

ภาคผนวก ค

ใบรับรองผลการวิเคราะห์

ภาคผนวก ค-1

คุณภาพอากาศจากแหล่งกำเนิด



Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494887

Date Received : Sep 04, 2024

Date Reported : Sep 12, 2024

Report Number: 3086055-1

Page 1 of 1

Sample Number	2494887-1
Sampled Date	Sep 03, 2024
Sample Description	Emission from Stationary Source
Location	Baghouse Stack No.1/1 (S1)
Date Analysis Commenced	Sep 05, 2024
Condition of Sample	Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	750	mmHg	Diameter	1.17	m	Oxygen	20.9	%
Ambient Temperature	26.6	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	42.0	°C	Gas Velocity	15.9	m/s
Type of Fuel	-		Moisture	3.10	%	Flow Rate (Actual O2)	56074	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	03:20 PM - 04:02 PM	mg/m3	-	0.5	1.5	120	16	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline : (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001)
(2) Environmental Impact Assessment Report of Kiriu (Thailand) Co., Ltd.

Sampling By : Warawut Pubpa ทะเบียนเลขที่ ว-323-จ-0033

Remark :

- LOD : Limit of Detection
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Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

ทะเบียนเลขที่ ว-323-จ-0029

Approved by

D. Johnson.

Dej Changchon
Senior Manager

ทะเบียนเลขที่ ว-323-ค-0001

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494892

Date Received : Sep 06, 2024

Date Reported : Sep 12, 2024

Report Number: 3086058-1

Page 1 of 1

Sample Number	2494892-1
Sampled Date	Sep 03, 2024
Sample Description	Emission from Stationary Source
Location	Baghouse Stack No.1/2 (S2)
Date Analysis Commenced	Sep 07, 2024
Condition of Sample	Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	747	mmHg	Diameter	1.17	m	Oxygen	20.9	%
Ambient Temperature	26.2	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	52.0	°C	Gas Velocity	15.0	m/s
Type of Fuel	-		Moisture	3.69	%	Flow Rate (Actual O2)	50501	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	03:20 PM - 04:02 PM	mg/m3	-	0.5	2.6	120	16	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline : (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001)
(2) Environmental Impact Assessment Report of Kiriu (Thailand) Co., Ltd.

Sampling By : Tinnakorn Kulchart ทะเบียนเลขที่ ว-323-จ-0062

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Technical Management

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2494893
Date Received : Sep 05, 2024
Date Reported : Sep 12, 2024
Report Number: 3086059-1

Page 1 of 1

Sample Number 2494893-1
Sampled Date Sep 05, 2024
Sample Description Emission from Stationary Source
Location Baghouse Stack No.1/3 (S3)
Date Analysis Commenced Sep 06, 2024
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	747	mmHg	Diameter	0.89	m	Oxygen	20.9	%
Ambient Temperature	32.4	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	42.0	°C	Gas Velocity	10.7	m/s
Type of Fuel	-		Moisture	3.19	%	Flow Rate (Actual O2)	21676	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	09:30 AM - 10:18 AM	mg/m3	-	0.5	1.9	120	16	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline : (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001)
(2) Environmental Impact Assessment Report of Kiriu (Thailand) Co., Ltd.

Sampling By : Jaradrawee Sriruksa ทะเบียนเลขที่ ว-323-จ-0058

Remark :

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Technical Management

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494894

Date Received : Sep 05, 2024

Date Reported : Sep 12, 2024

Report Number: 3086060-1

Page 1 of 1

Sample Number 2494894-1
Sampled Date Sep 05, 2024
Sample Description Emission from Stationary Source
Location Baghouse Stack No.1/4 (S4)
Date Analysis Commenced Sep 06, 2024
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	747	mmHg	Diameter	0.68	m	Oxygen	20.9	%
Ambient Temperature	32.4	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	43.0	°C	Gas Velocity	11.3	m/s
Type of Fuel	-		Moisture	3.20	%	Flow Rate (Actual O2)	13316	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result at 20.9 % O ₂	Guideline (1)	Guideline (2)	Method	Testing Location	
Air Testing										
Total Suspended Particulate	10:50 AM - 11:38 AM	mg/m3	-	0.5	<0.5	<0.5	120	16	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline :

- (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001)
- (2) Environmental Impact Assessment Report of Kiriu (Thailand) Co., Ltd.

Sampling By : Jaradrawee Sriruksa ทะเบียนเลขที่ ว-323-จ-0058

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Technical Management

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Approved by

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Dej Changchon
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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494895

Date Received : Sep 05, 2024

Date Reported : Sep 12, 2024

Report Number: 3086061-1

Page 1 of 1

Sample Number	2494895-1
Sampled Date	Sep 05, 2024
Sample Description	Emission from Stationary Source
Location	Baghouse Stack No.1/5 (S5)
Date Analysis Commenced	Sep 06, 2024
Condition of Sample	Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	747	mmHg	Diameter	0.89	m	Oxygen	20.9	%
Ambient Temperature	32.4	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	40.0	°C	Gas Velocity	9.8	m/s
Type of Fuel	-		Moisture	3.04	%	Flow Rate (Actual O2)	20008	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	01:00 PM - 02:00 PM	mg/m3	-	0.5	2.2	120	16	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline : (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001)
(2) Environmental Impact Assessment Report of Kiriu (Thailand) Co., Ltd.

Sampling By : Jaradrawee Sriruksa ทะเบียนเลขที่ ว-323-จ-0058

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Technical Management

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2494900
Date Received : Sep 04, 2024
Date Reported : Sep 12, 2024
Report Number: 3086069-1

Page 1 of 1

Sample Number 2494900-1
Sampled Date Sep 04, 2024
Sample Description Emission from Stationary Source
Location Baghouse Stack No.1/6 (S6)
Date Analysis Commenced Sep 05, 2024
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	748	mmHg	Diameter	1.30	m	Oxygen	20.9	%
Ambient Temperature	31.5	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	54.0	°C	Gas Velocity	14.5	m/s
Type of Fuel	-		Moisture	3.37	%	Flow Rate (Actual O2)	60674	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	09:00 AM - 09:42 AM	mg/m3	-	0.5	2.8	120	8	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline : (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001)
(2) Environmental Impact Assessment Report of Kiriu (Thailand) Co., Ltd.

Sampling By : Warawut Pubpa ทะเบียนเลขที่ ว-323-จ-0033

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Technical Management

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Approved by

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2494901
Date Received : Sep 04, 2024
Date Reported : Sep 12, 2024
Report Number: 3086070-1

Page 1 of 1

Sample Number 2494901-1
Sampled Date Sep 04, 2024
Sample Description Emission from Stationary Source
Location Baghouse Stack No.1/7 (S7)
Date Analysis Commenced Sep 05, 2024
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	748	mmHg	Diameter	1.20	m	Oxygen	20.9	%
Ambient Temperature	31.5	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	42.0	°C	Gas Velocity	16.7	m/s
Type of Fuel	-		Moisture	2.68	%	Flow Rate (Actual O2)	61601	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	10:30 AM - 11:18 AM	mg/m3	-	0.5	0.6	120	8	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline : (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001)
(2) Environmental Impact Assessment Report of Kiriu (Thailand) Co., Ltd.

Sampling By : Warawut Pubpa ทะเบียนเลขที่ ว-323-จ-0033

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Technical Management

Thanita K.

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494902

Date Received : Sep 06, 2024

Date Reported : Sep 12, 2024

Report Number: 3086071-1

Page 1 of 1

Sample Number 2494902-1
Sampled Date Sep 04, 2024
Sample Description Emission from Stationary Source
Location Baghouse Stack No.2/1 (S8)
Date Analysis Commenced Sep 07, 2024
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	748	mmHg	Diameter	1.17	m	Oxygen	20.9	%
Ambient Temperature	31.5	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	48.0	°C	Gas Velocity	13.9	m/s
Type of Fuel	-		Moisture	3.23	%	Flow Rate (Actual O2)	47602	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	10:36 AM - 11:18 AM	mg/m3	-	0.5	<0.5	120	16	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline : (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001)
(2) Environmental Impact Assessment Report of Kiriu (Thailand) Co., Ltd.

Sampling By : Tinnakorn Kulchart ทะเบียนเลขที่ ว-323-จ-0062

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O :
Project Name : Monitoring
Project Location :

Lot ID: 24109867

Date Received : Sep 26, 2024
Date Reported : Oct 02, 2024
Report Number: 3118848-1

Page 1 of 1

Sample Number 24109867-1
Sampled Date Sep 26, 2024
Sample Description Emission from Stationary Source
Location Baghouse Stack No.2/2 (S9)
Date Analysis Commenced Sep 27, 2024
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	751	mmHg	Diameter	1.17	m	Oxygen	20.9	%
Ambient Temperature	30.9	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	58.8	°C	Gas Velocity	17.7	m/s
Type of Fuel	-		Moisture	3.29	%	Flow Rate (Actual O2)	59335	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	09:40 AM - 10:28 AM	mg/m3	-	0.5	5.1	120	16	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline : (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001)
(2) Environmental Impact Assessment Report of Kiriu (Thailand) Co., Ltd.

