Reference: 1906-0357/WTC
Ambient Temperature: $(23 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 15) \%$

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250
Thailand

Procedure used: Calibration were conducted using in-house calibration procedure CP-PH01 by measuring against luminous intensity standard lamp (source-based method) according to the inverse square law measurement method.

Condition of this result of calibration

1. Reference standards Instruments:

- | Instrument | Model | Serial No. | Certificate No. | Due Date |
|-------------------------------------|---------------|------------|-----------------|-------------|
| 1) Photometry & Encoder | LMguide 0.8 m | 120RC003 | 61-140008-1 | 30 Apr 2021 |
| 2) Luminous intensity standard lamp | OL FEL-U | F-1542 | TP-1007-19 | 25 Jul 2019 |

2. This result of calibration was made on requested at the point specified by customer.
3. Test Equipment: Programmable Voltage/Current Source (Model: OL63A, S/N: 16221394).
4. Test Equipment: Illuminance Meter (Model: S1002, S/N: 080129).
5. This result of calibration was found accurate as shown on date and place of calibration only.
6. This Calibration is traceable to the International System of Unit maintained at:-
National Institute of Metrology Thailand (NIMT)

REVIEW BY	W. Pongthip
APPROVED BY	<i>[Signature]</i>
NEXT CAL DATE	4/6/20

Calibrated by: Nuntawat Khamchai
Issue Date: 12 June 2019

Approved Signatory: *[Signature]*
☒ Pongthip Tamsayakul
☐ Chatchawan Khunphitak
☐ Nuntawat Khamchai

B 0201937

Cert. No.: 19PH307
Page: 2 of 2

Result of calibration:

(*) Without adjustment () After adjustment

Function: Illuminance Measurement

Range: 200 lx

Standard Value	UUC* Reading	Error	Uncertainty
(lx)	(lx)	(lx)	(± lx)
0	0.0	0.0	0.058
20	20.0	0.0	0.27
50	50.0	0.0	0.65
100	100.0	0.0	1.3
150	150.0	0.0	2.0
190	190.0	0.0	2.5

Function: Illuminance Measurement

Range: 2000 lx

Standard Value	UUC* Reading	Error	Uncertainty
(lx)	(lx)	(lx)	(± lx)
200	200	0	2.7
500	499	-1	6.5
1000	1000	0	13
1500	1500	0	20
1900	1900	0	25

Function: Illuminance Measurement

Range: 20000 lx

Standard Value	UUC* Reading	Error	Uncertainty
(lx)	(lx)	(lx)	(± lx)
2000	2000	0	27
3000	3000	0	39
4000	4000	0	52
5000	5000	0	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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[Signature]

a 0943296



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL. 0-2717-3000-21 FAX. 0-2719-9484



Certificate of Calibration

Cert. No.: 20PH197
Page: 1 of 2

Equipment: Light Meter
Manufacturer: YENMARS
Model: TM-201L
Serial No.: 180101715
ID No.:

Condition As-Received: Used Item
Received Date: 07 April 2020
Calibration Date: 10 April 2020

Reference: 2004-0136WSC
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (60 ± 15) %

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.

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104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250
Thailand

Procedure used: Calibration were conducted using in-house calibration procedure CP-PH01 by measuring against luminous-intensity standard lamp (source-based method) According to the Inverse square law measurement method.

Condition of this result of calibration

1. Reference standards Instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Photometry & Encoder	LNguide 9.8 m	120RC003	61-140006-1	30 Apr 2021
2) High-accuracy Irradiance Standard	OL-PET-U	F-1473	TP-1039-19	21 Jun 2020

- This result of calibration was made on requested at the point specified by customer.
- Test Equipment: Programmable Voltage/Current Source (Model: OL830, S/N: 16221394).
- Test Equipment: Illuminance Meter (Model: S1002, S/N: 080129).
- The certificate is valid only to the item calibrated on date and place of calibration.
- This Calibration is traceable to the International System of Unit maintained at:-
National Institute of Metrology Thailand (NIMT)

REVIEW BY: *W. Achak*
APPROVED BY: *[Signature]*
NEXT CAL. DATE: 10/4/21

Calibrated by: Nuntawat Khamchai
Issue Date: 13 April 2020

Approved Signatory: *[Signature]*
[] Phatthana Pradipal
[] Ponthippa Tameyakul
[] Chalehawan Khunpluek

B 0229912



Cert. No.: 20PH197
Page: 2 of 2

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

Function: Illuminance Measurement		Range: 200 lx	
Standard Value	UUC* Reading	Error	Uncertainty
(lx)	(lx)	(lx)	(± lx)
0	0.0	0.0	0.060
20	20.0	0.0	0.27
50	50.0	0.0	0.65
100	100.0	0.0	1.3
150	150.0	0.0	2.0
190	190.0	0.0	2.5

Function: Illuminance Measurement		Range: 2000 lx	
Standard Value	UUC* Reading	Error	Uncertainty
(lx)	(lx)	(lx)	(± lx)
200	200	0	2.7
500	500	0	6.5
1000	1001	1	13
1500	1502	2	20
1900	1901	1	25

Function: Illuminance Measurement		Range: 20000 lx	
Standard Value	UUC* Reading	Error	Uncertainty
(lx)	(lx)	(lx)	(± lx)
2000	2000	0	27
3000	3000	0	39
4000	3990	-10	52
5000	4980	-20	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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BKK_EN0072



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL. 0-2717-3000-21 FAX. 0-2719-9484



Cert. No.: 19CH1797
Page: 1 of 3

Certificate of Calibration

Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: SevenCompact S220
Serial No.: B520948426
ID No.: BKK_EN0072
Condition As-Received: Used Item
Received Date: 11 October 2019
Calibration Date: 18 October 2019
Reference: 1910-0448DTC-7
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.

Ambient Temperature: (25 ± 2.5) °C
Relative Humidity: (50 ± 15) %
Calibration Procedure:

- In - house method :
- CP-CH5 : based on direct measurement by using standard voltage calibrator and certified reference material (CRM)
- CP-CH8 : based on comparison technique by comparison with reference standard thermometer

Calibrated by: Uthair Kankaw

Approved by: *[Signature]*
Approved Signatory

() Ponthippa Tameyakul
(✓) Malee Butkruea
() Salhip Meangmai

Issue Date: 21 October 2019

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.

REVIEW BY: *[Signature]*
APPROVED BY: *[Signature]*
NEXT CAL. DATE: 18/10/21



Cert. No.: 19CH1797
Page: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument :-

Instrument	Model	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	701	6440311	130RC006	18E4697	6 Dec 2019
2) Ref. Standard Thermometer	1523	2188080	130RC044	19I879	04 June 2020

- This certification is traceable to the International System of Unit maintained at:-
- Traceable to National Institute of Metrology (Thailand), NIMT

2. Reference Standard Materials

: pH calibration standard
The calibration of the standard buffer solution is performed by two-point calibration using glass electrode.
(Traceable to Danish Institute of Fundamental Metrology (DFM))

Material	Manufacturer	Lot No.	Exp. date
pH 4.007	HACH LANGE GmbH	C02540	14 Aug 2022
pH 8.999	HACH LANGE GmbH	C02615	29 Apr 2021
pH 10.011	HACH LANGE GmbH	C02608	15 Mar 2021

3. This certificate was certified only for the instrument we calibrated.

4. This result of calibration was found accurate as shown on date and place of calibration only.

Calibration Results

Function: Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model: InLabExpert Pro-ISM
- Serial No.: 9265091
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	25.010	25.2	0.1902	0.20	2.00

Remark: - UUC* = Unit Under Calibration

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A 0006594



Cert.No.: 19CH1797
Page.: 3 of 3

Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4,7,10)

Unit Under Calibration	Nominal Value		Standard Voltage Input		Actual Reading	Uncertainty of Measurement (mV)	Coverage factor k
	pH	mV	mV	pH			
pH Meter S/N: B520948426	0.000	414.12	414.0	-0.001	0.058	2.00	
	1.000	354.95	354.9	0.999	0.058	2.00	
	2.000	295.80	295.7	2.000	0.058	2.00	
	3.000	236.64	236.5	3.000	0.058	2.00	
	4.000	177.48	177.4	4.000	0.058	2.00	
	5.000	118.32	118.2	5.000	0.058	2.00	
	6.000	59.16	59.1	6.000	0.058	2.00	
	7.000	0.00	-0.1	7.000	0.058	2.00	
	8.000	-59.16	-59.2	8.000	0.058	2.00	
	9.000	-118.32	-118.4	9.000	0.11	2.52	
	10.000	-177.48	-177.5	10.000	0.058	2.00	
	11.000	-236.64	-236.8	11.000	0.11	2.52	
	12.000	-295.80	-295.8	12.000	0.058	2.00	
	13.000	-354.96	-355.0	13.001	0.058	2.00	
	14.000	-414.12	-414.1	14.001	0.058	2.00	

Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of measurement (±pH)	Coverage factor k
pH Electrode S/N: 9265091	4.007	4.000	185.5	0.0058	2.00
	6.999	7.010	9.2	0.0063	2.00
	10.011	10.005	-166.7	0.013	2.00

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

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a 0967293

HACH COMPANY

C/O AS Scler (Thailand) Limited, Building D Room No. D3 11, 3rd Floor, No. 735/4, Srinakharin Road, Pattanakarn, Suanluang, Bangkok
[Phone +66 (02) 026-3529 Ext. 0] Fax +66(02) 026-35721 www.scler.hach.com

LABX 2000942

Test Report

Customer	: บริษัท (Suanluang) จำกัด (Suanluang) จำกัด	Manufacturer	: HACH
Equipment	: Chlorine Meter	Sensor Model	: -
Controller Model	: Pocket II C2	Sensor Serial No.	: -
Controller Serial No.	: 1206201134	Period	: 1/1
Date of test	: 31/03/2020	Humidity	: 58.0 %RH
Environment temperature	: 25.0 °C		

Results

Item	Characteristic	Before	After	Remark
1	Visual Inspect	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
2	Power Supply (4.5 - 6.5 VDC)	5.0 VDC	5.0 VDC	
3	Display Check	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
4	Keyboard Check	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
5	Function System Program	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	

Warning and Error Checked

Item	Error	Before	After
6	Error list	<input checked="" type="checkbox"/> None <input type="checkbox"/> Appear	<input checked="" type="checkbox"/> None <input type="checkbox"/> Appear

Check with Standard

Item	Characteristic	Before	After	Remark
7	Blank (0.00 mg/l)	0.00 mg/l	0.00 mg/l	
8	Standard C2 No. 1 (0.25 ± 0.09 mg/l)	0.23 mg/l	0.24 mg/l	
9	Standard C2 No. 2 (0.91 ± 0.10 mg/l)	0.88 mg/l	0.90 mg/l	
10	Standard C2 No. 3 (1.64 ± 0.14 mg/l)	1.63 mg/l	1.63 mg/l	
11	Blank (0.0 mg/l)	0.0 mg/l	0.0 mg/l	
12	Standard C2 No. 1 (2.1 ± 0.3 mg/l)	2.0 mg/l	2.0 mg/l	
13	Standard C2 No. 2 (3.8 ± 0.3 mg/l)	3.8 mg/l	3.7 mg/l	
14	Standard C2 No. 3 (6.8 ± 0.8 mg/l)	6.8 mg/l	6.7 mg/l	

REVIEW BY: Amphong R.
APPROVED BY: P. P.
NEXT CAL DATE: 31/03/21



BKK_EN0171

HACH COMPANY
C/O AS Scler (Thailand) Limited, Building D Room No. D3 11, 3rd Floor, No. 735/4, Srinakharin Road, Pattanakarn, Suanluang, Bangkok
[Phone +66 (02) 026-3529 Ext. 0] Fax +66(02) 026-35721 www.scler.hach.com

LABX 2000942

Summary of checked

- ☒ The instrument can work normally and efficiently. (เครื่องมือสามารถใช้งานได้ปกติและแม่นยำ)
- ☐ The instrument can work but it's require to maintenance. (เครื่องมือสามารถใช้งานได้แต่ต้องบำรุงรักษา)
- ☐ The instrument could not work due to trouble. (เครื่องมือไม่สามารถใช้งานได้เนื่องจากมีปัญหา)

Remark:

Standard Equipment Used

Equipment	Equipment I.D.
Standard Chlorine DPD-CHLORINE-UR	Lot No. A8172 Exp date: Jun-23
Standard Chlorine DPD-CHLORINE-HR	Lot No. A8154 Exp date: Jun-20
Digital multi meter	S/N: 23302862 Due date: 17-Aug-20
Thermo hydrometer	S/N: 45163261 Due date: 21-Aug-20

Test By: WILAILAK S.
(Miss Wilailak Sawangpun)
Service Engineer

Approved by: S. S.
(Mr. Suanun Satyangkool)
Position: Assistant Service Division Manager



Be Right



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
5144 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL: 0-2717-3002-27 FAX: 0-2719-9484



Cert.No.: 19CG5243
Page: 1 of 2

Certificate of Calibration

Equipment: Burette
Capacity: 50 mL
Serial No.:
ID. No.: BKK_EN0171
Manufacturer: Wileg
Made in: Germany

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.
Khwaeng Phatthanakan, Khet Suan Luang
Bangkok 10250 Thailand

Ambient Temperature: (20 ± 2.5) °C
Relative Humidity: (50 ± 10) %
Barometric Pressure: 758 mmHg
Calibration Procedure: ASTM E 542 - 01

Calibrated by: Srisuda Khamtha

Approved by: Maha
Approved Signatory

- () Ponthippa Tumayakul
- (x) Malee Butkruea
- () Ponpan Palpin

Issue Date: 28 October 2019

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.

A 0007037



Equipment : Burette
Capacity : 50 mL
Serial No. :
ID. No. : BKK_EN0171
Manufacturer : Witeg
Received Date : 11 October 2019
Condition As-Received : Used Item
Calibration Date : 25 October 2019
Reference : 1910-0448DTC-2

Cert.No.: 19CG5243
Page: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

Instruments	Model	Serial No.	ID. No.	Certificate No.	Traceability	Due date
1) Balance	XP205	B134206712	140RC007	19MM184	NIMT	01 Mar 2020

This certification is traceable to SI Unit

- This certificate was certified only for the measuring instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- True value is converted to true volume at the standard temperature of 20 °C

Calibration result:

Nominal capacity (mL)	Reading (mL)	Uncertainty (± mL)	k Factor
50	49.9981	0.010	2.00

Remark mL = cm³

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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a 0968619



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Keengkhoi, Saraburi 18110, Thailand.
Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100
Bangkok Tel : +66 2586 5792-4 Fax : +66 2586 5109
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Certificate No. T193008

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cold Room)

Manufacturer : KOLDTECH

Model : KM 320

Serial No. : TBN-1012061/05

Customer Code : BKK_EN0167

ID No. : T2463A3

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

104 Phatthakan 40, Phatthakan Rd., Khwaeng Phatthakan,
Khet Suan Luang, Bangkok 10250

Customer Location : Laboratory

Date of Receipt : 17 December 2019

Calibrated By : Watcharapon Songthong (Technician)

Approved By : / Sujar Naknared (Site Calibration Manager)

Date of Issue : 26 DEC 2019

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-L14 116/01-04-58



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Keengkhoi, Saraburi 18110, Thailand.
Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100
Bangkok Tel : +66 2586 5792-4 Fax : +66 2586 5109
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Certificate No. T193008

Page 2 of 4

Calibration Report

Equipment : Chamber (Cooling Room)
Date of Calibration : 25 December 2019
Environment : Temperature : 19.6-20.2 °C
Line Voltage : 221.4-230.2 V
Relative Humidity : 55-65 %RH

Condition of this results of calibration :

- This equipment was calibrated by insert 16 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 (Reapproved 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	TYPE T	TN161-TN170	T192246	09 September 2020
TC	TYPE T	TN171-TN180	T192246	09 September 2020
DATA LOGGER	34970A	T121	T192246	09 September 2020

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSG-TIS-TIS 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

Equipment Description :

Time Constant ☒ 1 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

FM-L15 116/01-04-58



Metrological Center

SCI ECO Services Company Limited

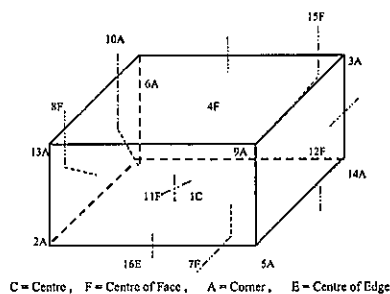
33/2 Moo 3, T.Banpa, A.Keengkhoi, Saraburi 18110, Thailand.
Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100
Bangkok Tel : +66 2586 5792-4 Fax : +66 2586 5109
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Certificate No. T193008

Page 3 of 4

Calibration Report



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

Approved By

FM-L15 116/01-04-58



Metrological Center

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Bangkok Tel : +66 2586 5792-4 Fax : +66 2586 5109
Website : www.scleco.co.th E-Mail : calibrate@scg.co.th



Metrological Center

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Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100
Bangkok Tel : +66 2586 5792-4 Fax : +66 2586 5109
Website : www.scleco.co.th E-Mail : calibrate@scg.co.th



Certificate No. T192919

Page 2 of 3

Calibration Report

Equipment : Chamber (Oven)
Date of Calibration : 11-12 December 2019
Environment : Temperature : 21.5-22.3 °C
Line Voltage : 224.2-228.5 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine resistance thermometer detectors into its chamber , the other one resistance thermometer detector use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 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
RTD	100 ohm	29-CH11-10	T192677	12 November 2020
DATA LOGGER	34970A	T151	T192677	12 November 2020

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 - Minute At 40 °C
Fresh Air Damper : ☒ Open ☒ Min ☐ Medium ☐ Max
☐ Close
☐ Not Available

5. Adjustment :

(X) without adjustment () after adjustment

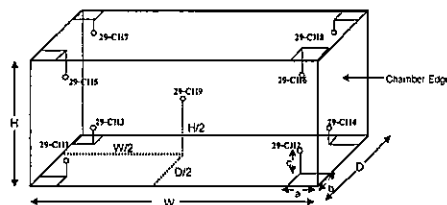
Approved By: Boonchai

FM-L15 116/01-04-58

Certificate No. T192919

Page 3 of 3

Calibration Report



Remark :

Internal Dimensions of Chamber : W (Width) = 36 cm. , H (Height) = 20 cm. and D (Depth) = 26 cm.
Size of Installed Standard sensor number 29-CH11 to number 29-CH8 : a = 5 cm. , b = 5 cm. and c = 5 cm.
Size of Installed Standard sensor number 29-CH9 : W/2 = 36 cm/2 , H/2 = 20 cm/2 and D/2 = 26 cm/2

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)							
	29-CH1	29-CH2	29-CH3	29-CH4	29-CH5	29-CH6	29-CH7	29-CH8
40	39.98	40.11	40.31	40.03	39.93	39.89	40.15	39.75
60	60.10	60.33	60.48	60.01	60.04	60.15	60.17	59.82
70	70.21	70.46	70.39	69.99	70.09	70.30	70.24	69.91
95	95.33	95.73	95.76	94.76	95.23	95.43	95.37	94.91
105	105.44	105.60	105.75	104.65	105.43	105.52	105.12	104.86

Setting (°C)	Chamber (Oven)		Temperature Distribution				
	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage Factor k
40.0	Min, Max	Average	40.03	0.64	0.28	0.38	2.00
60.0	39.9, 40.1	40.0	60.13	0.09	0.44	0.40	2.00
70.0	69.9, 70.1	70.0	70.19	0.04	0.44	0.39	2.00
95.0	94.4, 94.6	94.5	95.27	0.03	0.78	0.42	2.00
105.0	104.9, 105.1	105.0	105.28	0.09	0.76	0.43	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: Boonchai

FM-L15 116/01-04-58



Metrological Center

SCI ECO Services Company Limited

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

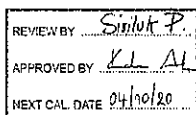


Certificate No. T190879

Page 1 of 3

Certificate of Calibration

Equipment : Liquid Bath (Water)
Manufacturer : MEMMERT
Model : WNB29
Serial No. : L611.0135
Customer Code : BKK_EN0148
ID No. : T6455A4
Customer : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok 10250
Customer Location : ORGANIC PREPARATION LAB
Date of Receipt : 28 March 2019
Calibrated By : Watcharasak Puffarat (Technician)
Approved By : Boonchai / Boonchai Suriyawong (Site Calibration Manager)
Date of Issue : 25 APR 2019



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-L14 116/01-04-58

Certificate No. T190879

Page 2 of 3

Calibration Report

Equipment : Liquid Bath (Water)
Date of Calibration : 4 April 2019
Environment : Temperature : 20.4-21.9 °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 use for ambient temperature measurement . The calibration was done in according to WI-T36 (based on ASTM E715-89 (Reapproved 2001)).
All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
RTD	100 OHM	M8 (CH1-CH5)	T182879	8 November 2019
DATA LOGGER	34970A	T99	T182879	8 November 2019

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 : 2 Hour - Minute At 60 °C

5. Adjustment :

(X) without adjustment () after adjustment

Approved By: Boonchai

FM-L15 116/01-04-58



Metrological Center

SCI ECO Services Company Limited

332 Moo 3, T.Banpa, A.Kaengkhon, Saraburi 18110, Thailand.

Saraburi Tel : +66 3627 3086 Fax : +66 3627 3100

Bangkok Tel : +66 2586 5792-4 Fax : +66 2586 5109

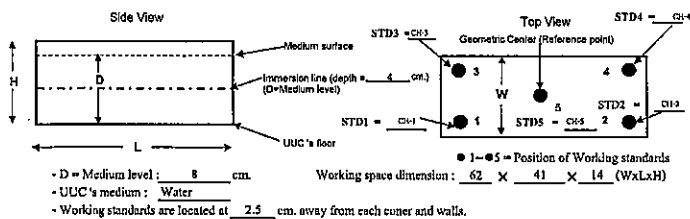
Website : www.scieco.co.th E-Mail : calibrate@scieco.co.th



Certificate No. T190879

Page 3 of 3

Calibration Report



Measurement Results:

Calibration Point	Average Standard Reading at each position (°C)				
	CH-1	CH-2	CH-3	CH-4	CH-5
60	60.02	60.24	59.89	59.92	60.04
80	79.91	80.44	79.75	79.99	79.99
95	94.49	94.05	94.14	93.50	93.93

Liquid Bath (Water)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (±°C)	Uncertainty (±°C)	Coverage Factor k
	Min	Max					
60.9	60.8	60.9	60.8	0.02	0.13	0.29	2.03
80.9	80.8	80.9	80.8	0.02	0.17	0.28	2.00
95.0	94.9	95	94.9	0.03	0.13	0.26	2.00

* The quoted uncertainty include "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]*

PM-L15 11601-04-58

BKK_EN0007



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

534/4 PATTANASAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250

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



Cert. No.: 19TM63
Page: 1 of 3

Certificate of Calibration

Equipment : Hot Air Oven
Model : UFE 500
Serial No. : G511.1574
ID No. : BKK-EN0007
Manufacturer : Memmert

Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakon 40, Phatthanakon Rd.,
Khwaeng Phatthanakon, Khet Suan Luang,
Bangkok 10250 Thailand
Oven Room

Location :
Ambient Temperature : (26 ± 1) °C
Relative Humidity : (50 ± 30) %

Calibrated by : Preecha Hishib

Approved by : *[Signature]*
Approved Signatory

() Ponthipha Tameyskul
() Malee Bulkruea
() Suwit Injai

Issue Date : 4 February 2019

The Uncertainties are for a confidence probability of approximately 95%.

This certificate may not be reproduced other than to full, except with the prior written approval of the head of Corporate Services 3 (Equipment Calibration and Testing Services).

A 0091112



Equipment : Hot Air Oven
Model : UFE 500
Serial No. : G511.1574
ID No. : BKK-EN0007
Manufacturer : Memmert
Received Order : 11 January 2019
Condition As-Received : Used Item
Calibration Date : 11 January 2019
Reference : 1901-02590C-1

Cert. No.: 19TM63
Page: 2 of 3

Procedure Used :- Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY41016811	18H37	NIMT	07 Feb 2019

2. This certification is traceable to the SI unit.

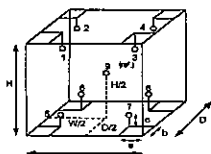
3. This result of calibration was found accurate as shown on date and place of calibration only.

Remark : NIMT : National Institute of Metrology Thailand.

Result of Calibration :- (*) Without Adjustment

Function of UUC : Temperature Source

Fresh air setting : Close



Probe installation Details :
a = 5.0 cm
b = 5.0 cm
c = 5.0 cm
Dimension of Chamber :
D = 0.40 m
W = 0.56 m
H = 0.48 m
Capacity = 0.11 m³

Environment during calibration		
	Beginning	Finished
Temp. (°C)	27	27
REL.Humid. (%)	53	58
AC Supply (Volt)	225	224

Position	Ref. Std./ID No.
1	2G101
2	2G102
3	2G103
4	2G104
5	2G105
6	2G106
7	2G107
8	2G108
9 (ref.)	2G109

[Signature]

a 0921676



Equipment : Hot Air Oven
Model : UFE 500
Serial No. : G511.1574
ID No. : BKK-EN0007
Manufacturer : Memmert
Received Order : 11 January 2019
Condition As-Received : Used Item
Calibration Date : 11 January 2019
Reference : 1901-02590C-1

Cert. No.: 19TM63
Page: 3 of 3

Result of Calibration :- (*) Without Adjustment
Function of UUC : Temperature Source

Calibration Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature stability (±°C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (±°C)	Coverage Factor k
121.0	121.0	121.0	0.11	0.84	1.1	1.1	2
175.0	175.0	175.0	0.12	1.3	1.6	1.1	2
180.0	180.0	180.0	0.12	1.4	1.7	1.1	2

Calibration Point (°C)	Measured Temperature (°C)								
	1	2	3	4	5	6	7	8	9 (ref.)
121.0	121.179	121.301	120.988	121.196	121.562	120.825	121.437	120.622	120.838
175.0	174.875	175.066	174.585	174.974	175.523	174.567	175.828	174.461	174.618
180.0	179.802	180.037	179.534	179.628	180.497	179.539	180.551	179.385	179.561

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

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

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[Signature]

a 0921677



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-1000-27 FAX. 0-2719-9484



Cert.No.: 19CH1798
Page: 1 of 2

Certificate of Calibration

Equipment: Conductivity Meter
Manufacturer: Mettler Toledo
Model: SevenCompact
Serial No.: B429832167
ID No.: BKK_EN0065
Condition As-Received: Used Item
Received Date: 11 October 2019
Calibration Date: 18 October 2019
Reference: 1910-0448DTC-8
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand
Ambient Temperature: (25 ± 2.5) °C
Relative Humidity: (50 ± 15) %
Calibration Procedure: In-house method:
CP-CH8: based on direct measurement by
using certified reference material (CRM)
Calibrated by: Uthair Kankawil

Approved by: Malee
Approved Signatory

() Pomthippa Tameyakul
() Malee Bulkruea
() Sathip Maengmal
Issue Date: 21 October 2019

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.