Sampling By : Tarin Octjinda ทะเบียนเลขที่ ว-323-จ-0044

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494904

Date Received : Sep 06, 2024

Date Reported : Sep 12, 2024

Report Number: 3086073-1

Page 1 of 1

Sample Number	2494904-1
Sampled Date	Sep 04, 2024
Sample Description	Emission from Stationary Source
Location	Baghouse Stack No.2/3 (S10)
Date Analysis Commenced	Sep 07, 2024
Condition of Sample	Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	748	mmHg	Diameter	0.89	m	Oxygen	20.9	%
Ambient Temperature	31.5	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	45.0	°C	Gas Velocity	13.4	m/s
Type of Fuel	-		Moisture	3.64	%	Flow Rate (Actual O2)	26818	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	02:00 PM - 02:42 PM	mg/m3	-	0.5	2.1	120	16	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline : (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001)
(2) Environmental Impact Assessment Report of Kiriu (Thailand) Co., Ltd.

Sampling By : Tinnakorn Kulchart ทะเบียนเลขที่ ว-323-จ-0062

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

ทะเบียนเลขที่ ว-323-จ-0029

Approved by

D. Johnson.

Dej Changchon
Senior Manager

ทะเบียนเลขที่ ว-323-ค-0001

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4469-23/ EMAIL

S:\Reports_Air Stack_2GL.rpt (11:39AM)



Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494905

Date Received : Sep 06, 2024

Date Reported : Sep 12, 2024

Report Number: 3086074-1

Page 1 of 1

Sample Number	2494905-1
Sampled Date	Sep 04, 2024
Sample Description	Emission from Stationary Source
Location	Baghouse Stack No.2/4 (S11)
Date Analysis Commenced	Sep 07, 2024
Condition of Sample	Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	748	mmHg	Diameter	0.68	m	Oxygen	20.9	%
Ambient Temperature	31.5	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	49.0	°C	Gas Velocity	11.7	m/s
Type of Fuel	-		Moisture	3.74	%	Flow Rate (Actual O2)	13394	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	09:20 AM - 10:08 AM	mg/m3	-	0.5	1.8	120	16	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline : (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001)
(2) Environmental Impact Assessment Report of Kiriu (Thailand) Co., Ltd.

Sampling By : Tinnakorn Kulchart ทะเบียนเลขที่ ว-323-จ-0062

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

ทะเบียนเลขที่ ว-323-จ-0029

Approved by

D. Johnson.

Dej Changchon
Senior Manager

ทะเบียนเลขที่ ว-323-ค-0001

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494906

Date Received : Sep 06, 2024

Date Reported : Sep 12, 2024

Report Number: 3086075-1

Page 1 of 1

Sample Number	2494906-1
Sampled Date	Sep 04, 2024
Sample Description	Emission from Stationary Source
Location	Baghouse Stack No.2/5 (S12)
Date Analysis Commenced	Sep 07, 2024
Condition of Sample	Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	748	mmHg	Diameter	0.89	m	Oxygen	20.9	%
Ambient Temperature	31.5	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	49.0	°C	Gas Velocity	15.5	m/s
Type of Fuel	-		Moisture	3.37	%	Flow Rate (Actual O2)	30640	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	11:40 AM - 12:22 PM	mg/m3	-	0.5	<0.5	120	16	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline : (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001)
(2) Environmental Impact Assessment Report of Kiriu (Thailand) Co., Ltd.

Sampling By : Tinnakorn Kulchart ทะเบียนเลขที่ ว-323-จ-0062

Remark :

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- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)
ทะเบียนเลขที่ ว-323-จ-0029

Approved by

D. Johnson.

Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ค-0001

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2494908

Date Received : Sep 06, 2024
Date Reported : Sep 12, 2024
Report Number: 3086082-1

Page 1 of 1

Sample Number 2494908-1
Sampled Date Sep 03, 2024
Sample Description Emission from Stationary Source
Location Baghouse Stack No.2/6 (S13)
Date Analysis Commenced Sep 07, 2024
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	750	mmHg	Diameter	1.20	m	Oxygen	20.9	%
Ambient Temperature	26.2	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	54.0	°C	Gas Velocity	20.6	m/s
Type of Fuel	-		Moisture	3.36	%	Flow Rate (Actual O2)	72672	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	10:30 AM - 11:18 AM	mg/m3	-	0.5	1.1	120	15	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline : (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001)
(2) Environmental Impact Assessment Report of Kiriu (Thailand) Co., Ltd.

Sampling By : Suphanut Pisaipan ทะเบียนเลขที่ ว-323-จ-0018

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)
ทะเบียนเลขที่ ว-323-จ-0029

Approved by

D. Johnson.

Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ค-0001

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ภาคผนวก ค-2

คุณภาพอากาศในบรรยากาศ



Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2494991

Date Received : Sep 10, 2024
Date Reported : Sep 14, 2024
Report Number: 3086154-1

Page 1 of 1

Sample Description	Air Quality			
Location	วัดจอมพลเจ้าพระยา (A1)			
Date Analysis Commenced	Sep 12, 2024			
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag			
Sample Number	Sampled Date	Total Suspended Particulate (mg/m ³)	Barometric Pressure (mm Hg)	Atmospheric Temperature (°C)
2494991-1	Sep 01 - Sep 02, 2024	0.030	756	30
2494991-2	Sep 02 - Sep 03, 2024	0.016	756	30
2494991-3	Sep 03 - Sep 04, 2024	0.020	756	30
2494991-4	Sep 04 - Sep 05, 2024	0.029	756	31
2494991-5	Sep 05 - Sep 06, 2024	0.030	756	31
2494991-6	Sep 06 - Sep 07, 2024	0.041	756	32
2494991-7	Sep 07 - Sep 08, 2024	0.032	756	32
Guideline		0.33	-	-

Reference Method

Total Suspended Particulate : US EPA 40 CFR Part 50 Appendix B

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

Sampled By : Jakkarin Manwicha

Remark :

- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Thanita K.

Thanita Kulsuriwong
Scientist (4)

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2494991
Date Received : Sep 10, 2024
Date Reported : Sep 14, 2024
Report Number: 3086154-2

Page 1 of 1

Sample Description	Air Quality			
Location	วัดคลองกรำ (A2)			
Date Analysis Commenced	Sep 12, 2024			
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag			
Sample Number	Sampled Date	Total Suspended Particulate (mg/m3)	Barometric Pressure (mm Hg)	Atmospheric Temperature (°C)
2494991-8	Sep 01 - Sep 02, 2024	0.028	756	30
2494991-9	Sep 02 - Sep 03, 2024	0.012	756	30
2494991-10	Sep 03 - Sep 04, 2024	0.035	756	30
2494991-11	Sep 04 - Sep 05, 2024	0.048	756	31
2494991-12	Sep 05 - Sep 06, 2024	0.053	756	31
2494991-13	Sep 06 - Sep 07, 2024	0.072	756	32
2494991-14	Sep 07 - Sep 08, 2024	0.037	756	32
Guideline		0.33	-	-

Reference Method

Total Suspended Particulate : US EPA 40 CFR Part 50 Appendix B

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

Sampled By : Jakkarin Manwicha

Remark :

- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Thanita K.

Thanita Kulsuriwong
Scientist (4)

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2494991
Date Received : Sep 10, 2024
Date Reported : Sep 14, 2024
Report Number: 3086154-3

Page 1 of 1

Sample Description	Air Quality			
Location	วัดราษฎร์ศุภคาราม (A3)			
Date Analysis Commenced	Sep 12, 2024			
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag			
Sample Number	Sampled Date	Total Suspended Particulate (mg/m ³)	Barometric Pressure (mm Hg)	Atmospheric Temperature (°C)
2494991-15	Sep 01 - Sep 02, 2024	0.047	756	30
2494991-16	Sep 02 - Sep 03, 2024	0.017	756	30
2494991-17	Sep 03 - Sep 04, 2024	0.085	756	30
2494991-18	Sep 04 - Sep 05, 2024	0.097	756	31
2494991-19	Sep 05 - Sep 06, 2024	0.058	756	31
2494991-20	Sep 06 - Sep 07, 2024	0.119	756	32
2494991-21	Sep 07 - Sep 08, 2024	0.100	756	32
Guideline		0.33	-	-

Reference Method

Total Suspended Particulate : US EPA 40 CFR Part 50 Appendix B

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

Sampled By : Jakkarin Manwicha

Remark :

- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Thanita K.