A 000592



Cert.No.: 19CH1798
Page: 2 of 2

Condition of this result of calibration

1. Reference Standard Instrument :-

Instrument	Model	Serial No.	ID No.	Certificate No.	Due date
1) Thermometer	ASTM 63C	9549224	130RC003	191408	31 Mar 2020

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

• Traceable to National Institute of Metrology (Thailand), NIMT

2. Reference Standard Material :-

- Conductivity calibration solution, Thermo Scientific (traceable to NIST)
- Conductivity calibration solution, HACH LANGE GmbH (traceable to DFM)
- Control Conductivity calibration solution temperature by Water bath (25±0.1) °C

Material	Manufacturer	Lot No.	Exp. date
*84 µS/cm	Thermo Scientific	059/02	28 Jan 2020
1410.3 µS/cm	HACH LANGE GmbH	C02517	05 June 2020
12.849 mS/cm	HACH LANGE GmbH	C02520	07 June 2020

3. This certificate was certified only for the instrument we calibrated.

4. This result of calibration was found accurate as shown on date and place of calibration only.

Calibration results

Function: Conductivity Measurement

(*) After Adjustment at 1409.0 µS/cm

Conductivity Electrode Serial No.: 5515490192

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement (±)	Coverage factor K
*84 µS/cm	81.9 µS/cm	83.9 µS/cm	4.2 µS/cm	2.00
1410.3 µS/cm	1172 µS/cm	1410 µS/cm	4.6 µS/cm	2.00
12.849 mS/cm	8.33 mS/cm	12.84 mS/cm	0.045 mS/cm	2.00

Remark

• UUC* = Unit Under Calibration

• Adjustment Cell constant 84 = 0.5025 cm⁻¹

1410.3 = 0.111805 cm⁻¹

12.849 = 0.144118 cm⁻¹

• * : Not NSC - ONSC Accredited

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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a 0967295



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TEL. 0-2717-1000 FAX. 0-2719-9484

Cert.No.: 19TW123
Page: 1 of 2

Certificate of Testing

Equipment: DO Meter
Manufacturer: YSI
Model: 5000-230V
Serial No.: 09J101147
ID No.: BKK_EN0017
Received Date: 11 June 2019
Test Date: 18 June 2019
Reference: 1808-0371DTC-1
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand
Laboratory Condition: Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure: In-house method: CP-CH9
by Comparison Technique with Azide Modification Method

Calibrated by: Walaik Sirithuan

Approved by: Sathip
Approved Signatory

() Pomthippa Tameyakul
() Malee Bulkruea
() Ponpan Palpin
() Sathip Maengmal

Issue Date: 21 June 2019



Cert.No.: 19TW123
Page: 2 of 2

Result: Without Adjustment

Dissolved Oxygen Probe No.: 15K100498

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.08	8.06	0.012

This report was certified only for the instrument we tested, it is allowable to use for study the system efficiency. The environmental impact control and present to organization it may concerned intend to use for advertising and referral purpose is prohibited. This report may not be reproduced other in full, without written approval of the laboratory

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a 0945224

B 0202991



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TEL: 0-2717-3996-24 FAX: 0-2719-3484



Certificate of Calibration

Certificate No.: 19T1693
Page: 1 of 2

Equipment: DO Meter With Sensor

Manufacturer: YSI

Model: 5000-230V

Serial No.: 09J101147

ID No.: BKK_EN0017

Condition As-Received: Used Item

Received Date: 11 June 2019

Calibration Date: 27 June 2019

Reference: 1906-03710TC Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

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Calibration Services and environmental analysis department.

104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250
Thailand

Procedure used: Calibration were conducted using In-house calibration procedure CP-T01 according to comparison with
Platinum Resistance Thermometer (PRT) into liquid bath temperature controller.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standards instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Digital Thermometer	1529	A66178	181381	28 Oct 2019
2) Platinum Resistance Temperature	102 P	3883	181381	28 Oct 2019

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

3. This Certification is traceable to the International System of Unit maintained at:
- National Institute of Metrology Thailand (NIMT)

Calibrated by: Ratchanil Limwong
Issue Date: 29 June 2019

Approved Signatory:

() Phatnua Prokpaipal
() Chatchawan Khunpluek
(X) Wondop Larpkum

B 0203650



Cert. No.: 19T1693
Page: 2 of 2

Result of Calibration:

Without Adjustment

Function:

Temperature measurement

This equipment was connected with Temperature Sensor Model 5010 S/N. 16K100498
Dimension of probe: Diameter 3.5 mm., Length 32 mm. Sheath material: Stainless Steel

Immersion	Standard	UUC*	Error	Uncertainty
Depth	Temperature	Reading		of Measurement
(mm.)	(°C)	(°C)	(°C)	(±°C)
45	20.0043	19.93	-0.0743	0.099

UUC*: Unit Under Calibration

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

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a 0847075



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.
Saraburi Tel: +66 3627 3096 Fax: +66 3627 3100
Bangkok Tel: +66 2586 5792-4 Fax: +66 2586 5109
Website: www.sceco.co.th E-Mail: calibrate@sceco.co.th



Certificate No. T191982

Page 1 of 4

Certificate of Calibration

Equipment: Chamber (Incubator)

Manufacturer: MEMMERT

Model: IPC759

Serial No.: F818.0033

Customer Code: BKK_EN0272

ID No.: T8041A4

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

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

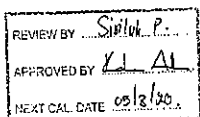
Customer Location: Wet Chemistry Lab 2

Date of Receipt: 1 August 2019

Calibrated By: Sujjar Naknakred (Site Calibration Manager)

Approved By: Boonchai Suriyawong (Assistant Calibration Manager)

Date of Issue: 13 AUG 2019



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-L14 T14/01-04-58



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.
Saraburi Tel: +66 3627 3096 Fax: +66 3627 3100
Bangkok Tel: +66 2586 5792-4 Fax: +66 2586 5109
Website: www.sceco.co.th E-Mail: calibrate@sceco.co.th



Certificate No. T191982

Page 2 of 4

Calibration Report

Equipment: Chamber (Incubator)

Date of Calibration: 5 August 2019 (Finished Time 2:30 PM)

Environment: Temperature 24.0-29.0 °C
Line Voltage 221.7-224.9 V

Condition of this results of test:

1. This instrument was calibrated by insert 12 standard resistance thermometer into its chamber and test according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986.)

All data show below were final values and the initial data may be obtained upon 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	22-(CH1-10)	T182538	21 September 2019
RTD	100 ohm	23-(CH1-10)	T182538	21 September 2019
DATA LOGGER	34970A	T149	T182538	21 September 2019

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

UUC Description:

Time Constant 3 Hour - Minute At 20 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Result of test:

(X) without adjustment () after adjustment

Approved By:

FM-L15 T15/01-04-58

a 0978689



Certificate of Calibration

Certificate No.: 20748
Page: 1 of 2

Equipment: pH Meter With Sensor

Manufacturer: Mettler Toledo

Model: S2-Field Kit

Serial No.: B727332415

ID No.: BKK_EL0012

Condition As-Received: Used Item

Received Date: 25 December 2019

Calibration Date: 09 January 2020

Reference: 1912-0784EnC

Submitted by: ALS Laboratory Group (Thailand) Co. Ltd.

Ambient Temperature: $(25 \pm 3) ^\circ\text{C}$

Relative Humidity: $(50 \pm 20) \%$

This certificate may not be reproduced other than in full,
except with the prior written approval of the head of
Calibration Services and environmental analysis department.

104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250
Thailand

Procedure used: Calibration were conducted using in-house calibration procedure CP-T01 according to comparison with
Industrial Platinum Resistance Thermometer (IPRT) into liquid bath temperature controller.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standards Instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Black Slack Thermometer	1560	8C454	191522	16 May 2020
2) PRT Scanner Module	2562	A01303	191522	16 May 2020
3) Industrial Platinum Resistance Thermometer	5027-12	571971	191522	16 May 2020

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

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

-National Institute of Metrology Thailand (NIMT)

REVIEW BY
APPROVED BY
NEXT CAL. DATE 9 Jan 2020

Calibrated by: Mr. Sataporn Mukkamsee
Issue Date: 13 January 2020

Approved Signatory:

☐ Phalinee Prabpalpal
☐ Chatchawan Khunpluek
☒ Wanlop Larpkum

BKK_EL0037



Cert. No.: 20749
Page: 2 of 2

Result of Calibration:

Without Adjustment

Function: Temperature measurement

This equipment was connected with Temperature Sensor ID No. B727332415/T

Dimension of probe: Diameter 5 mm., Length 5 mm. Sheath material: Glass

Immersion Depth (mm.)	Standard Temperature ($^{\circ}\text{C}$)	UUC* Reading ($^{\circ}\text{C}$)	Error ($^{\circ}\text{C}$)	Uncertainty of Measurement ($\pm^{\circ}\text{C}$)
100	20.0017	19.8	-0.2017	0.12
100	24.9966	24.9	-0.0966	0.12
100	29.9940	29.9	-0.0940	0.12
100	35.0047	34.8	-0.1047	0.12
100	40.0039	39.9	-0.1039	0.12
100	45.0016	45.0	-0.0016	0.12
100	49.9975	49.9	-0.0975	0.12

UUC*: Unit Under Calibration

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

-000-

B 0979304



Agilent Technologies

Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

Agilent Preventive Maintenance provides factory recommended service for your analytical systems to
ensure reliable operation and the accuracy of your results. Delivered by highly-trained and certified
service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides
everything you need to reduce unplanned downtime and keep your systems operating at their peak.

For more information about Agilent Technologies services please visit our web site using the following
URL <http://www.agilent.com/en-us/services/analytical/instrument-services>

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- For customers using HF applications, the instrument should be returned to its standard sample
introduction system.
- A customer representative should be available to the engineer while performing the preventive
maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended
Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of additional or special procedures and/or parts for the instrument
service, then these must be ordered separately and charged as a repair, which may incur additional

Service Engineer's Responsibilities

- Only complete/printout pages that relate to the system being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using a "X" or tick mark "✓" in the checkbox.
- Complete Not Applicable check boxes to indicate services not delivered, as needed.
- Complete the PM service in the order of the tasks listed.
- Complete the Service Review section together with the customer.

REVIEW BY
APPROVED BY
NEXT CAL. DATE 26 Feb 21



Agilent Technologies

Agilent 5110 and 5100 ICP-OES Preventive Maintenance Checklist

System Information

Instrument system name and ID	B7201A / BKK_EL0037
Instrument system site and location	ALS Laboratory Group (Thailand) Co. Ltd.
List system component product numbers	List the serial numbers of each component
1. 48016A	1. MY16010005
2. 82410A	2. A14240769
3. 82455A	3. A16040115
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

ICP-OES Configuration table	Circle the type or write in the type if other
Nebulizer Type	Sea Spray One Neb other
Spray Chamber	Cyclonic Single Pass Cyclonic Double Pass other
Torch	Radial Dual View other
Injector Diameter	2.4mm 1.5mm 1.4mm 0.8mm other
Injector Material	Quartz Ceramic other

Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist

General Preparation

- ☒ Discuss any specific questions or issues with the customer prior to starting.
- ☒ Review the Instrument logbook.
- ☒ Perform general external inspection of system for cleanliness.
- ☒ Check for proper installation of safety-related parts, assemblies, sensors etc.
- ☒ Check for required firmware/software updates and verify with customers if they would like it installed.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it.
- ☒ Run Instrument Performance test and record results in Instrument Performance Test Results Table - Pre PM.

Inspect and clean the system

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window.
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☐ Replace high capacity air inlet dust filter element if installed.
- ☒ Remove and clean instrument water inlet filter.

G8481A Cooling water system

- ☐ Section NOT Applicable
- ☐ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter.
- ☐ Re fill with Polyclear cooling fluid.
- ☒ Clean the cooling system Air filter and the condenser by compressed air or vacuum cleaner.

Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist

SPS 3 Auto Sampler

- ☒ Section NOT Applicable
- ☐ Power cycle the autosampler and verify successful initialization.
- ☐ Inspect X and Z axis belts for wear. Replace is necessary.
- ☐ Clean X and Z axis slide shafts.
- ☐ Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and rinse port, ensure that the probe is approximately centered in the vial.

SPS 4 Auto Sampler

- ☐ Section NOT Applicable
- ☒ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☒ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner
- ☒ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☒ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☒ Pump Tubing Replacement. Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles

AVS 4.6.7

- ☒ Section NOT Applicable
- ☐ Replace valve rotor seal
- ☐ Check fittings for signs of leaks
- ☐ Check tubing including autosampler tubing for kinks or excessive wear
- ☐ Check high flow pump for signs of leaks

Instrument Adjustment

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.
- ☒ Run Instrument Performance Test and record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above run the following Instrument tests and record the result in the Instrument Test Results Table
 - ☒ Subsystem Communications Test
 - ☒ Air Flow

Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist

- ☒ Water Flow
- ☒ Gas Flows
- ☒ RF Generator
- ☒ Camera Test
- ☒ Optics Test
- ☒ Nebulizer Test

Instrument Performance Test Results Table

Note: These measurements do not form part of any specification and are for reference only.

	Pre PM Sensitivity Check		Post PM Sensitivity Check	
	Radial	Axial*	Radial	Axial*
Zn 213.857 nm SRBR	0.446.6	7500.9	0089.3	6598.5
Mn 257.610 nm SRBR	10746.0	19547.9	9845.4	11673.9
Al 398.152 nm SBR	11.0	14.8	11.6	18.2
K 766.491 nm SBR	5.7	30.7	5.5	43.4

* Axial result is not applicable for G8016AA, G8012AA Radial View Instruments.

Instrument Test Results Table

Note: The Instrument Test results are for systems using ICP Expert version 7.3 and above only.

Instrument Test	Result
Subsystem Communications Test	Pass
Air Flow	Pass
Water Flow	Pass
Gas Flows	Pass
RF Generator	Pass
Camera Test	Pass
Optics Test	Pass
Nebulizer test	Pass

Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist

ICP-OES Status Results Table

Note: These measurements do not form part of any specification and are for reference only.

Measurement	Standby Mode	Plasma On
Mains Voltage	218 VAC	220 VAC
Mains Current	0.08 A	0.2 A
Instrument Temperature	23.9 °C	24.0 °C
RF Air Flow (sensor speed)	12.0 Hz	16.0 Hz
Plasma Exhaust Temperature	No measurement	56.7 °C
Water Flow Oscillator	No measurement	1 L/min
Water Inlet Temperature	No measurement	1.28 L/min
Water Inlet Temperature	22.0 °C	22.0 °C
Polychromator Temperature	38.0 °C	38.0 °C
CCD Temperature	-40.0 °C	-40.0 °C
Thermal Stabilizer	65.0 °C	65.0 °C
Argon Supply Pressure	667.0 kPa	645 kPa
Purge Gas Supply Pressure*1	672.0 kPa	620 kPa
Option Gas Supply Pressure*1	- kPa	- kPa
Nebulizer Flow	No measurement	0.7 L/min
Nebulizer Back Pressure	No measurement	268.83 kPa
Plasma Gas Flow	No measurement	7.87 L/min
Auxiliary Gas Flow	No measurement	0.03 L/min
RF Power	No measurement	1.2 KW
RF Supply Current	No measurement	0.06 A
RF Supply Voltage	No measurement	178 V

*1 If option installed

Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist

ICP-OES Parts List Table

Part description	Part Number	Product/Model # where used	Quantity Consumed
Axial Pre-Optic Window	G8010-88014	G8010A, G8011A, G8014A/G8015A	1
Radial Pre-Optic Window	G8010-88016	All	1
Polyclear Cooling Fluid	G3292-80010	G8481A	1
Purge Gas Filter	G8010-60130	All	1
Air inlet filter	G8000-68002	All	1
High Capacity Air Filter	G8010-60180	Optional	1
Rotor seal for 6-7 port valve for AVS0/7	G8494-60002	G8494A/G8495	1
Rotor seal for 4 port valve for AVS4	G8493-60002	G8493A	1
Rinse solution to rinse station 2.5mm id x 1m	G8410-80123	SPS 4	1
Barb connector 2.5mm-1.5mm ID	G8410-80124	SPS 4	1
PVC waste tubing, 5mm od x 5mm id, 2m	G8410-80122	SPS 4	1
Additional Parts may be required from engineers stock:			
X axis drive belt	6410047600	SPS 3	1
Z axis drive belt	6410047400	SPS 3	1
Peristaltic pump tubing, PVC SolvaFlex, 3 bridged,	3710049000	SPS 4	2

Restore system

For HP applications, ask the customer to reinstall their sample introduction system.

Leave system in an idle state: on and purging.

Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section below if there are additional comments.

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Agilent Technologies

Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist

- ☒ Review the service and any test results with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box below or if necessary, in the customer's IQ records.

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

N/A

REVIEW BY Shanath S.
APPROVED BY Samin N.
NEXT CAL. DATE 21 Feb 21

Other Important Customer Web Links

- How to get information on your product:
- ☐ Literature Library - <http://www.agilent.com/en-us/products/icp-oes/icp-oes-systems/5110-icp-oes/literature>
 - ☐ Need to know more? - <http://www.agilent.com/crosslab/university/>
 - ☐ Need technical support, FAQs? - <http://www.agilent.com/en-us/support/landing/icp-oes>
 - ☐ Need supplies? - www.agilent.com/chem/supplies

Service Completion

Service request number 60025 0191 Date service completed Feb 24, 2020

Agilent signature [Signature] Customer signature [Signature]

Document part number: G8014-90075

Issued: 3 February 2017, Revision: 1.1 Copyright © 2017
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Agilent Technologies

Report Summary

Instrument Model Agilent 5100/5110 SVDV ICP-OES
Instrument ID G8010A/G8014A
Instrument Serial Number MY16010005
Software Version 7.3.0.8799
Firmware Version 3354
Tested By Khunphol Test
Test Completed On 2/25/2020 1:54:10 PM

Result Summary

Subsystem Communications Test Pass
Air Flow Test Pass
Water Flow Test Pass
Gas Flows Test Pass
RF Generator Test Pass
Camera Test Pass
Optics Test Pass
Advanced Valve System Test Skipped
Resolution Test Pass
Sensitivity Test Pass
Precision Test Pass

Subsystem Communications Test Pass

Air Flow Test

30% Air Flow (relative speed) 12.00
75% Air Flow (relative speed) 17.00

Water Flow Test

RF Water Flow (L/min) 1.37
Camera Water Flow (L/min) 1.23
Water Inlet Temperature (°C) 18.58

Gas Flows Test

Pass					
Nebulizer Target Flow	Actual Flow	Back Pressure	Auxiliary Target Flow	Actual Flow	Back Pressure
0.70	0.71	268.63	2.00	1.99	129.22
Makeup Target Flow	Actual Flow	Back Pressure	Plasma Target Flow	Actual Flow	Back Pressure
2.00	1.99	129.75	18.00	17.89	25.93

RF Generator Test

RF Power Supply Test Passed
RF Power Supply (V) 147.04
RF Oscillator Test Passed
RF Oscillator Frequency (MHz) 25.739
Work Coil Current (A) 46.707
RF Power Supply Current (A) 2.000

Camera Test

Pass			
	Integration Time (ms)	Standard Deviation	Status
Electronic Offset Test	1000	6.826	Passed
Dark Current Test	6000	0.907	Passed
Array Test	5	0.021	Passed
Linearity Test		0.019	Passed

Optics Test

Pass			
	Radial	Axial	SVDV
Intensity	2511179	3116480	2761652
Wavelength	737.212	737.212	737.212

Resolution Test			Pass
Element Wavelength	Specification	Width	
N (174.213 nm)	≤ 6.40	7.81	
As (188.980 nm)	≤ 8.20	6.43	
C (193.027 nm)	≤ 11.50	8.89	
Mo (202.032 nm)	≤ 8.20	6.57	
Cr (206.158 nm)	≤ 13.40	10.30	
Zn (213.857 nm)	≤ 8.70	7.30	
Pb (220.353 nm)	≤ 9.50	7.46	
Co (228.615 nm)	≤ 17.20	12.45	
Ba (230.424 nm)	≤ 9.40	7.80	
Mn (257.610 nm)	≤ 13.30	9.84	
Mn (260.568 nm)	≤ 20.30	14.96	
Cr (267.716 nm)	≤ 11.00	8.59	
Cu (324.754 nm)	≤ 25.00	18.91	
Cu (327.395 nm)	≤ 14.20	11.71	
Sr (338.071 nm)	≤ 33.50	24.92	
Ba (455.403 nm)	≤ 44.00	33.60	
Sr (460.733 nm)	≤ 36.00	22.33	
Ba (493.408 nm)	≤ 36.00	25.84	
Ba (614.171 nm)	≤ 42.00	28.46	
Ar (676.283 nm)	≤ 74.00	62.25	
K (766.491 nm)	≤ 60.00	62.92	

Page 3 of 5

Sensitivity Test						Pass
Radial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 46.0	SRBR	140.3	1345.0	81.1	
Se (196.026 nm)	≥ 41.0	SRBR	93.8	1002.9	94.0	
Zn (213.857 nm)	≥ 1421.0	SRBR	13088.3	41760.0	181.3	
Pb (220.353 nm)	≥ 46.0	SRBR	152.2	1912.7	136.2	
Mn (257.610 nm)	≥ 3516.0	SRBR	9845.4	176791.9	321.3	
Al (396.152 nm)	≥ 3.4	SBR	11.6	26224.8	2241.9	
Ba (493.408 nm)	≥ 34.0	SBR	174.8	1519375.4	8640.4	
K (766.491 nm)	≥ 1.8	SBR	5.5	77052.1	11908.3	
Axial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 208.0	SRBR	414.4	7802.5	309.7	
Se (196.026 nm)	≥ 158.0	SRBR	293.9	5929.0	359.1	
Zn (213.857 nm)	≥ 234.0	SRBR	1170.3	17669.8	227.3	
Pb (220.353 nm)	≥ 1743.0	SRBR	6593.5	185102.7	781.5	
Cd (214.439 nm)	≥ 4227.0	SRBR	5868.0	118353.0	433.1	
Pb (220.353 nm)	≥ 320.0	SRBR	406.7	10163.0	557.9	
Mn (257.610 nm)	≥ 10625.0	SRBR	21673.9	778712.2	1280.0	
Cr (267.715 nm)	≥ 1048.0	SRBR	4387.7	186485.1	1772.4	
Cu (324.754 nm)	≥ 18.0	SBR	44.8	208221.0	4563.9	
Al (396.152 nm)	≥ 8.0	SBR	18.2	161098.6	8401.5	
Ba (493.408 nm)	≥ 60.0	SBR	216.7	7047159.1	32366.9	
K (766.491 nm)	≥ 24.0	SBR	43.4	1586217.0	35725.8	

Page 4 of 5

Precision Test			Pass
Radial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 2.60	0.67	
Se (196.026 nm)	≤ 2.60	0.92	
Zn (213.857 nm)	≤ 1.50	0.45	
Pb (220.353 nm)	≤ 2.60	0.78	
Mn (257.610 nm)	≤ 1.50	0.49	
Al (396.152 nm)	≤ 1.50	0.38	
Ba (493.408 nm)	≤ 1.50	0.58	
K (766.491 nm)	≤ 1.50	0.38	
Axial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 1.50	0.36	
Se (196.026 nm)	≤ 1.50	0.53	
Zn (213.857 nm)	≤ 1.50	0.30	
Zn (213.857 nm)	≤ 1.50	0.65	
Cd (214.439 nm)	≤ 1.50	0.54	
Pb (220.353 nm)	≤ 1.50	0.53	
Mn (257.610 nm)	≤ 1.50	0.53	
Cr (267.716 nm)	≤ 1.50	0.59	
Cu (324.754 nm)	≤ 1.50	0.52	
Al (396.152 nm)	≤ 1.50	0.50	
Ba (493.408 nm)	≤ 1.50	1.04	
K (766.491 nm)	≤ 1.50	1.21	

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BKK_EL0054



SCG
CEMENT-BUILDING MATERIALS

Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110

Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

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

Certificate No. T191633

Page 1 of 5

Certificate of Calibration

Equipment : Hot Block
Manufacturer : Environmental Express
Model : SC 196
Serial No. : 6974CECW3285
Customer Code : BKK_EL0054
ID No. : T5306A3

Customer : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok 10250

Customer Location : Acid Digestion Lab

Date of Receipt : 18 June 2019

Calibrated By : Preecha Pissasutthikul (Temperature Calibration Manager)

Approved By : Montri Commuan (Calibration Manager)

Date of Issue : 01 JUL 2019

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-L12 10938-05-57



Metrological Center

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

Certificate No. T191633

Page 2 of 5

Calibration Report

Equipment : Hot Block
Date of Calibration : 26 June 2019
Environment : Temperature 24.5-25.4 °C
Line Voltage 220.8-223.7 V

Condition of this results of test :

1. This instrument was calibrated by insert 40 standard thermocouples type T into its chamber and test according to WI-T20. All data show below were final values and the initial data may be obtained upon 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	TN71-TN80	T182695	16 October 2019
TC	TYPE T	TN81-TN90	T182695	16 October 2019
TC	TYPE T	TN71-TN80	T182695	16 October 2019
TC	TYPE T	TN81-TN90	T182695	16 October 2019
DATA LOGGER	34970A	T47	T182695	16 October 2019

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

UUC Description :