Thanita Kulsuriwong
Scientist (4)

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Analysis / Test Report

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

Lot ID: 2494995
Date Received :Sep 10, 2024
Date Reported :Sep 17, 2024
Report Number :3086156-1

P/O : PO231210109

Project Name : Monitoring

Project Location :

Page 1 of 2

Sample Number : 2494995-1 to 7
Parameter : Wind Speed / Wind Direction
Location : วัดราษฎร์อิสตาราม (A3)
Sampling Date : Sep 01 - Sep 08, 2024
Sampling by : Jakkarin Manwicha

Time	Sep 01 - Sep 02, 2024			Sep 02 - Sep 03, 2024			Sep 03 - Sep 04, 2024			Sep 04 - Sep 05, 2024			Sep 05 - Sep 06, 2024			Sep 06 - Sep 07, 2024			Sep 07 - Sep 08, 2024		
	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)		WS (m/s)	WD (deg)	
12:00 PM - 01:00 PM	0.5	260.0	W	0.5	200.0	SSW	2.5	228.0	SW	2.0	225.0	SW	0.0	-	-	3.1	234.0	SW	0.0	-	-
01:00 PM - 02:00 PM	0.7	260.0	W	0.2	-	-	3.1	175.0	S	1.3	259.0	W	0.6	246.0	WSW	1.3	95.0	E	4.2	135.0	SE
02:00 PM - 03:00 PM	0.3	275.0	W	1.2	133.0	SE	2.8	159.0	SSE	1.6	215.0	SW	0.0	-	-	3.5	28.0	NNE	3.3	59.0	ENE
03:00 PM - 04:00 PM	0.9	245.0	WSW	0.6	246.0	WSW	1.4	185.0	S	1.5	232.0	SW	1.8	284.0	WNW	0.0	-	-	2.1	126.0	SE
04:00 PM - 05:00 PM	0.4	144.0	SE	0.3	178.0	S	2.0	176.0	S	1.9	249.0	WSW	2.4	283.0	WNW	0.0	-	-	2.0	103.0	ESE
05:00 PM - 06:00 PM	1.5	294.0	WNW	0.6	178.0	S	2.6	236.0	SW	3.8	249.0	WSW	0.0	-	-	0.0	-	-	0.9	239.0	WSW
06:00 PM - 07:00 PM	0.2	-	-	0.7	178.0	S	0.0	-	-	0.2	-	-	0.2	-	-	1.6	235.0	SW	0.7	216.0	SW
07:00 PM - 08:00 PM	0.1	-	-	1.1	178.0	S	0.3	245.0	WSW	0.4	235.0	SW	0.6	257.0	WSW	0.0	-	-	0.5	149.0	SSE
08:00 PM - 09:00 PM	0.6	25.0	NNE	0.5	73.0	ENE	0.6	263.0	W	0.6	229.0	SW	0.4	265.0	W	1.7	95.0	E	0.8	209.0	SSW
09:00 PM - 10:00 PM	0.5	15.0	NNE	0.2	-	-	0.7	230.0	SW	0.4	229.0	SW	0.4	213.0	SSW	0.7	153.0	SSE	0.9	44.0	NE
10:00 PM - 11:00 PM	0.4	121.0	ESE	0.4	287.0	WNW	0.0	-	-	0.7	181.0	S	0.9	214.0	SW	0.4	243.0	WSW	0.9	53.0	NE
11:00 PM - 12:00 AM	0.6	35.0	NE	0.6	288.0	WNW	0.9	250.0	WSW	1.5	221.0	SW	1.3	241.0	WSW	0.0	-	-	0.9	32.0	NNE
12:00 AM - 01:00 AM	0.3	194.0	SSW	0.6	288.0	WNW	0.1	-	-	1.0	202.0	SSW	0.9	268.0	W	0.7	217.0	SW	0.6	187.0	S
01:00 AM - 02:00 AM	0.5	47.0	NE	0.2	-	-	0.1	-	-	0.9	185.0	S	0.2	-	-	0.0	-	-	0.7	95.0	E
02:00 AM - 03:00 AM	0.6	55.0	NE	0.5	142.0	SE	0.2	-	-	1.2	251.0	WSW	0.1	-	-	0.9	14.0	NNE	1.2	60.0	ENE
03:00 AM - 04:00 AM	0.1	-	-	0.3	152.0	SSE	0.5	236.0	SW	1.1	279.0	W	0.9	310.0	NW	0.9	160.0	SSE	1.0	199.0	SSW
04:00 AM - 05:00 AM	0.9	294.0	WNW	0.4	175.0	S	0.3	233.0	SW	0.6	243.0	WSW	0.9	322.0	NW	0.8	254.0	WSW	0.9	31.0	NNE
05:00 AM - 06:00 AM	0.2	-	-	0.6	241.0	WSW	0.8	222.0	SW	0.9	282.0	WNW	0.4	181.0	S	0.4	132.0	SE	1.3	128.0	SE
06:00 AM - 07:00 AM	0.6	293.0	WNW	0.2	-	-	0.7	233.0	SW	0.7	291.0	WNW	1.6	11.0	N	0.6	35.0	NE	1.0	33.0	NNE
07:00 AM - 08:00 AM	0.4	271.0	W	1.6	271.0	W	0.9	270.0	W	0.4	235.0	SW	0.6	10.0	N	0.6	9.0	N	0.2	-	-
08:00 AM - 09:00 AM	0.6	297.0	WNW	0.9	280.0	W	0.4	273.0	W	0.9	303.0	WNW	0.8	153.0	SSE	0.0	-	-	0.6	9.0	N
09:00 AM - 10:00 AM	2.5	232.0	SW	0.0	-	-	1.1	283.0	WNW	1.4	292.0	WNW	0.1	-	-	2.1	204.0	SSW	0.4	61.0	ENE
10:00 AM - 11:00 AM	0.2	-	-	3.5	213.0	SSW	3.4	286.0	WNW	1.5	288.0	WNW	0.1	-	-	0.0	-	-	0.3	172.0	S
11:00 AM - 12:00 PM	0.2	-	-	1.0	234.0	SW	1.4	253.0	WSW	1.9	255.0	WSW	0.0	-	-	1.8	37.0	NE	0.5	1.0	N

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

The above results are valid only for the analyzed/tested 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) strongly recommends that this report is not reproduced except in full.

Approved by

Sarayuth Jittrantont
Assistant General Manager



Analysis / Test Report

Client : Kiri (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494995

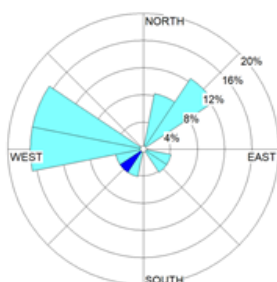
Date Received : Sep 10, 2024

Date Reported : Sep 17, 2024

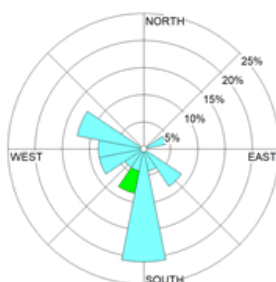
Report Number : 3086156-1

Page 2 of 2

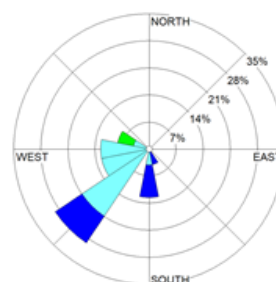
Wind Rose



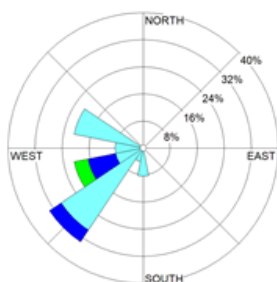
Date : Sep 01-02, 2024



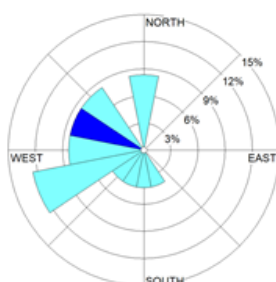
Date : Sep 02-03, 2024



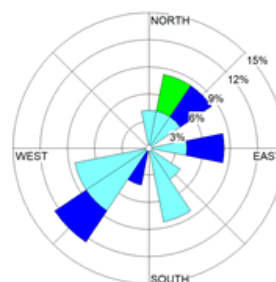
Date : Sep 03-04, 2024



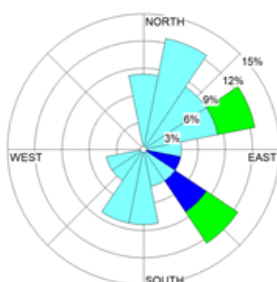
Date : Sep 04-05, 2024



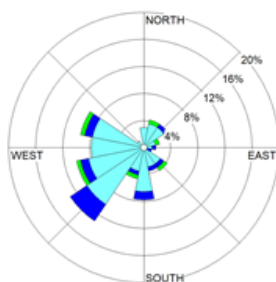
Date : Sep 05-06, 2024



Date : Sep 06-07, 2024



Date : Sep 07-08, 2024



Date : Sep 01-08, 2024

WS (m/s)	%
≥ 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	3.57
1.7-3.3	10.12
0.3-1.7	64.88
Calms	21.43

The above results are valid only for the analyzed/tested 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) strongly recommends that this report is not reproduced except in full.

Approved by

Sarayuth Jitranont
Assistant General Manager

ภาคผนวก ค-3

ระดับเสียงโดยทั่วไป



Analysis / Test Report

TESTING
No.0042

Client : Kiri (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494997

Date Received : Sep 10, 2024

Date Reported : Sep 16, 2024

Report Number: 3110575-1

Page 1 of 1

Sample Number 2494997-1
Parameter Noise (Leq 24 hrs.)
Location ร่มรั้วโครงการ ทิศเหนือ
Measurement Date Sep 02 - Sep 03, 2024
Measurement by Jakkarin Manwicha
Sound Level meter Serial No. 623389

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	54.8	83.9	52.4
02:00 PM - 03:00 PM	57.6	90.3	52.8
03:00 PM - 04:00 PM	55.1	73.1	52.0
04:00 PM - 05:00 PM	55.0	75.0	51.4
05:00 PM - 06:00 PM	53.0	68.7	51.2
06:00 PM - 07:00 PM	53.8	70.4	51.4
07:00 PM - 08:00 PM	55.6	78.9	52.1
08:00 PM - 09:00 PM	54.1	68.9	51.1
09:00 PM - 10:00 PM	52.1	65.4	49.8
10:00 PM - 11:00 PM	54.3	87.0	48.2
11:00 PM - 12:00 AM	52.9	72.6	49.6
12:00 AM - 01:00 AM	53.9	71.1	51.7
01:00 AM - 02:00 AM	53.6	66.3	51.8
02:00 AM - 03:00 AM	51.5	64.8	49.2
03:00 AM - 04:00 AM	55.4	75.7	53.1
04:00 AM - 05:00 AM	57.6	78.3	53.2
05:00 AM - 06:00 AM	57.8	87.3	52.5
06:00 AM - 07:00 AM	59.5	75.4	56.3
07:00 AM - 08:00 AM	62.2	82.8	54.6
08:00 AM - 09:00 AM	57.3	82.5	53.8
09:00 AM - 10:00 AM	57.6	87.2	52.8
10:00 AM - 11:00 AM	55.5	76.4	52.4
11:00 AM - 12:00 PM	58.1	83.3	52.4
12:00 PM - 01:00 PM	57.7	85.8	54.4

Leq Average 24 hrs. (dB(A)) 56.4
Lmax (dB(A)) 90.3
L90 (dB(A)) 52.1
Ldn (dB(A)) 62.4
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkoch
Scientist (3)

Approved by

Supot S

Supot Salamteh
Section Head



Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494997

Date Received : Sep 10, 2024

Date Reported : Sep 16, 2024

Report Number: 3110576-1

Page 1 of 1

Sample Number 2494997-2
Parameter Noise (Leq 24 hrs.)
Location ร่มรั้วโครงการ ทิศเหนือ
Measurement Date Sep 03 - Sep 04, 2024
Measurement by Jakkarin Manwicha
Sound Level meter Serial No. 623389

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	55.7	74.8	53.8
02:00 PM - 03:00 PM	56.4	85.8	53.6
03:00 PM - 04:00 PM	57.2	76.3	53.3
04:00 PM - 05:00 PM	57.5	74.8	52.2
05:00 PM - 06:00 PM	54.6	69.4	52.3
06:00 PM - 07:00 PM	54.8	75.1	52.0
07:00 PM - 08:00 PM	54.7	73.7	52.3
08:00 PM - 09:00 PM	54.2	70.5	51.9
09:00 PM - 10:00 PM	53.1	67.8	50.1
10:00 PM - 11:00 PM	52.5	83.9	48.7
11:00 PM - 12:00 AM	52.2	69.6	50.2
12:00 AM - 01:00 AM	53.6	74.7	51.1
01:00 AM - 02:00 AM	52.2	72.8	50.1
02:00 AM - 03:00 AM	53.4	75.6	48.0
03:00 AM - 04:00 AM	56.7	88.5	48.3
04:00 AM - 05:00 AM	56.9	71.7	51.6
05:00 AM - 06:00 AM	57.9	92.4	52.0
06:00 AM - 07:00 AM	56.1	74.5	52.7
07:00 AM - 08:00 AM	57.5	78.7	53.8
08:00 AM - 09:00 AM	55.8	78.5	53.1
09:00 AM - 10:00 AM	55.4	72.4	52.6
10:00 AM - 11:00 AM	55.0	82.5	52.2
11:00 AM - 12:00 PM	54.3	71.9	52.6
12:00 PM - 01:00 PM	56.6	86.0	53.6

Leq Average 24 hrs. (dB(A)) 55.5
Lmax (dB(A)) 92.4
L90 (dB(A)) 52.2
Ldn (dB(A)) 61.6
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkoch
Scientist (3)

Approved by

Supot S

Supot Salamteh
Section Head

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Life Sciences

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Analysis / Test Report

TESTING
No.0042

Client : Kiri (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494997

Date Received : Sep 10, 2024

Date Reported : Sep 16, 2024

Report Number : 3110577-1

Page 1 of 1

Sample Number : 2494997-3
Parameter : Noise (Leq 24 hrs.)
Location : ร่มรั้วโครงการ ทิศเหนือ
Measurement Date : Sep 04 - Sep 05, 2024
Measurement by : Jakkarin Manwicha
Sound Level meter : Serial No. 623389

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	56.2	71.6	53.4
02:00 PM - 03:00 PM	57.8	76.6	52.7
03:00 PM - 04:00 PM	56.3	80.5	52.9
04:00 PM - 05:00 PM	55.6	72.0	51.8
05:00 PM - 06:00 PM	53.4	66.5	51.8
06:00 PM - 07:00 PM	54.6	71.8	52.2
07:00 PM - 08:00 PM	55.2	74.0	52.8
08:00 PM - 09:00 PM	53.2	68.3	51.1
09:00 PM - 10:00 PM	52.2	71.7	50.2
10:00 PM - 11:00 PM	55.1	90.4	49.1
11:00 PM - 12:00 AM	52.2	69.2	50.5
12:00 AM - 01:00 AM	53.1	66.9	51.1
01:00 AM - 02:00 AM	53.5	67.3	51.5
02:00 AM - 03:00 AM	52.4	77.5	49.8
03:00 AM - 04:00 AM	55.1	92.9	48.3
04:00 AM - 05:00 AM	55.4	70.8	51.4
05:00 AM - 06:00 AM	57.3	90.4	52.0
06:00 AM - 07:00 AM	57.0	70.2	52.9
07:00 AM - 08:00 AM	57.4	79.1	53.3
08:00 AM - 09:00 AM	56.2	79.1	52.6
09:00 AM - 10:00 AM	57.4	87.6	53.0
10:00 AM - 11:00 AM	54.0	68.8	51.7
11:00 AM - 12:00 PM	54.1	69.3	52.0
12:00 PM - 01:00 PM	56.2	77.9	53.6

Leq Average 24 hrs. (dB(A)) : 55.4
Lmax (dB(A)) : 92.9
L90 (dB(A)) : 51.8
Ldn (dB(A)) : 61.4

Standard (dB(A)) : 70
Reference Method : ISO1996-1 and 1996-2
Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkoch
Scientist (3)

Approved by

Suppt S

Supot Salamteht
Section Head

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494997

Date Received : Sep 10, 2024

Date Reported : Sep 16, 2024

Report Number: 3110581-1

Page 1 of 1

Sample Number 2494997-7
Parameter Noise (Leq 24 hrs.)
Location ร่มรั้วโครงการ ทิศตะวันออก
Measurement Date Sep 02 - Sep 03, 2024
Measurement by Jakkarin Manwicha
Sound Level meter Serial No. 623388

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	59.4	85.0	57.0
02:00 PM - 03:00 PM	59.6	82.7	56.6
03:00 PM - 04:00 PM	58.9	81.9	57.0
04:00 PM - 05:00 PM	56.5	73.2	55.5
05:00 PM - 06:00 PM	58.0	79.5	55.4
06:00 PM - 07:00 PM	56.5	70.5	55.3
07:00 PM - 08:00 PM	58.3	87.6	55.7
08:00 PM - 09:00 PM	57.8	83.5	55.9
09:00 PM - 10:00 PM	58.6	80.1	56.0
10:00 PM - 11:00 PM	58.0	81.6	55.2
11:00 PM - 12:00 AM	56.3	76.8	54.9
12:00 AM - 01:00 AM	58.0	79.6	55.6
01:00 AM - 02:00 AM	63.3	81.3	55.6
02:00 AM - 03:00 AM	68.0	75.4	60.2
03:00 AM - 04:00 AM	57.5	78.1	56.5
04:00 AM - 05:00 AM	57.3	81.0	56.4
05:00 AM - 06:00 AM	59.7	85.1	56.4
06:00 AM - 07:00 AM	58.8	73.5	57.4
07:00 AM - 08:00 AM	58.2	85.7	56.0
08:00 AM - 09:00 AM	61.8	83.3	56.4
09:00 AM - 10:00 AM	59.6	80.1	56.6
10:00 AM - 11:00 AM	58.2	79.3	55.6
11:00 AM - 12:00 PM	57.2	83.5	54.3
12:00 PM - 01:00 PM	59.7	84.6	56.7