Time Constant 1 Hour 30 Minute At 105 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Result of test :

(X) without adjustment () after adjustment

Approved By: *Matin*

FM-L13 108/30-05-57



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110

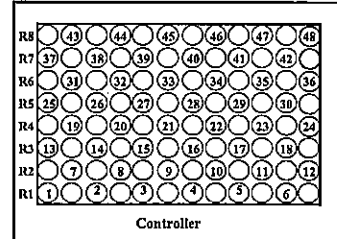
Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

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

Certificate No. T191633

Page 3 of 5

Calibration Report



○ STANDARD THERMOCOUPLE TYPE T

1 - TN71	11 - TN81	21 - TN71	31 - TN81	41 - TN81
2 - TN72	12 - TN82	22 - TN72	32 - TN82	42 - TN82
3 - TN73	13 - TN83	23 - TN73	33 - TN83	43 - TN83
4 - TN74	14 - TN84	24 - TN74	34 - TN84	44 - TN84
5 - TN75	15 - TN85	25 - TN75	35 - TN85	45 - TN85
6 - TN76	16 - TN86	26 - TN76	36 - TN86	46 - TN86
7 - TN77	17 - TN87	27 - TN77	37 - TN87	47 - TN87
8 - TN78	18 - TN88	28 - TN78	38 - TN88	48 - TN88
9 - TN79	19 - TN88	29 - TN79	39 - TN89	
10 - TN80	20 - TN90	30 - TN80	40 - TN90	

Approved By: *Matin*

FM-L13 108/30-05-57



Metrological Center

SCI ECO Services Company Limited

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Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

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Certificate No. T191633

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Calibration Report

Measurement Results :

Average Standard Reading at each position (°C)										
Calibration Point	TN71	TN72	TN73	TN74	TN75	TN76	TN77	TN78	TN79	TN80
105	Max	105.99	106.80	106.44	106.36	105.22	105.55	106.07	105.26	104.80
	Min	105.64	106.56	106.17	106.14	105.04	105.34	105.85	105.07	104.61
	Average	105.81	106.68	106.30	106.25	105.13	105.44	105.96	105.17	104.71
Average Standard Reading at each position (°C)										
Calibration Point	TN81	TN82	TN83	TN84	TN85	TN86	TN87	TN88	TN71	TN72
105	Max	104.85	104.09	104.20	104.27	104.86	104.81	104.40	105.21	106.17
	Min	104.54	103.87	104.01	104.07	104.62	104.58	104.15	104.95	105.65
	Average	104.70	103.98	104.10	104.17	104.74	104.70	104.28	105.08	105.91
Average Standard Reading at each position (°C)										
Calibration Point	TN73	TN74	TN75	TN76	TN77	TN78	TN79	TN80	TN81	TN82
105	Max	107.11	107.45	106.76	106.48	106.32	105.95	105.72	105.41	104.69
	Min	106.61	106.97	106.27	106.00	105.79	105.40	105.17	104.84	104.15
	Average	106.86	107.21	106.51	106.24	106.06	105.67	105.44	105.13	104.42
Average Standard Reading at each position (°C)										
Calibration Point	TN83	TN84	TN85	TN86	TN87	TN88	TN71	TN72	TN73	TN74
105	Max	104.70	104.92	104.95	105.21	104.71	104.76	105.28	105.23	105.47
	Min	104.19	104.36	104.40	104.67	104.16	104.19	104.68	105.86	105.11
	Average	104.44	104.64	104.67	104.94	104.44	104.48	105.08	105.05	105.29

Approved By: *Matin*

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

Certificate No. T191633

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Calibration Report

Measurement Results :

Average Standard Reading at each position (°C)								
Calibration Point	TN75	TN76	TN77	TN78	TN79	TN80	TN81	TN82
105	Max	106.04	105.93	105.87	105.14	104.90	104.56	104.47
	Min	105.71	105.59	105.60	104.83	104.62	104.25	104.02
	Average	105.89	105.76	105.73	104.98	104.76	104.41	104.25

Hot Block			Temperature Distribution	
Sensing (°C)	Reading (°C)		Stability (± °C)	Uncertainty (± °C)
	Min, Max	Average		
105.0	105, 105.3	105.2	0.28	0.96

* The quoted uncertainty exclude "stability" and "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=2, providing a level of confidence of approximately 95 %.

Approved By: *Matin*

FM-L13 108/30-05-57

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Purpose

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Logged On User Name: panthep_kurasathain@agilent.com
Signature Creation Date: April 1, 2020
Reason for Signature: Executed protocol and published this original version of document

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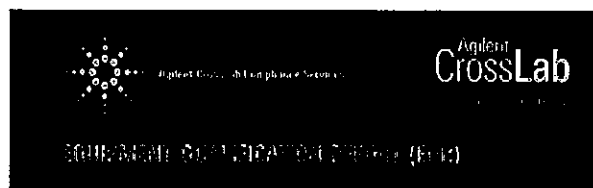
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Date: April 1, 2020 12:30 PM
System ID: JP15471169

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Agilent CrossLab Compliance

Qualification Type: ICPMS-OQ

System ID: JP15471169

EQP Name: AgilentRecommended

EQP Details: Agilent Technologies System

EQP Revision: ICPMS.01.07
EQP Release Date: July 2018
Date: April 1, 2020 1:23:37 PM
Report Type: Report

Org. Name: ALS Laboratory Group (Thailand) Co., Ltd.

Org. Location: 104 Phatthanakan 40, Suan Luang, Bangkok 10250,

Date: April 1, 2020 1:23:37 PM
System ID: JP15471169

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Date: April 1, 2020 1:23:37 PM
System ID: JP15471169

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Test Summary

Purpose

This section includes a status for each scheduled test and the overall qualification. For each test that is run, (1) the status is automatically determined based on pre-defined limits, and (2) the total number of times the test was run is displayed.

For detailed results and specifications for a test, refer to the test results in this EQR.

Details

Test	Status	Runs
Autosampler Check : SPS4	Pass	1
Integrated Sample Introduction System (ISIS) Check : ISIS3	Pass	1
Autotune : G8403A	Pass	1
Background (No Gas Mode) : G8403A	Pass	1
Background (Gas Modes) : G8403A	Pass	1
20-Minute Stability (No Gas Mode) : G8403A	Pass	1

Overall Qualification Status

Pass

Date: April 1, 2020 1:23:37 PM
System ID: JP15471169

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Service Details

Purpose

This section includes local contact and delivery details for this service.

General Details

Service Order No/Request: 6003502713
EQP Name: Agilent/Recommended
EQP Revision: ICPMS.01.07
Report Type: Report

Organization Details

Name: ALS Laboratory Group (Thailand) Co., Ltd.
Location: 104 Phatthanakan 40, Suan Luang, Bangkok 10250.

Local Contact Details

Name: Khun Chatchanal Komardul
Job Title: Manager
Qualification Location: Laboratory

Operator Details

Name: Panthep Kurasathain
Job Title: Field Service Engineer

Data Acquisition Details

Customer Data System (CDS): MassHunter
Acquisition Software Name: MassHunter
Acquisition Software Revision: 4.3

Date: April 1, 2020 1:23:37 PM
System ID: JP15471169

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Instrument Details

Purpose

This section describes the as found system configuration.

Details

ICP-MS 1

Manufacturer	Agilent Technologies
Name	7500
Model Number	G8403A
Installed Options	#100H: Standard Package with Hydrogen option
Detector Type	SQ
Nebulizer	Mira Mist (G3161)
Spray Chamber	Quartz
Torch	Quartz
Sampling Cone	Ni
Skimmer Cone	Ni
Serial Number	JP15471169
Firmware Revision	4.3

ISIS 1

Manufacturer	Agilent Technologies
Name	ISIS
Model Number	G8411A
Type	Peristaltic pump system

Autosampler 1

Manufacturer	Agilent Technologies
Name	SPS4
Model Number	G8410A
Serial Number	AU15430722

Chiller 1

Manufacturer	Agilent Technologies
Name	Chiller
Model Number	G3292A
Serial Number	2U15A1948

Date: April 1, 2020 1:23:37 PM
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Calculation Formulas

Purpose

This section includes calculation formulas for all available tests. Depending upon which tests are scheduled, all or some apply to your qualification.

For a description of calculations for ICP-MS tests performed by the MassHunter software, refer to the MassHunter application and documentation.

Date: April 1, 2020 1:23:37 PM
System ID: JP15471169

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Protocol Details

Purpose

This section lists the revisions for all test units used in this report. For complete test-specific and high-level change details, refer to the Revision History document.

Test Revision	Test
ICPMS.01.01	20-Minute Stability (No Gas Mode)
ICPMS.01.01	Autosampler Check
ICPMS.01.01	Autolune
ICPMS.01.01	Background (Gas Modes)
ICPMS.01.04	Background (No Gas Mode)
ICPMS.01.01	Integrated Sample Introduction System (ISIS) Check

Date: April 1, 2020 1:23:37 PM
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Autosampler Check

Purpose

This test demonstrates that the autosampler module is correctly installed and connected. It does not test module performance.

Setpoint

Results	Criteria	Observed Result	Expected Result	Status
After the self test, is probe in the home position?		Yes	Yes	Pass
As commanded, is the probe positioned at vial 2?		Yes	Yes	Pass
Setpoint Status:	Pass		Runs: 1	
Overall Autosampler Check Test Status	Pass			

Date: April 1, 2020 1:23:37 PM
System ID: JP15471169

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Integrated Sample Introduction System (ISIS) Check

Purpose

This test demonstrates that the ISIS module is correctly installed and connected. It does not test module performance.

Setpoint

Results	Criteria	Observed Result	Expected Result	Status
As commanded, does the pump rotate?		Yes	Yes	Pass
As commanded, do the valves load and inject?		Yes	Yes	Pass
Setpoint Status:	Pass		Runs: 1	
Overall Integrated Sample Introduction System (ISIS) Check Test Status	Pass			

Date: April 1, 2020 1:23:37 PM
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Autotune

Purpose

This test uses traceable checkout standards to run a software-executed autotune in all modes. The tune report provides values for peak width, mass axis, sensitivity, oxide species, and doubly-charged species tests.

Setpoint

Results	Criteria	Observed Result	Expected Result	Status
Peakwidth Mass 7		0.730	AMU	
Agilent Recommended:		>= 0.65		
		<= 0.80		
Status:	Pass			
Peakwidth Mass 69		0.783	AMU	
Agilent Recommended:		>= 0.65		
		<= 0.80		
Status:	Pass			
Peakwidth Mass 205		0.782	AMU	
Agilent Recommended:		>= 0.65		
		<= 0.80		
Status:	Pass			
Mass Axis 7		7.00	AMU	
Agilent Recommended:		>= 6.9		
		<= 7.1		
Status:	Pass			
Mass Axis 69		68.95	AMU	
Agilent Recommended:		>= 68.8		
		<= 69.1		
Status:	Pass			
Mass Axis 205		205.00	AMU	
Agilent Recommended:		>= 204.9		
		<= 205.1		
Status:	Pass			

Date: April 1, 2020 1:23:37 PM
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Mass 7 Sensitivity No Gas	68.89	Mcps/ppm
Agilent Recommended:	>= 25.6	
Status:	Pass	
Mass 69 Sensitivity No Gas	207.83	Mcps/ppm
Agilent Recommended:	>= 127.5	
Status:	Pass	
Mass 205 Sensitivity No Gas	136.79	Mcps/ppm
Agilent Recommended:	>= 76.6	
Status:	Pass	
Mass 59 Sensitivity He	54.06	Mcps/ppm
Agilent Recommended:	>= 23.8	
Status:	Pass	
Mass 69 Sensitivity H2	142.61	Mcps/ppm
Agilent Recommended:	>= 68	
Status:	Pass	
Oxide Ratio 156/140	1.078	%
Agilent Recommended:	<= 1.38	
Status:	Pass	
Doubly Charged Species Ratio 70/140	1.738	%
Agilent Recommended:	<= 2.3	
Status:	Pass	
Setpoint Status:	Pass	Runs: 1
Overall Autotune Test Status	Pass	

Date: April 1, 2020 1:23:37 PM
System ID: JP15471169

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Background (No Gas Mode)

Purpose

This test examines the background of the ICP-MS in no gas mode by monitoring ions during a blank run.

Setup

Conditions

Masses:	7	AMU
	89	AMU
	205	AMU

Measurements and Results

Mass (AMU):	7	89	205	
Measured Value:	3.500	2.000	5.300	cps
Agilent Recommended:	≤ 5.0	≤ 4.5	≤ 11.5	
Status:	Pass	Pass	Pass	

Setup Status: **Pass** Runs: 1

Overall Background (No Gas Mode) Test Status

Pass

Date: April 1, 2020 1:23:37 PM
System ID: JP15471159

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Background (Gas Mode)

Purpose

This test examines the background of the ICP-MS in the various gas modes by monitoring ions during a blank run.