Leq Average 24 hrs. (dB(A)) 60.0
Lmax (dB(A)) 87.6
L90 (dB(A)) 56.0
Ldn (dB(A)) 67.7
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkoch
Scientist (3)

Approved by

Supot S

Supot Salamteh
Section Head



Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494997

Date Received : Sep 10, 2024

Date Reported : Sep 16, 2024

Report Number: 3110582-1

Page 1 of 1

Sample Number 2494997-8
Parameter Noise (Leq 24 hrs.)
Location รีมรั้วโครงการ ทิศตะวันออก
Measurement Date Sep 03 - Sep 04, 2024
Measurement by Jakkarin Manwicha
Sound Level meter Serial No. 623388

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	58.4	77.7	56.2
02:00 PM - 03:00 PM	57.8	76.5	56.1
03:00 PM - 04:00 PM	59.1	86.8	56.5
04:00 PM - 05:00 PM	58.3	81.4	54.9
05:00 PM - 06:00 PM	58.0	82.8	55.0
06:00 PM - 07:00 PM	56.2	76.7	54.6
07:00 PM - 08:00 PM	58.0	77.4	56.5
08:00 PM - 09:00 PM	57.9	77.4	56.3
09:00 PM - 10:00 PM	59.2	82.2	56.5
10:00 PM - 11:00 PM	58.7	82.4	56.4
11:00 PM - 12:00 AM	57.8	83.5	55.1
12:00 AM - 01:00 AM	58.7	80.6	56.8
01:00 AM - 02:00 AM	58.2	81.8	56.6
02:00 AM - 03:00 AM	57.7	78.5	56.1
03:00 AM - 04:00 AM	56.9	74.2	55.8
04:00 AM - 05:00 AM	56.9	80.2	54.7
05:00 AM - 06:00 AM	57.9	81.1	54.6
06:00 AM - 07:00 AM	56.3	74.7	54.5
07:00 AM - 08:00 AM	60.9	85.7	56.4
08:00 AM - 09:00 AM	58.9	84.1	56.5
09:00 AM - 10:00 AM	60.0	88.1	56.7
10:00 AM - 11:00 AM	58.7	81.2	56.5
11:00 AM - 12:00 PM	57.4	71.1	55.5
12:00 PM - 01:00 PM	59.7	87.9	57.0

Leq Average 24 hrs. (dB(A)) 58.4
Lmax (dB(A)) 88.1
L90 (dB(A)) 56.2
Ldn (dB(A)) 64.3
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkoch
Scientist (3)

Approved by

Supot S

Supot Salamteh
Section Head



Analysis / Test Report

TESTING
No.0042

Client : Kiri (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494997

Date Received : Sep 10, 2024

Date Reported : Sep 16, 2024

Report Number: 3110583-1

Page 1 of 1

Sample Number 2494997-9
Parameter Noise (Leq 24 hrs.)
Location ร่มรั้วโครงการ ทิศตะวันออก
Measurement Date Sep 04 - Sep 05, 2024
Measurement by Jakkarin Manwicha
Sound Level meter Serial No. 623388

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	59.6	84.0	56.9
02:00 PM - 03:00 PM	58.6	79.1	56.6
03:00 PM - 04:00 PM	60.9	90.6	56.4
04:00 PM - 05:00 PM	57.5	82.6	54.9
05:00 PM - 06:00 PM	58.4	91.2	54.8
06:00 PM - 07:00 PM	56.2	79.3	54.7
07:00 PM - 08:00 PM	57.8	84.9	56.1
08:00 PM - 09:00 PM	58.2	85.6	55.7
09:00 PM - 10:00 PM	58.8	79.6	55.5
10:00 PM - 11:00 PM	57.8	82.4	54.9
11:00 PM - 12:00 AM	56.0	76.7	53.6
12:00 AM - 01:00 AM	57.4	79.3	55.8
01:00 AM - 02:00 AM	57.7	77.2	55.9
02:00 AM - 03:00 AM	57.4	81.8	55.6
03:00 AM - 04:00 AM	56.0	73.3	55.4
04:00 AM - 05:00 AM	55.7	70.8	54.4
05:00 AM - 06:00 AM	58.8	81.3	54.5
06:00 AM - 07:00 AM	56.1	70.4	54.4
07:00 AM - 08:00 AM	59.0	83.0	56.3
08:00 AM - 09:00 AM	58.9	82.1	56.3
09:00 AM - 10:00 AM	59.3	82.0	56.4
10:00 AM - 11:00 AM	58.8	80.2	56.2
11:00 AM - 12:00 PM	57.1	89.2	55.1
12:00 PM - 01:00 PM	59.4	79.2	56.6

Leq Average 24 hrs. (dB(A)) 58.2
Lmax (dB(A)) 91.2
L90 (dB(A)) 55.6
Ldn (dB(A)) 63.8
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkoch
Scientist (3)

Approved by

Supot S

Supot Salamteh
Section Head



Analysis / Test Report

TESTING
No.0042

Client : Kiri (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494997

Date Received : Sep 10, 2024

Date Reported : Sep 16, 2024

Report Number: 3110584-1

Page 1 of 1

Sample Number 2494997-10
Parameter Noise (Leq 24 hrs.)
Location ร่มรั้วโครงการ ทิศตะวันตก
Measurement Date Sep 02 - Sep 03, 2024
Measurement by Jakkarin Manwicha
Sound Level meter Serial No. 900074

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	67.5	86.5	65.8
02:00 PM - 03:00 PM	67.9	85.3	66.3
03:00 PM - 04:00 PM	68.1	86.0	66.5
04:00 PM - 05:00 PM	68.2	88.0	66.5
05:00 PM - 06:00 PM	67.3	82.9	66.2
06:00 PM - 07:00 PM	67.5	90.5	66.0
07:00 PM - 08:00 PM	67.6	82.9	66.2
08:00 PM - 09:00 PM	65.3	77.0	63.6
09:00 PM - 10:00 PM	64.9	83.2	63.4
10:00 PM - 11:00 PM	64.3	75.4	63.1
11:00 PM - 12:00 AM	64.1	72.2	63.1
12:00 AM - 01:00 AM	64.5	77.5	63.3
01:00 AM - 02:00 AM	65.1	83.4	63.6
02:00 AM - 03:00 AM	69.4	85.6	65.3
03:00 AM - 04:00 AM	66.6	83.5	64.6
04:00 AM - 05:00 AM	68.1	89.6	66.8
05:00 AM - 06:00 AM	68.2	78.3	67.0
06:00 AM - 07:00 AM	68.8	86.0	67.3
07:00 AM - 08:00 AM	69.0	81.5	67.3
08:00 AM - 09:00 AM	68.5	79.9	67.2
09:00 AM - 10:00 AM	68.6	80.7	67.1
10:00 AM - 11:00 AM	67.9	83.6	66.6
11:00 AM - 12:00 PM	68.1	83.4	66.7
12:00 PM - 01:00 PM	68.2	85.2	66.8

Leq Average 24 hrs. (dB(A)) 67.5
Lmax (dB(A)) 90.5
L90 (dB(A)) 66.2
Ldn (dB(A)) 73.5
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkoch
Scientist (3)

Approved by

Supot S

Supot Salamteh
Section Head



Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494997

Date Received : Sep 10, 2024

Date Reported : Sep 16, 2024

Report Number: 3110585-1

Page 1 of 1

Sample Number 2494997-11
Parameter Noise (Leq 24 hrs.)
Location ร่มรั้วโครงการ ทิศตะวันตก
Measurement Date Sep 03 - Sep 04, 2024
Measurement by Jakkarin Manwicha
Sound Level meter Serial No. 900074

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	67.9	83.2	66.5
02:00 PM - 03:00 PM	67.9	84.9	66.3
03:00 PM - 04:00 PM	67.2	82.0	65.7
04:00 PM - 05:00 PM	67.2	86.1	65.7
05:00 PM - 06:00 PM	67.2	78.2	66.1
06:00 PM - 07:00 PM	67.6	91.7	66.1
07:00 PM - 08:00 PM	66.3	80.0	64.0
08:00 PM - 09:00 PM	64.9	78.7	63.4
09:00 PM - 10:00 PM	64.6	87.3	63.3
10:00 PM - 11:00 PM	64.5	76.7	63.2
11:00 PM - 12:00 AM	64.4	72.7	63.2
12:00 AM - 01:00 AM	64.8	82.5	63.4
01:00 AM - 02:00 AM	64.6	79.0	63.0
02:00 AM - 03:00 AM	64.5	69.6	63.2
03:00 AM - 04:00 AM	64.9	83.2	62.9
04:00 AM - 05:00 AM	67.1	84.9	65.7
05:00 AM - 06:00 AM	67.1	82.1	65.8
06:00 AM - 07:00 AM	67.3	87.8	65.7
07:00 AM - 08:00 AM	66.8	79.3	65.4
08:00 AM - 09:00 AM	66.7	91.6	65.2
09:00 AM - 10:00 AM	66.7	82.2	65.1
10:00 AM - 11:00 AM	66.4	79.2	65.0
11:00 AM - 12:00 PM	66.5	83.4	65.1
12:00 PM - 01:00 PM	66.7	80.2	65.1

Leq Average 24 hrs. (dB(A)) 66.4
Lmax (dB(A)) 91.7
L90 (dB(A)) 65.1
Ldn (dB(A)) 72.2
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
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Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkoch
Scientist (3)

Approved by

Supot S

Supot Salamteh
Section Head



Analysis / Test Report



TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494997

Date Received : Sep 10, 2024

Date Reported : Sep 16, 2024

Report Number: 3110586-1

Page 1 of 1

Sample Number 2494997-12
Parameter Noise (Leq 24 hrs.)
Location ร่มรั้วโครงการ ทิศตะวันตก
Measurement Date Sep 04 - Sep 05, 2024
Measurement by Jakkarin Manwicha
Sound Level meter Serial No. 900074

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	66.7	79.9	65.3
02:00 PM - 03:00 PM	67.1	82.7	65.3
03:00 PM - 04:00 PM	67.3	88.2	65.4
04:00 PM - 05:00 PM	66.9	84.7	65.4
05:00 PM - 06:00 PM	66.6	78.6	65.5
06:00 PM - 07:00 PM	67.2	90.7	65.6
07:00 PM - 08:00 PM	66.3	82.8	63.7
08:00 PM - 09:00 PM	63.8	79.4	62.4
09:00 PM - 10:00 PM	63.5	80.0	62.4
10:00 PM - 11:00 PM	64.2	83.0	62.7
11:00 PM - 12:00 AM	64.5	72.7	63.2
12:00 AM - 01:00 AM	64.3	78.6	63.1
01:00 AM - 02:00 AM	64.2	72.3	63.1
02:00 AM - 03:00 AM	64.3	76.1	63.2
03:00 AM - 04:00 AM	65.1	77.5	63.2
04:00 AM - 05:00 AM	67.2	82.2	65.8
05:00 AM - 06:00 AM	67.2	79.6	65.7
06:00 AM - 07:00 AM	66.8	84.3	65.0
07:00 AM - 08:00 AM	66.8	85.5	65.2
08:00 AM - 09:00 AM	66.6	82.5	65.3
09:00 AM - 10:00 AM	67.0	86.7	65.4
10:00 AM - 11:00 AM	66.7	83.2	65.3
11:00 AM - 12:00 PM	66.4	82.2	64.8
12:00 PM - 01:00 PM	66.9	85.8	65.3

Leq Average 24 hrs. (dB(A)) 66.2
Lmax (dB(A)) 90.7
L90 (dB(A)) 65.2
Ldn (dB(A)) 72.1
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
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Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkoch
Scientist (3)

Approved by

Supot S

Supot Salamteh
Section Head

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Analysis / Test Report

TESTING
No.0042

Client : Kiri (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494997

Date Received : Sep 10, 2024

Date Reported : Sep 16, 2024

Report Number: 3110578-1

Page 1 of 1

Sample Number 2494997-4
Parameter Noise (Leq 24 hrs.)
Location ร่มรั้วโครงการ ทิศใต้
Measurement Date Sep 02 - Sep 03, 2024
Measurement by Jakkarin Manwicha
Sound Level meter Serial No. 623387

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	67.2	78.4	66.3
02:00 PM - 03:00 PM	67.3	78.1	66.3
03:00 PM - 04:00 PM	67.3	78.8	66.6
04:00 PM - 05:00 PM	68.3	80.6	67.5
05:00 PM - 06:00 PM	68.1	80.7	67.3
06:00 PM - 07:00 PM	67.8	80.3	66.8
07:00 PM - 08:00 PM	68.0	80.1	67.2
08:00 PM - 09:00 PM	68.5	80.2	67.8
09:00 PM - 10:00 PM	68.3	80.7	67.5
10:00 PM - 11:00 PM	68.1	80.0	67.2
11:00 PM - 12:00 AM	67.4	80.1	66.7
12:00 AM - 01:00 AM	67.1	79.5	66.0
01:00 AM - 02:00 AM	68.5	80.2	67.7
02:00 AM - 03:00 AM	68.1	80.7	67.2
03:00 AM - 04:00 AM	69.3	82.2	68.1
04:00 AM - 05:00 AM	68.9	81.5	68.1
05:00 AM - 06:00 AM	69.0	82.3	68.4
06:00 AM - 07:00 AM	67.7	81.6	66.8
07:00 AM - 08:00 AM	67.5	80.2	66.8
08:00 AM - 09:00 AM	68.1	80.2	67.2
09:00 AM - 10:00 AM	68.3	79.9	67.4
10:00 AM - 11:00 AM	67.7	80.5	66.5
11:00 AM - 12:00 PM	67.7	80.9	66.6
12:00 PM - 01:00 PM	68.2	80.6	67.2

Leq Average 24 hrs. (dB(A)) 68.1
Lmax (dB(A)) 82.3
L90 (dB(A)) 67.2
Ldn (dB(A)) 74.6
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkoch
Scientist (3)

Approved by

Supot S

Supot Salamteh
Section Head

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Analysis / Test Report

TESTING
No.0042

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494997

Date Received : Sep 10, 2024

Date Reported : Sep 16, 2024

Report Number: 3110579-1

Page 1 of 1

Sample Number 2494997-5
Parameter Noise (Leq 24 hrs.)
Location ร่มรั้วโครงการ ทิศใต้
Measurement Date Sep 03 - Sep 04, 2024
Measurement by Jakkarin Manwicha
Sound Level meter Serial No. 623387

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	67.0	80.4	66.1
02:00 PM - 03:00 PM	67.5	80.2	66.3
03:00 PM - 04:00 PM	67.0	79.6	66.0
04:00 PM - 05:00 PM	68.2	81.3	67.0
05:00 PM - 06:00 PM	68.5	82.0	67.6
06:00 PM - 07:00 PM	68.9	81.1	68.1
07:00 PM - 08:00 PM	69.4	81.3	68.6
08:00 PM - 09:00 PM	69.1	81.4	68.3
09:00 PM - 10:00 PM	69.1	81.7	68.4
10:00 PM - 11:00 PM	68.6	81.1	67.7
11:00 PM - 12:00 AM	68.8	81.1	68.0
12:00 AM - 01:00 AM	68.6	81.2	67.8
01:00 AM - 02:00 AM	68.8	81.2	68.1
02:00 AM - 03:00 AM	68.6	81.2	67.8
03:00 AM - 04:00 AM	68.8	81.1	68.1
04:00 AM - 05:00 AM	69.0	80.7	68.2
05:00 AM - 06:00 AM	68.6	81.2	67.7
06:00 AM - 07:00 AM	68.5	81.0	67.1
07:00 AM - 08:00 AM	67.6	79.2	66.7
08:00 AM - 09:00 AM	66.8	78.8	65.9
09:00 AM - 10:00 AM	67.0	84.0	66.1
10:00 AM - 11:00 AM	66.2	79.2	65.3
11:00 AM - 12:00 PM	66.0	79.0	64.9
12:00 PM - 01:00 PM	65.8	79.4	64.6

Leq Average 24 hrs. (dB(A)) 68.1
Lmax (dB(A)) 84.0
L90 (dB(A)) 67.6
Ldn (dB(A)) 75.0
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการ
โรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkoch
Scientist (3)

Approved by

Supot S

Supot Salamteh
Section Head



Analysis / Test Report

TESTING
No.0042

Client : Kiri (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2494997

Date Received : Sep 10, 2024

Date Reported : Sep 16, 2024

Report Number: 3110580-1

Page 1 of 1

Sample Number 2494997-6
Parameter Noise (Leq 24 hrs.)
Location ร่มรั้วโครงการ ทิศใต้
Measurement Date Sep 04 - Sep 05, 2024
Measurement by Jakkarin Manwicha
Sound Level meter Serial No. 623387

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	66.3	79.9	65.2
02:00 PM - 03:00 PM	67.0	79.1	65.9
03:00 PM - 04:00 PM	66.9	83.1	65.6
04:00 PM - 05:00 PM	68.1	82.5	65.7
05:00 PM - 06:00 PM	69.6	91.7	66.1
06:00 PM - 07:00 PM	68.1	80.3	67.0
07:00 PM - 08:00 PM	68.9	80.3	68.1
08:00 PM - 09:00 PM	69.0	88.3	68.1
09:00 PM - 10:00 PM	68.8	81.3	68.2
10:00 PM - 11:00 PM	68.3	80.5	67.6
11:00 PM - 12:00 AM	68.4	80.4	67.5
12:00 AM - 01:00 AM	67.9	80.5	67.1
01:00 AM - 02:00 AM	68.1	80.6	67.3
02:00 AM - 03:00 AM	68.0	80.8	67.3
03:00 AM - 04:00 AM	68.3	80.4	67.4
04:00 AM - 05:00 AM	68.1	80.4	67.2
05:00 AM - 06:00 AM	68.7	94.8	67.7
06:00 AM - 07:00 AM	68.0	80.1	66.2
07:00 AM - 08:00 AM	66.3	78.1	65.2
08:00 AM - 09:00 AM	65.8	82.9	64.3
09:00 AM - 10:00 AM	65.7	78.4	64.7
10:00 AM - 11:00 AM	65.6	78.0	64.6
11:00 AM - 12:00 PM	65.4	78.4	64.2
12:00 PM - 01:00 PM	66.1	96.9	64.2

Leq Average 24 hrs. (dB(A)) 67.7
Lmax (dB(A)) 96.9
L90 (dB(A)) 66.2
Ldn (dB(A)) 74.5
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkoch
Scientist (3)

Approved by

Supot S

Supot Salamteh
Section Head

ภาคผนวก ค-4

คุณภาพน้ำทิ้ง



Analysis / Test Report

TESTING

No.0042

Lot ID: 2474518

Date Received : Jul 10, 2024

Date Reported : Jul 17, 2024

Report Number : 3039301-1

Client : Kiriu (Thailand) Co., Ltd.