Setup

Gas Mode: Helium

Conditions

Mass:	78	AMU
Integration Time:	1.0	sec
Cycles:	20	

Measurements and Results

Mass (AMU):	78	
Measured Value:	15.00	cps
Agilent Recommended:	≤ 11.5	
Status:	Pass	

Setup Status: **Pass** Runs: 1

Setup

Gas Mode: Hydrogen

Conditions

Mass:	78	AMU
Integration Time:	1.0	sec
Cycles:	20	

Measurements and Results

Mass (AMU):	78	
Measured Value:	3.50	cps
Agilent Recommended:	≤ 4.5	
Status:	Pass	

Setup Status: **Pass** Runs: 1

Overall Background (Gas Mode) Test Status

Pass

Date: April 1, 2020 1:23:37 PM
System ID: JP15471159

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20-Minute Stability (No Gas Mode)

Purpose

This test monitors the abundance of ions present in the checkout standard over a 20-minute period to verify that the signal is stable. The %RSD of the abundance of given ions is calculated internally by the software and compared to the limit.

Setup

Conditions

Mode:	Spectrum
Masses:	7, 9, 69, 89, 140, 205
Integration Time:	0.69 sec
Peak Pattern:	3 points/peak
Replicates:	20
Sweeps/Replicates:	100

Measurements and Results

Mass (AMU):	7	89	205	
Stability RSD:	1.00967	0.62481	0.58798	%
Agilent Recommended:	≤ 2.3	≤ 2.3	≤ 2.3	
Status:	Pass	Pass	Pass	

Setup Status: **Pass** Runs: 1

Overall 20-Minute Stability (No Gas Mode) Test Status

Pass

Date: April 1, 2020 1:23:37 PM
System ID: JP15471159

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Declaration of Change Control

This document is under change control. Revision history is maintained and printed on each document. Access to the master documents is limited to process owners. Documents receive periodic review and cannot be assigned an evergreen status.

The qualification performed according to this document refers only to the hardware/software configuration in place at the time of the qualification. Agilent Technologies recommends that instrument configuration change management procedures be in place in order to maintain the validation process. Any changes to the analytical or computer hardware or software must be clearly specified.

A change management system provides a means for determining the degree of requalification required according to the extent of the changes made. All details of the changes must be thoroughly recorded and documented, together with details of completed tests and their results.

Note: Hardware/software configuration management is the customer's responsibility.

Date: April 1, 2020 1:23:37 PM
System ID: JP15471159

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Attachments

Document	Pages	Location
Operator's training certificate and qualifications	1	EQR
Certificate of Qualification for ACE	1	EQR
Tune reports	3	EQR
Test Report	2	EQR
Test Report	2	EQR
Test Report	2	EQR

Date: April 1, 2020 1:23:37 PM
System ID: JP15471169

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General

Document Name: Operator's training certificate and qualifications



Certificate of Completion

Learner Name: Pantley, Kureshshin
Title Of Course: AN-CE-ICPMS-3-016-A: Agilent 7900 ICPMS FSS update training
Completion Date: June 7, 2020
Certified By Company: Learning at Agilent

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Date: April 1, 2020 1:23:37 PM
System ID: JP15471169

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Document Name: Certificate of Qualification for ACE

Certificate of Completion

Learner Name: Pantley, Kureshshin
Title Of Course: AN-CE-SS-11-016-G-ACE A-02-30-08 - Update include
Completion Date: February 12, 2020
Certified By Company: Learning at Agilent

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System ID: JP15471169

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Document Name: Tune reports

Tune Report

Batch Folder: C:\Agilent\7900\ICPMS\Tune\177956
Acq. Date-Time: 1/4/2020 9:30
Report Generated: 02/14/20
Instrument Name: CE-4336-2P14371169

(See file)

Mass	Range	Count	RPD%	Background
7	10000	6819	6.89	3.500
89	90000	2039	3.53	3.900
202	20000	13679	3.34	3.300

Ratio (m/z 89): 156/140: 1.075 % Ratio (m/z 202): 203/140: 3.768 %

Integration Time (sec): 0.1 Sampling Period (sec): 0.01

Mass	Peak Height	Area	W-43%	W-15%
7	8486.22	7.30	8.64	8.730
89	28887.25	65.93	8.30	8.519
202	12743.29	276.68	8.80	8.783

Integration Time (sec): 0.1 Acquisition Time (sec): 32.71 Y Axis: Units

Tune Parameters
All Parameters Passed # 0

Parameter	Value	Reference	Unit
RF Power	2300 W	Maximum Power	6.00 W
RF Matching	3.53 V	SCT Time	2.00
Spray Depth	8.0 mm	Gas Switch	Maximum Gas
Carrier Gas	2.00 L/min	Makeup Gas	0.50 L/min
Makeup Gas	0.50 L/min		

All Listed Parameters # 0

Parameter	Value	Reference	Unit
Electron 1	5.0 V	Cell Voltage	-90 V
Electron 2	-146.0 V	Cell Bias	-90 V
Orange Bias	-40 V	Offset	0.00 V
Orange Lens	7.2 V	Field Stop	-40 V

Page 1 of 3
Generated at: 9:35 on: 1/4/2020

Date: April 1, 2020 1:23:37 PM
System ID: JP15471169

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Document Name:

Test Report

Batch Summary Report

Batch Folder: D:\Agilent\PMQ\01_Mar_2020\PMQ_01_Mar_2020
Analysis File: 01_Mar_2020\PMQ_01_Mar_2020
Time Stamp: 01_Mar_2020

Run	Analysis Time	Sample Name	Test	Level	Result
1	12/02/2017 12:12:41	01_Mar_2020	01_Mar_2020	01_Mar_2020	01_Mar_2020

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1/4/2018 10:23:37

Date: April 1, 2020 1:23:37 PM
System ID: JP15471169

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Document Name:

Test Report

Batch Summary Report

Run	Analysis Time	Sample Name	Test	Level	Result
1	12/02/2017 12:12:41	01_Mar_2020	01_Mar_2020	01_Mar_2020	01_Mar_2020

Page 1/2

1/4/2018 10:23:37

Date: April 1, 2020 1:23:37 PM
System ID: JP15471169

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Document Name:

Test Report

Batch Summary Report

Batch Folder: D:\Agilent\PMQ\01_Mar_2020\PMQ_01_Mar_2020
Analysis File: 01_Mar_2020\PMQ_01_Mar_2020
Time Stamp: 01_Mar_2020

Run	Analysis Time	Sample Name	Test	Level	Result
1	12/02/2017 12:12:41	01_Mar_2020	01_Mar_2020	01_Mar_2020	01_Mar_2020

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1/4/2018 10:23:37

Date: April 1, 2020 1:23:37 PM
System ID: JP15471169

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Document Name:

Test Report

Batch Summary Report

Run	Analysis Time	Sample Name	Test	Level	Result
1	12/02/2017 12:12:41	01_Mar_2020	01_Mar_2020	01_Mar_2020	01_Mar_2020

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1/4/2018 10:23:37

Date: April 1, 2020 1:23:37 PM
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Logged On User Name: penthep_kurasathain@agilent.com
Signature Creation Date: April 1, 2020
Reason for Signature: Executed protocol and published this original version of document

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Date: April 1, 2020 1:23:37 PM
System ID: JP15471159

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Certificate of System Qualification

MassHunter-OQ-Workstation

System ID: ASBKQW7006
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Phatthanakan 40, Suan Luang, Bangkok 10260.

Date: April 1, 2020 1:22:20 PM
EQP Name: Agilent Recommended
EQP Revision: SW.02.04
Overall Qualification Status: Pass

Preparation/Installation Verification	Pass
Security Basic Access	
Agilent MassHunter ICPMS	Pass
Security User Interface Locking	
Agilent MassHunter ICPMS Software	Pass
Reporting and Calculation Report	
Agilent MassHunter ICPMS	Pass
Communication	
Agilent MassHunter ICPMS Software	Pass

Date: April 1, 2020 1:22:20 PM
System ID: ASBKQW7006

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System Details

Purpose

This section describes the as found system configuration.

Details

System	
System ID	ASBKQW7006
Software 1	
System Type	Workstation
Software	Agilent MassHunter ICPMS Software
Qualified Module 1	
Module Name	Agilent MassHunter ICPMS
Connected Instruments 1	
Friendly Name	7900 ICPMS
Main Module Model Number	GB403A
Serial Number	JP15471159
Detected Software 1	
Type	Agilent MassHunter ICP-MS
Manufacturer	Agilent Technologies
Version	C.01.03 Patch4
System Hardware	
Manufacturer	Hewlett-Packard
Model Number	HP Z230 SFF Workstation
System Serial Number	SGH548P65P
Processor/Speed	Intel(R) Xeon(R) CPU E3-1225 v3 @ 3.20GHz
Number of Processors	1
Memory (RAM Gb)	4 GB
Graphics Adapter	Intel(R) HD Graphics P4600, DameWare Development Mirror Driver 64-bit
Video Memory (Gb)	1 GB

Date: April 1, 2020 1:22:20 PM
System ID: ASBKQW7006

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Operating System

Operating System	Microsoft Windows 7 Professional
Computer name	ASBKQW7006
Manufacturer	Microsoft Corporation
Service Pack	1
Version	6.1.7601
Installation Directory	C:\windows

Video Drivers

Version	10.18.10.3960, 1.1.0.0
Screen Resolution	1920 x 1080 x 4294967296 colors
Name	Intel(R) HD Graphics P4600, DameWare Development Mirror Driver 64-bit

Physical Hard Disk Drives

Disk Information	C:
Disk Model	WDC WD5000AAKX-60UBA SCSI Disk Device
Total Disk Size	460.8 GB
Free Disk Size	237.72 GB
Raid Configuration	Not Applicable

Physical Hard Disk Drives

Disk Information	D:
Disk Model	WDC WD5000AAKX-60UBA SCSI Disk Device
Total Disk Size	13.48 GB
Free Disk Size	0.54 GB
Raid Configuration	Not Applicable

Physical Hard Disk Drives

Disk Information	E:
Disk Model	Seagate BUP Slim BK USB Device
Total Disk Size	455.76 GB
Free Disk Size	270.31 GB
Raid Configuration	Not Applicable

Date: April 1, 2020 1:22:20 PM
System ID: ASBKQW7006

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Network Interface

Physical Address 50:65:F3:2D:B5:02
 IP Address 192.168.1.127,fe80:b062:4e37:9f9:5f5d
 Subnet Mask 255.255.255.0,84
 Description Intel(R) Ethernet Connection I217-LM
 DNS Server(s) 0.0.0.0
 Default gateway 0.0.0.0
 Type Instrument Control

Network Interface

Physical Address A0:38:9F:85:F9:60
 IP Address 172.18.122.158,fe80:15ac:2790:6249:4825
 Subnet Mask 255.255.255.0,84
 Default gateway 172.18.122.254,172.18.120.254
 Description Intel(R) Ethernet I210-T1 GbE NIC
 DNS Server(s) 172.18.120.11,10.245.32.6,10.245.32.5,10.245.32.1,10.250.88.43,10.250.89.43,10.24.48
 Type Network

Printer Drivers

Printer Send To OneNote 2013
 Printer Driver Send to Microsoft OneNote 15 Driver
 Printer Port nul

Printer Drivers

Printer Microsoft XPS Document Writer
 Printer Driver Microsoft XPS Document Writer
 Printer Port XPSPort

Printer Drivers

Printer Foxit PhantomPDF Printer
 Printer Driver Foxit PhantomPDF Printer Driver
 Printer Port FOXIT_PDF

Printer Drivers

Printer Fax
 Printer Driver Microsoft Shared Fax Driver
 Printer Port SHRFAX

Date: April 1, 2020 1:22:20 PM
 System ID: ASBK0W7005

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Printer Drivers

Printer Valtek003VALBKLP005
 Printer Driver RICOH SP C440DN PCL 8
 Printer Port IP_172.18.122.211

Printer Drivers

Printer Valtek003VALBKLP005,fasbk003VASBKLP025
 Printer Driver LANIER SP C440DN PCL 8,FX DocuPrint CP405 d PCL 8
 Printer Port 172.18.122.211,172.18.122.211

Printer Drivers

Printer Valtek003VALBKLP005,fasbk003VASBKLP025
 Printer Driver LANIER SP C440DN PCL 8,FX DocuPrint CP405 d PCL 8
 Printer Port 172.18.122.211,172.18.122.211

Date: April 1, 2020 1:22:20 PM
 System ID: ASBK0W7005

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Electronic Signature

Purpose

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

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 Logged On User Name: penhep_kurassathin@agilent.com
 Signature Creation Date: April 1, 2020
 Reason for Signature: Executed protocol and published this original version of document

Regulatory Disclaimer

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

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BKK_EN0102



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
 CORPORATE SERVICES: EQUIPMENT CALIBRATION AND TESTING SERVICES
 1344 PATTANAKARN ROAD 501 1/F, SIAMLIANG, SIAMLIANG BANGKOK 10330
 TEL: 0-2717-3080-37 FAX: 0-2719-9484



Certificate of Calibration

Cert. No.: 19CH1577/
 Page: 1 of 2

This Certificate was issued to replace to the Certificate No.19CH1577

Equipment: pH Meter

Manufacturer: Thermo Orion

Model: EA960

Serial No.: 6983

ID No.: BKK_EN0102

Condition As-Received: Used Item

Received Date: 2 September 2019

Calibration Date: 13 September 2019

Reference: 1909-0028DTC-1

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
 104 Phatthanakan 40, Phatthanakan Rd.,
 Khwaeng Phatthanakan, Khet Suan Luang,
 Bangkok 10250 Thailand

Ambient Temperature: (25 ± 2.5) °C

Relative Humidity: (50 ± 15) %

Calibration Procedure: In-house method:
 CP-QHS: based on direct measurement by
 using standard voltage calibrator and
 certified reference material (CRM)

Calibrated by: Waiarak Sinihean

Approved by: Mali
 Approved Signatory

() Pornthippa Tameyakul

() Malee Sutkruea

() Sathip Meangmal

Issue Date: 7 October 2019

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced unless it is full, except with the prior written
 Approval of the head of Corporate Services & Equipment Calibration and Testing Services.

A 0006055



Cert. No.: 19CH1577/1
Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument :-
- | Instrument | Model | Serial No. | ID No. | Cert. No. | Due Date |
|--------------------------------|-------|------------|----------|-----------|-------------|
| 1) Document Process Calibrator | 753 | 43160066 | 130RC002 | 19E1939 | 21 May 2020 |
- This certification is traceable to the International System of Unit maintained at:-
- Traceable to National Institute of Metrology (Thailand), NIMT

2. Reference Standard Materials :- pH calibration standard :-
The calibration of the standard buffer solution is performed by two-point calibration using glass electrode.
(Traceable to Danish Institute of Fundamental Metrology (DFM))

Material	Manufacturer	Lot No.	Exp. date
pH 4.007	HACH LANGE GmbH	C02540	14 Aug 2022
pH 6.996	HACH LANGE GmbH	C02546	10 Sep 2022
pH 10.012	HACH LANGE GmbH	C02542	21 Aug 2022

3. This certificate is certified only for the instrument we calibrated.
4. This result of calibration was found accurate as shown on date and place of calibration only.

Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
			mV	pH		
pH Meter SN: 6983	4.000	177.48	177.4	3.999	0.058	2.00
	7.000	0.00	-0.1	6.999	0.058	2.00
	10.000	-177.48	-177.6	10.000	0.058	2.00

Function : pH Measurement

Performing three - buffer standard curve 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 SN: SP1-10121	4.007	4.004	178.9	0.0062	2.05
	6.996	7.018	7.5	0.0071	2.05
	10.012	10.014	-162.7	0.014	2.05

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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a 0965131



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
334/4 PATTANAKARN ROAD SOI 11, KHANLEANG, SUKSAKULANG, BANGKOK 10230
TEL. 0-2717-3999-24 FAX: 0-2719-9444



Certificate of Calibration

Certificate No.: 19E345/1
Page : 1 of 2

This Certificate was issued to replace to the Certificate No. 19E345/1

Equipment : pH Meter
Manufacturer : Thermo Orion
Model : EA960
Serial No.: 8963
ID No.: BKU_EN0102
Condition As-Received: Used Item
Received Date: 02 September 2019
Calibration Date: 06 September 2019
Reference: 1908-0028DTC
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 10) %
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khel Suan Luang, Bangkok 10250
Thailand
Procedure used: Calibration were conducted using In-house calibration Procedure CP-E17 According to direct measurement method with Multi-Product Calibrator.

Condition of this result of calibration

1. Reference standards Instruments :

- | Instrument | Model | Serial No. | Certificate No. | Due Date |
|-----------------------------|-------|------------|-----------------|-------------|
| 1) Multi-Product Calibrator | S500A | 8440007 | 19E2047 | 25 Apr 2020 |
2. This result of calibration was made on requested at the point specified by customer.
3. This result of calibration was found accurate as shown on date and place of calibration only.
4. This Certification is traceable to the International System of Unit maintained at:-
- National Institute of Metrology Thailand (NIMT)

Calibrated by : Pongsagorn Soonsaporn
Issue Date : 07 October 2019

Approved Signatory :
J Phatnong Prathapal
Nantawat Khemichal

B 0213617



Cert. No.: 19E345/1
Page.: 2 of 2

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

Function: DC voltage measurement Range: Autorange
Channel: 1

Standard Value	UUC* Reading	Error	Uncertainty
(mV)	(mV)	(mV)	(± μV)
-200.0000	-200.0	0.0	72
-100.0000	-100.0	0.0	65
0.0000	0.0	0.0	58
100.0000	100.0	0.0	65
200.0000	200.0	0.0	72

Function: DC voltage measurement Range: Autorange

Standard Value	UUC* Reading	Error	Uncertainty
(mV)	(mV)	(mV)	(± μV)
-200.0000	-200.2	-0.2	72
-100.0000	-100.2	-0.2	65
0.0000	-0.2	-0.2	58
100.0000	99.8	-0.2	65
200.0000	199.8	-0.2	72

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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a 0965132

ภาคผนวก จ

สำเนาหนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

ที่ อก ๐๓๐/๑)๕ ๕๖๖ ๖



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ เขตราชเทวี
กรุงเทพมหานคร ๑๐๕๐๐

๓๐ มีนาคม ๒๕๖๑

เรื่อง ค่ออาณัติรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง ๑. คำขอขึ้นทะเบียน/ค่ออาณัติรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๘ สิงหาคม ๒๕๖๐

๒. หนังสือบริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ลงวันที่ ๘ สิงหาคม ๒๕๖๐

๓. หนังสือบริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ลงวันที่ ๘ สิงหาคม ๒๕๖๐

สิ่งที่ส่งมาด้วย เอกสารแบบท้ายหนังสือรับค่ออาณัติรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด จำนวน ๒๘ แผ่น

ตามหนังสือที่อ้างถึง ๑, ๒ และ ๓ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด
ขอค่ออาณัติรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๓๐๔
ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงสวนหลวง เขตสวนหลวง กรุงเทพมหานคร คือกรมโรงงาน
อุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด
ค่ออาณัติรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

-๒-

/๔๕) นายวรารณ...

จำนวน ๑๒๓ รายการ อาภาณัติ จำนวน ๑๖ รายการ ภาคอุตสาหกรรม จำนวน ๓๖ รายการ และดิน
จำนวน ๑๒๕ รายการ รวมทั้งสิ้นจำนวน ๓๔๗ รายการ ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กันยายน ๒๕๖๓ หากประสงค์จะค่ออาณัติหนึ่งเพื่อ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอค่ออาณัติพร้อมเอกสารประกอบคำขอต่อ
กรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ซึ่งคำขอค่ออาณัติดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ร้อยเอก

(ธนศ จันทกษัย)

รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๒๐๒ ๔๑๔๖-๗ ๐ ๒๒๐๒ ๔๐๐๒

โทรสาร ๐ ๒๒๕๔ ๒๖๐๘ ๐ ๒๒๕๔ ๓๔๑๕

/๔๐) นายสุริยา...

หน้าสืบ จำนวน 47 รายการ

ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
2	Arsenic	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method ⁽⁴⁾
3	Barium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method ⁽⁴⁾
4	α-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
5	β-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
6	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
7	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method ⁽⁴⁾ 2) 5-Day BOD Test, Membrane Electrode Method ⁽⁴⁾
8	Cadmium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method ⁽⁴⁾
9	Chemical Oxygen Demand	1) Closed Reflux, Colorimetric Method ⁽⁴⁾ 2) Open Reflux, Titrimetric Method ⁽⁴⁾
10	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
11	Chromium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method ⁽⁴⁾
12	Color	ADMI Weighted-Ordinate Spectrophotometric Method ⁽⁴⁾
13	Copper	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method ⁽⁴⁾
14	Cyanide	Distillation, Colorimetric Method ⁽⁴⁾
15	o,p'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
16	p,p'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
17	o,p'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
18	p,p'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾

/19 o,p'-DDT...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
19	o,p'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
20	p,p'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
21	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
22	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
23	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
24	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
25	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
26	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
27	Formaldehyde	Distillation, Colorimetric Method ⁽⁴⁾
28	Free Chlorine	1) DPD Ferrous Titrimetric Method ⁽⁴⁾ 2) Iodometric Method ⁽⁴⁾
29	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
30	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
31	Hexavalent Chromium	Filtration, Colorimetric Method ⁽⁴⁾
32	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method ⁽⁴⁾
33	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method ⁽⁴⁾
34	Mercury	1) Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽⁴⁾ 3) Inductively Coupled Plasma-Mass Spectrometric Method ⁽⁴⁾
35	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
36	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method ⁽⁴⁾
37	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ⁽⁴⁾ 2) Soxhlet Extraction Method ⁽⁴⁾
38	pH	Electrometric Method ⁽⁴⁾
39	Phenols	Distillation, Chloroform Extraction Method ⁽⁴⁾

/40 Selenium...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
40	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method ⁽⁴⁾
41	Sulfide	ZnS Precipitation, Iodometric Method ⁽⁴⁾
42	Temperature	Laboratory and Field Methods ⁽⁴⁾
43	Total Dissolved Solids	Dried at 180°C ⁽⁴⁾
44	Total Kjeldahl Nitrogen	Digestion, Semi-Micro Kjeldahl Method ⁽⁴⁾
45	Total Suspended Solids	Dried at 103-105°C ⁽⁴⁾
46	Trivalent Chromium	1) Digestion, Inductively Coupled Plasma Method; Filtration, Colorimetric Method; Calculation ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method; Filtration, Colorimetric Method; Calculation ⁽⁴⁾
47	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method ⁽⁴⁾

หน้าสืบ จำนวน 123 รายการ

ลำดับที่	สารเคมี	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...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
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-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
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...

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ลำดับที่	สารเคมี	วิธีการตรวจ
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
26	Carbontetrachloride	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; Filtration, Colorimetric Method; Calculation ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method; Filtration, Colorimetric Method; Calculation ⁽⁴⁾
35	Chromium (VI)	Filtration, Colorimetric Method ⁽⁴⁾
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⁾

๑๓๓๖ / 41 DDT...

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ลำดับที่	สารเคมี	วิธีการตรวจ
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	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⁾

๑๓๓๖ / 59 2,4-Dimethylphenol...

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ลำดับที่	สารเคมี	วิธีการตรวจ
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	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

๑๓๓๖ / 77 Hexachlorocyclopentadiene...

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ลำดับที่	สารเคมี	วิธีการตรวจ
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) Cold Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) 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 ^(23,24,4)
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⁾

๑๓๓๖ / 93 Nitrobenzene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
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/ 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, Direct Photometric Method ^[4] 2) 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]

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/107 Toluene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
107	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
108	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
109	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
110	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
111	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
112	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
113	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
114	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
115	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
116	Vanadium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method ^[4]
117	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
118	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
119	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
120	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
121	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
122	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
123	Zinc	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma-Mass Spectrometric Method ^[4]

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/อากาศเสีย...

ภาคพื้นดิน (ปล่องระบาย) จำนวน 16 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic, Digestion, Inductively Coupled Plasma Method ^[4]
2	Arsenic	Isokinetic, Digestion, Inductively Coupled Plasma Method ^[4]
3	Carbon Monoxide	1) Sampling bag, Non-Dispersive Infrared Method ^[4] 2) Non-Dispersive Infrared Method ^[4]
4	Chlorine	1) Absorption, Ion Chromatographic Method ^[4] 2) Isokinetic, Ion Chromatographic Method ^[4]
5	Copper	Isokinetic, Digestion, Inductively Coupled Plasma Method ^[4]
6	Dioxins	Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory ^[4]
7	Hydrogen Chloride	1) Absorption, Ion Chromatographic Method ^[4] 2) Isokinetic, Ion Chromatographic Method ^[4]
8	Hydrogen Sulfide	Absorption, Iodometric Method ^[4]
9	Lead	Isokinetic, Digestion, Inductively Coupled Plasma Method ^[4]
10	Mercury	1) Isokinetic, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[4] 2) Isokinetic, Digestion, Inductively Coupled Plasma Method ^[4]
11	Opacity	Ringelmann's Method ^[4]
12	Oxides of Nitrogen	1) Absorption, Phenoldisulfonic Acid Method ^[4] 2) Chemiluminescence Method ^[4]
13	Sulfur Dioxide	1) Absorption, Barium-Thorin Titrimetric Method ^[4] 2) UV-Fluorescence Method ^[4]
14	Sulfuric Acid	Isokinetic, Barium-Thorin Titrimetric Method ^[4]
15	Total Suspended Particulate	Isokinetic, Gravimetric Method ^[4]
16	Xylene	Absorption, Gas Chromatographic Method ^[4]

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/ภาคอุตสาหกรรม...