300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231110507

Project Name : Monitoring

Project Location :

Page 1 of 2

Sample Number	2474518-1
Sampled Date	Jul 10, 2024 9:30 AM
Sample Description	Wastewater
Location	Effluent (เก็บตัวอย่างพร้อมการนิคม)
Date Analysis Commenced	Jul 10, 2024
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	59.7	≤500	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	135	≤750	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	37	≤600	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	35	≤600	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C		-	-	7.7	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	360	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	32	≤200	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.029/2567 : General Standards for Wastewater drainage into central wastewater treatment systems in Industrial Estates.

Sampling By : Tanasit Wongsachai ทะเบียนเลขที่ ว-323-จ-9460

Remark :

Technical Management

Photchana S.

Photchana Seeda

Scientist (4)

ทะเบียนเลขที่ ว-323-จ-9446

Approved by

D. Changchon.

Dej Changchon

Senior Manager

ทะเบียนเลขที่ ว-323-ค-9442

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory.
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Analysis / Test Report

Client : Kiriu (Thailand) Co., Ltd.

300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231110507

Project Name : Monitoring

Project Location :

TESTING

No.0042

Lot ID: 2474518

Date Received : Jul 10, 2024

Date Reported : Jul 17, 2024

Report Number : 3039301-1

Page 2 of 2

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- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Photchana S.

Photchana Seeda

Scientist (4)

ทะเบียนเลขที่ ว-323-จ-9446

Approved by

D. Changchon.

Dej Changchon

Senior Manager

ทะเบียนเลขที่ ว-323-ค-9442

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Analysis / Test Report

TESTING

No.0042

Lot ID: 2485891

Date Received : Aug 09, 2024

Date Reported : Aug 16, 2024

Report Number : 3066410-1

Client : Kiriu (Thailand) Co., Ltd.

300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231110507

Project Name : Monitoring

Project Location :

Page 1 of 2

Sample Number	2485891-1
Sampled Date	Aug 09, 2024 1:43 PM
Sample Description	Wastewater
Location	Effluent (เก็บตัวอย่างพร้อมการนิคม)
Date Analysis Commenced	Aug 09, 2024
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	73.8	≤500	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	166	≤750	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	39	≤600	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	39	≤600	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	6	≤10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C		-	-	7.4	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	356	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	43	≤200	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.029/2567 : General Standards for Wastewater drainage into central wastewater treatment systems in Industrial Estates.

Sampling By : Narunat thammasaro ทะเบียนเลขที่ ว-323-จ-9477

Remark :

Technical Management

Photchana S.

Photchana Seeda

Scientist (4)

ทะเบียนเลขที่ ว-323-จ-9446

Approved by

D. Changchon.

Dej Changchon

Senior Manager

ทะเบียนเลขที่ ว-323-ค-9442

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Analysis / Test Report

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231110507
Project Name : Monitoring
Project Location :

TESTING
No.0042
Lot ID: 2485891
Date Received : Aug 09, 2024
Date Reported : Aug 16, 2024
Report Number : 3066410-1

Page 2 of 2

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Technical Management

Photchana S.

Photchana Seeda
Scientist (4)

ทะเบียนเลขที่ ว-323-จ-9446

Approved by

D. Chumson.

Dej Changchon
Senior Manager

ทะเบียนเลขที่ ว-323-ค-9442

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Analysis / Test Report

TESTING

No.0042

Lot ID: 24100194

Date Received : Sep 12, 2024

Date Reported : Sep 19, 2024

Report Number : 3096356-1

Client : Kiriu (Thailand) Co., Ltd.

300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231110507

Project Name : Monitoring

Project Location :

Page 1 of 2

Sample Number	24100194-1						
Sampled Date	Sep 12, 2024 9:50 AM						
Sample Description	Wastewater						
Location	Effluent (เก็บตัวอย่างพร้อมการนิคม)						
Date Analysis Commenced	Sep 12, 2024						
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	106	≤500	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	294	≤750	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	87	≤600	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	86	≤600	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	10	≤10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C		-	-	8.0	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	312	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	57	≤200	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.029/2567 : General Standards for Wastewater drainage into central wastewater treatment systems in Industrial Estates.

Sampling By : Warunyoo Chimphalee ทะเบียนเลขที่ ว-323-จ-0020

Remark :

Technical Management

Photchana S.

Photchana Seeda

Scientist (4)

ทะเบียนเลขที่ ว-323-จ-0028

Approved by

D. Changchon.

Dej Changchon

Senior Manager

ทะเบียนเลขที่ ว-323-ค-0001

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300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231110507

Project Name : Monitoring

Project Location :

TESTING

No.0042

Lot ID: 24100194

Date Received : Sep 12, 2024

Date Reported : Sep 19, 2024

Report Number : 3096356-1

Page 2 of 2

- LOD : Limit of Detection
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Technical Management

Photchana S.

Photchana Seeda

Scientist (4)

ทะเบียนเลขที่ ว-323-จ-0028

Approved by

D. Changchon.

Dej Changchon

Senior Manager

ทะเบียนเลขที่ ว-323-ค-0001

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Analysis / Test Report

TESTING

No.0042

Lot ID: 24105573

Date Received : Oct 08, 2024

Date Reported : Oct 15, 2024

Report Number : 3109155-1

Client : Kiriu (Thailand) Co., Ltd.

300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231110507

Project Name : Monitoring

Project Location :

Page 1 of 2

Sample Number	24105573-1						
Sampled Date	Oct 08, 2024 10:50 AM						
Sample Description	Wastewater						
Location	Effluent (เก็บตัวอย่างพร้อมการนิคม)						
Date Analysis Commenced	Oct 08, 2024						
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	119	≤500	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	298	≤750	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	41	≤600	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	40	≤600	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	7	≤10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5520 B	Rayong
pH at 25 degree C		-	-	7.4	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 4500 - H (B)	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	256	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	85	≤200	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2540 D	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.029/2567 : General Standards for Wastewater drainage into central wastewater treatment systems in Industrial Estates.

Sampling By : Amonwich Wongsachai ทะเบียนเลขที่ ว-323-จ-0040

Remark :

Technical Management

Photchana S.

Photchana Seeda

Scientist (4)

ทะเบียนเลขที่ ว-323-จ-0028

Approved by

D. Changchon.

Dej Changchon

Senior Manager

ทะเบียนเลขที่ ว-323-ค-0001

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Analysis / Test Report

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231110507
Project Name : Monitoring
Project Location :

TESTING
No.0042
Lot ID: 24105573
Date Received : Oct 08, 2024
Date Reported : Oct 15, 2024
Report Number : 3109155-1

Page 2 of 2

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Technical Management

Photchana S.

Photchana Seeda
Scientist (4)

ทะเบียนเลขที่ ว-323-จ-0028

Approved by

D. Changchon.

Dej Changchon
Senior Manager

ทะเบียนเลขที่ ว-323-ค-0001

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Analysis / Test Report

TESTING

No.0042

Lot ID: 24116569

Date Received : Nov 07, 2024

Date Reported : Nov 14, 2024

Report Number : 3133555-1

Client : Kiriu (Thailand) Co., Ltd.

300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231110507

Project Name : Monitoring

Project Location :

Page 1 of 2

Sample Number	24116569-1
Sampled Date	Nov 07, 2024 11:00 AM
Sample Description	Wastewater
Location	Effluent (เก็บตัวอย่างพร้อมการนิคม)
Date Analysis Commenced	Nov 07, 2024
Condition of Sample	Contained in one amber glass bottle and three plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	169	≤500	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	298	≤750	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	139	≤600	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	136	≤600	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	14	≤10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5520 B	Rayong
pH at 25 degree C		-	-	7.7	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 4500 - H (B)	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	436	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	55	≤200	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2540 D	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.029/2567 : General Standards for Wastewater drainage into central wastewater treatment systems in Industrial Estates.

Sampling By : Warunyoo Chimphalee ทะเบียนเลขที่ ว-323-จ-0020

Remark :

Technical Management

Photchana S.