ภาคอุตสาหกรรม จำนวน 36 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Gas Chromatographic Method ^[1,2] 2) Soxhlet Extraction, Gas Chromatographic Method ^[1,2] 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,2]
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,2] 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^[1,2] 3) Digestion, Inductively Coupled Plasma Method ^[1,2] 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^[1,2]
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,2] 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^[1,2] 3) Digestion, Inductively Coupled Plasma Method ^[1,2] 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^[1,2]
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,2] 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^[1,2] 3) Digestion, Inductively Coupled Plasma Method ^[1,2] 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^[1,2]
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,2] 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^[1,2] 3) Digestion, Inductively Coupled Plasma Method ^[1,2] 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^[1,2]

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/6 Cadmium...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,2,23) 3) Digestion, Inductively Coupled Plasma Method ^(8,15) 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
7	Chlordane	1) Waste Extraction, Gas Chromatographic Method ^(1,4) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,2,23) 3) Digestion, Inductively Coupled Plasma Method ^(8,15) 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
9	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,2,23) 3) Digestion, Inductively Coupled Plasma Method ^(8,15) 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
10	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,2,23) 3) Digestion, Inductively Coupled Plasma Method ^(8,15) 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
11	Cyanide	1) Distillation, Colorimetric Method ^(2,22) 2) Waste Extraction, Distillation, Colorimetric Method ^(2,22)

วิธีวิเคราะห์ /12 2,4-D...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
12	2,4-D	1) Waste Extraction, Gas Chromatographic Method ^(1,4) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)
13	DDO	1) Waste Extraction, Gas Chromatographic Method ^(1,4) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)
14	DDE	1) Waste Extraction, Gas Chromatographic Method ^(1,4) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)
15	DDT	1) Waste Extraction, Gas Chromatographic Method ^(1,4) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)
16	Dieldrin	1) Waste Extraction, Gas Chromatographic Method ^(1,4) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)
17	Endrin	1) Waste Extraction, Gas Chromatographic Method ^(1,4) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)
18	Heptachlor	1) Waste Extraction, Gas Chromatographic Method ^(1,4) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)
19	Hexavalent Chromium	1) Waste Extraction, Colorimetric Method ^(1,17) 2) Digestion, Colorimetric Method ^(1,17)
20	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,2,23) 3) Digestion, Inductively Coupled Plasma Method ^(8,15) 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)

วิธีวิเคราะห์ /21 Lindane...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
21	Lindane	1) Waste Extraction, Gas Chromatographic Method ^(1,4) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)
22	Mercury	1) Waste Extraction, Cold-Vapor Atomic Absorption Spectrometry Method ^(1,15) 2) Waste Extraction, Cold-Vapor Atomic Fluorescence Spectrometry Method ^(1,11) 3) Digestion, Cold-Vapor Atomic Absorption Spectrometry Method ^(1,15) 4) Digestion, Cold-Vapor Atomic Fluorescence Spectrometry Method ^(1,11) 5) Direct Thermal Decomposition, Amalgamation and Atomic Absorption Spectrometry Method ^(2,2)
23	Methoxychlor	1) Waste Extraction, Gas Chromatographic Method ^(1,4) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)
24	Mirex	1) Waste Extraction, Gas Chromatographic Method ^(1,4) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,2,23) 3) Digestion, Inductively Coupled Plasma Method ^(8,15) 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,2,23) 3) Digestion, Inductively Coupled Plasma Method ^(8,15) 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)

วิธีวิเคราะห์ /27 Polychlorinated...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Polychlorinated biphenyls (PCBs)	1) Waste Extraction, Gas Chromatographic Method ^(1,19) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)
28	Pentachlorophenol	1) Waste Extraction, Gas Chromatographic Method ^(1,4) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)
29	pH	Electrometric Method ⁽¹⁰⁾
30	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,2,23) 3) Digestion, Inductively Coupled Plasma Method ^(8,15) 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,2,23) 3) Digestion, Inductively Coupled Plasma Method ^(8,15) 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,2,23) 3) Digestion, Inductively Coupled Plasma Method ^(8,15) 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
33	Toxaphene	1) Waste Extraction, Gas Chromatographic Method ^(1,4) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,6,18) 3) Solvent Extraction, Gas Chromatographic/Mass Spectrometry Method ^(1,4,20)

วิธีวิเคราะห์ /34 Trivalent Chromium...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
34	Trivalent Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Filtration, Colorimetric Method; Calculation ^(1,13,17) 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method; Filtration, Colorimetric Method; Calculation ^(1,13,17,23) 3) Digestion, Inductively Coupled Plasma Method; Filtration, Colorimetric Method; Calculation ^(1,13,17) 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method; Filtration, Colorimetric Method; Calculation ^(1,17,23)
35	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13,17) 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,13,23) 3) Digestion, Inductively Coupled Plasma Method ^(1,13) 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,23)
36	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,23) 3) Digestion, Inductively Coupled Plasma Method ^(1,13) 4) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,23)

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ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Acenaphthene	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(27,28)
3	Aldrin	1) Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20) 2) Soxhlet Extraction, Gas Chromatographic Method ^(16,20)

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/4 Anthracene...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
4	Anthracene	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
5	Antimony	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ^(1,13) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,23)
6	Arsenic	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ^(1,13) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,23)
7	Atrazine	1) Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20) 2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18)
8	Barium	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ^(1,13) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,23)
9	Benz(a)anthracene	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(27,28)
11	Benzo(b)fluoranthene	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
12	Benzo(k)fluoranthene	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
14	Benzo(a)pyrene	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
15	Benzo(g,h,i)perylene	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
16	Beryllium	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ^(1,13) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,23)
17	Bis(2-chloroethyl)ether	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)

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/18 Bis(2-ethylhexyl)phthalate...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
18	Bis(2-ethylhexyl)phthalate	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(27,28)
20	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(27,28)
21	Butanol	Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(16,20)
22	Butyl Benzyl Phthalate	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
23	Cadmium	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ^(1,13) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,23)
24	Carbazole	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(27,28)
26	Carbontetrachloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(27,28)
27	Chlordane	1) Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20) 2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18)
28	p-Chloroaniline	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(27,28)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(27,28)
31	Chloroform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(27,28)
32	2-Chlorophenol	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)

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/33 Chromium...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
33	Chromium	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ^(1,13) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(1,23)
34	Chromium (II)	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method; Filtration, Colorimetric Method; Calculation ^(1,13,17,21) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method; Filtration, Colorimetric Method; Calculation ^(1,23,17,21)
35	Chromium (VI)	Filtration, Colorimetric Method ^(17,21)
36	Chrysene	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
37	Cyanide	Extraction, Distillation, Colorimetric Method ^(21,22,29)
38	2,4-D	1) Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20) 2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18)
39	DDD	1) Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20) 2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18)
40	DDE	1) Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20) 2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18)
41	DDT	1) Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20) 2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18)
42	Dibenz(a,h)anthracene	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
43	Di-n-Butyl Phthalate	Solvent Extraction, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(27,28)
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(27,28)
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(27,28)

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/47 3,3-Dichlorobenzidine...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
47	3,3-Dichlorobenzidine	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
53	2,4-Dichlorophenol	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
57	Dieldrin	1) Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20) 2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18)
58	Diethyl Phthalate	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
59	2,4-Dimethylphenol	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
60	2,4-Dinitrophenol	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
61	2,4-Dinitrotoluene	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
62	2,6-Dinitrotoluene	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
63	Di-n-Octyl Phthalate	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)

/64 Endosulfan...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
64	Endosulfan	1) Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
65	Endrin	2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18) 1) Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
66	Ethylbenzene	2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
67	Fluoranthene	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
68	Fluorene	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
69	Heptachlor	1) Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
70	Heptachlor Epoxide	2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18) 1) Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
71	Hexachlorobenzene	2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18) 1) Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
72	Hexachloro-1,3-butadiene	2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
74	α-HCH	1) Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
75	β-HCH	2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18) 1) Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
76	γ-HCH	2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18) 1) Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)

/77 Hexachlorocyclopentadiene...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
77	Hexachlorocyclopentadiene	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
78	Hexachloroethane	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
79	Indeno(1,2,3-cd)pyrene	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
80	Isophorone	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
81	Lead	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ^(8,11) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
82	Manganese	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ^(8,11) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽¹³⁾ 2) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽¹¹⁾ 3) Direct Thermal Decomposition, Amalgamation and Atomic Absorption Spectrometry Method ⁽²⁵⁾
84	Methanol	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(26,28)
85	Methoxychlor	1) Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20) 2) Soxhlet Extraction, Gas Chromatographic Method ^(16,18)
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
88	2-methylphenol	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
89	2-Methylnaphthalene	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
90	Methyl Ten-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)

/91 Naphthalene...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
91	Naphthalene	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
92	Nickel	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ^(8,13) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
93	Nitrobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
94	N-Nitrosodiphenylamine	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
95	N-Nitrosodi-n-propylamine	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
96	Polychlorinated Biphenyls	Solvent Extraction, Gas Chromatographic Method ^(16,18)
	- Aroclor 1016	
	- Aroclor 1221	
	- Aroclor 1232	
	- Aroclor 1242	
	- Aroclor 1248	
	- Aroclor 1254	
	- Aroclor 1260	
	- 2,2',5'- Trichlorobiphenyl	
	- 2,2',5,5'- Tetrachlorobiphenyl	
	- 2,2',4,5,5'- Pentachlorobiphenyl	
	- 2,3,3',4,4',5'- Pentachlorobiphenyl	
	- 2,2',3,4,4',5'- Hexachlorobiphenyl	
	- 2,2',4,4',5,5'- Hexachlorobiphenyl	
	- 2,2',3,4,4',5,5'- Heptachlorobiphenyl	

/97 Pentachlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
97	Pentachlorophenol	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,18)
98	Phenanthrene	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
99	Phenol	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
100	Pyrene	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
101	Selenium	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ^(8,13) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
102	Silver	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ^(8,13) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
103	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
106	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
107	Toxaphene	1) Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20) 2) Soxhlet Extraction, Gas Chromatographic Method ^(14,18)
108	TPH (C ₈ -C ₆)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
109	TPH (C ₈ -C ₁₀)	Solvent Extraction, Gas Chromatographic Method ^(9,14)
110	TPH (C ₁₀ -C ₃₀)	Solvent Extraction, Gas Chromatographic Method ^(9,14)
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)

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/112 1,1,1-Trichloroethane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
115	2,4,5-Trichlorophenol	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
116	2,4,6-Trichlorophenol	Solvent Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(14,20)
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
118	Vanadium	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ^(8,13) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)
119	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
120	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
121	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
122	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
123	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(27,28)
125	Zinc	1) Digestion, Inductively Coupled Plasma Atomic Emission Spectrometric Method ^(8,13) 2) Digestion, Inductively Coupled Plasma-Mass Spectrometry Method ^(8,23)

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กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ เขตราชเทวี
กรุงเทพมหานคร ๑๐๕๐๐

๑ ๙ มีนาคม ๒๕๖๑

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง ๑. หนังสือบริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

ลงวันที่ ๒๒ ตุลาคม ๒๕๖๐

๒. หนังสือบริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

ลงวันที่ ๒๓ พฤศจิกายน ๒๕๖๐

ตามที่หนังสืออ้างถึง ๑ และ ๒ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด
ห้องปฏิบัติการวิเคราะห์เลขทะเบียน ๖-๒๐๙ สถานที่ตั้งเลขที่ ๑๐๙ ซอยพัฒนาการ ๔๐
ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรของ
ห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

/๑๖) นายอริสรา...

ที่ อก ๐๓๓๐/๓) ๕ ๖ ๗ ๙



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ เขตราชเทวี
กรุงเทพมหานคร ๑๐๕๐๐

๒ ๓ เมษายน ๒๕๖๓

เรื่อง เปลี่ยนแปลงสารเคมีที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คําขอขึ้นทะเบียน/คําขอเปลี่ยนแปลงบุคลากร และขอขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑๓ มีนาคม ๒๕๖๓

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารเคมีที่วิเคราะห์

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด จำนวน ๑ แผ่น

ตามที่หนังสืออ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๙ สถานที่ตั้งเลขที่ ๑๐๙ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ
เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงสารเคมีที่วิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด
เพิ่มขอขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์ใน ๓ รายการ ตามสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือตอบรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์
เอกชน ที่ อก ๐๓๓๐/๓) ๕๙๖๒ ลงวันที่ ๓๐ มีนาคม ๒๕๖๓ คือในวันที่ ๒ กันยายน ๒๕๖๓

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

๐๒๙๒

(นายคิร ชันท์ธิด)

นักวิทยาศาสตร์ชำนาญการพิเศษ วิทยาการสารสนเทศ
ผู้อำนวยการศูนย์ทดสอบและประเมินผลสิ่งแวดล้อม
ปฏิบัติการตามมาตรฐานของกรมโรงงานอุตสาหกรรม

กองวิจัยและเคมียกย่องโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบและเคมียกย่องโรงงาน

โทร. ๐ ๒๒๐๒ ๕๓๕๖ ๐ ๒๒๐๒ ๕๐๐๖

โทรสาร ๐ ๒๒๕๔ ๓๑๐๘ ๐ ๒๒๕๔ ๓๕๑๕

เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารเคมีที่วิเคราะห์

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๒๐๙

ที่ อก ๐๓๓๐/๓) ๕ ๖ ๗ ๙ ลงวันที่ ๒๓ มีนาคม ๒๕๖๓

ขอขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์ที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓ รายการ

น้ำดื่ม จำนวน ๓ รายการ

ลำดับที่	สารเคมี	วิธีการวิเคราะห์
1	TPH (C ₄ -C ₆)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(1,4)
2	TPH (C ₈ -C ₁₆)	Solvent Extraction, Gas Chromatographic Method ^(1,3)
3	TPH (C ₁₆ -C ₃₃)	Solvent Extraction, Gas Chromatographic Method ^(1,3)

เอกสารอ้างอิง

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3. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Nonhalogenated Organics Using GC/FID. SW-846 Method 8015B, 1996.
4. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS). SW-846 Method 8260D, 2018.

วิฑูรย์

(นางวิภากรรณ์ อัครสุตวิไล)

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และประเมินผลสิ่งแวดล้อม



บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

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