Photchana Seeda

Scientist (4)

ทะเบียนเลขที่ ว-323-จ-0028

Approved by

D. Changchon.

Dej Changchon

Senior Manager

ทะเบียนเลขที่ ว-323-ค-0001

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Analysis / Test Report

Client : Kiriu (Thailand) Co., Ltd.

300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231110507

Project Name : Monitoring

Project Location :

TESTING

No.0042

Lot ID: 24116569

Date Received : Nov 07, 2024

Date Reported : Nov 14, 2024

Report Number : 3133555-1

Page 2 of 2

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Technical Management

Photchana S.

Photchana Seeda

Scientist (4)

ทะเบียนเลขที่ ว-323-จ-0028

Approved by

D. Changchon.

Dej Changchon

Senior Manager

ทะเบียนเลขที่ ว-323-ค-0001

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Analysis / Test Report

TESTING

No.0042

Lot ID: 24132423

Date Received : Dec 03, 2024

Date Reported : Dec 11, 2024

Report Number : 3172525-1

Client : Kiriu (Thailand) Co., Ltd.

300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231110507

Project Name : Monitoring

Project Location :

Page 1 of 2

Sample Number	24132423-1						
Sampled Date	Dec 03, 2024 10:44 AM						
Sample Description	Wastewater						
Location	Effluent (เก็บตัวอย่างพร้อมการนิคม)						
Date Analysis Commenced	Dec 03, 2024						
Condition of Sample	Contained in one amber glass bottle and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	43.2	≤500	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	173	≤750	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	67	≤600	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	65	≤600	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5520 B	Rayong
pH at 25 degree C		-	-	8.2	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 4500 - H (B)	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	468	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	47	≤200	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2540 D	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.029/2567 : General Standards for Wastewater drainage into central wastewater treatment systems in Industrial Estates.

Sampling By : Wasan Kinunti ทะเบียนเลขที่ ว-323-จ-0019

Remark :

Technical Management

Photchana S.

Photchana Seeda

Scientist (4)

ทะเบียนเลขที่ ว-323-จ-0028

Approved by

D. Chongchon.

Dej Changchon

Senior Manager

ทะเบียนเลขที่ ว-323-ค-0001

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Analysis / Test Report

Client : Kiriu (Thailand) Co., Ltd.

300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231110507

Project Name : Monitoring

Project Location :

TESTING

No.0042

Lot ID: 24132423

Date Received : Dec 03, 2024

Date Reported : Dec 11, 2024

Report Number : 3172525-1

Page 2 of 2

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Technical Management

Photchana S.

Photchana Seeda

Scientist (4)

ทะเบียนเลขที่ ว-323-จ-0028

Approved by

D. Changchon.

Dej Changchon

Senior Manager

ทะเบียนเลขที่ ว-323-ค-0001

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ระดับความร้อนในสถานที่ทำงาน



Analysis / Test Report

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2493537

Date Received : Aug 28, 2024

Date Reported : Aug 31, 2024

Report Number: 3082780-1

Page 1 of 4

Sample Number 2493537-1
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Aug 27, 2024
Measurement by Supot Salamteh
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
พื้นที่เดาหลอม รง.1 (H3)	120	29.0	27.4	32.8	32.7
Average (WBGT)		29.0			
Guideline WBGT (°C)		32.0			

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


Supot Salamteh
Section Head

Approved by


Wichan Choonharat
Assistant Manager

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Analysis / Test Report

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2493537

Date Received : Aug 28, 2024

Date Reported : Aug 31, 2024

Report Number: 3082780-1

Page 2 of 4

Sample Number 2493537-2
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Aug 27, 2024
Measurement by Supot Salamteh
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
พื้นที่เดาหลอม รง.2 (H4)	120	29.1	27.6	32.7	32.7
Average (WBGT)		29.1			
Guideline WBGT (°C)		32.0			

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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P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2493537

Date Received : Aug 28, 2024

Date Reported : Aug 31, 2024

Report Number: 3082780-1

Page 3 of 4

Sample Number 2493537-3
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Aug 27, 2024
Measurement by Supot Salamteh
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
พื้นที่ทำไสแบบ Shell core รง.1 (H1)	120	30.1	28.5	33.7	33.4
Average (WBGT)		30.1			
Guideline WBGT (°C)		32.0			

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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Client : Kiriu (Thailand) Co., Ltd.
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P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2493537

Date Received : Aug 28, 2024

Date Reported : Aug 31, 2024

Report Number: 3082780-1

Page 4 of 4

Sample Number 2493537-4
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Aug 27, 2024
Measurement by Supot Salamteh
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
พื้นที่ทำไสแบบ Shell core รง.2 (H2)	120	30.8	28.8	35.4	35.4
Average (WBGT)		30.8			
Guideline WBGT (°C)		32.0			

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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Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 24129327
Date Received : Nov 21, 2024
Date Reported : Nov 29, 2024
Report Number: 3163607-1

Page 1 of 4

Sample Number 24129327-1
Parameter Heat Stress (Sampling Time : 09.00 AM - 11.00 PM)
Measurement Date Nov 20, 2024
Measurement by Tinnakorn Kumpasee
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
พื้นที่เดาหลอม รง.1 (H3)	120	30.6	28.5	35.5	35.4
Average (WBGT)		30.6			
Guideline WBGT (°C)		32.0			

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

Note:

This Analysis test report is reissued to supersede report No.3163607_1, Date Reported : Nov 27, 2024 due to revise analytical information.

Technical Management


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P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 24129327
Date Received : Nov 21, 2024
Date Reported : Nov 29, 2024
Report Number: 3163607-1

Page 2 of 4

Sample Number 24129327-2
Parameter Heat Stress (Sampling Time : 09.00 AM - 11.00 PM)
Measurement Date Nov 20, 2024
Measurement by Tinnakorn Kumpasee
Location ปฏิบัติงาน พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : แผนก :)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
พื้นที่เดาหลอม รง.2 (H4)	120	30.3	27.9	35.8	34.6
Average (WBGT)		30.3			
Guideline WBGT (°C)		32.0			

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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Note:

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P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 24129327
Date Received : Nov 21, 2024
Date Reported : Nov 29, 2024
Report Number: 3163607-1

Page 3 of 4

Sample Number 24129327-3
Parameter Heat Stress (Sampling Time : 09.00 AM - 11.00 PM)
Measurement Date Nov 20, 2024
Measurement by Tinnakorn Kumpasee
Location ปฏิบัติงาน พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : แผนก :)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
พื้นที่ทำไส้แบบ Shell core รง.1 (H1)	120	30.0	28.7	32.9	32.8
Average (WBGT)		30.0			
Guideline WBGT (°C)		32.0			

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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P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 24129327
Date Received : Nov 21, 2024
Date Reported : Nov 29, 2024
Report Number: 3163607-1

Page 4 of 4

Sample Number 24129327-4
Parameter Heat Stress (Sampling Time : 09.00 AM - 11.00 PM)
Measurement Date Nov 20, 2024
Measurement by Tinnakorn Kumpasee
Location ปฏิบัติงาน พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : แผนก :)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
พื้นที่ทำไส้แบบ Shell core รง.2 (H2)	120	31.2	28.6	37.1	36.6
Average (WBGT)		31.2			
Guideline WBGT (°C)		32.0			

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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Note:

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คุณภาพอากาศในสถานประกอบการ



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ANALYSIS REPORT

CUSTOMER NAME : KIRIU (THAILAND) CO.,LTD
ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เดาหลอมโรงงาน 1 (D1)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 08:00-12:00 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082479
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เดาหลอมโรงงาน 1 (D1) T24AT757-0001
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

Budsakorn ✓

(MISS BUDSAKORN LERDPANUMAS)
LABORATORY SUPERVISOR

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เดาหลอมโรงงาน 1 (D1)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 08:02-12:02 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082480
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เดาหลอมโรงงาน 1 (D1) (คุณกฤษฎา ศรีดาสอน) T24AT757-0002
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เตาหลอมโรงงาน 2 (D2)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 08:05-12:05 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082481
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เตาหลอมโรงงาน 2 (D2) T24AT757-0003
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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SAMPLING SOURCE : พื้นที่เตาหลอมโรงงาน 2 (D2)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 08:07-12:07 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082482
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0004

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เตาหลอมโรงงาน 2 (D2) (คุณวัชรารัฐ ศรีพิกุล) T24AT757-0004
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ANALYSIS REPORT

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เตรียมแบบทรายโรงงาน 1 (D5)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 08:10-12:10 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082483
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เตรียมแบบทรายโรงงาน 1 (D5) T24AT757-0005
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ANALYSIS REPORT

CUSTOMER NAME : KIRIU (THAILAND) CO.,LTD
ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เตรียมแบบทรายโรงงาน 1 (D5)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 08:12-12:12 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082484
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0006

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เตรียมแบบทรายโรงงาน 1 (D5) (คุณารุต นาคูเจริญชัย) T24AT757-0006
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เตรียมแบบทรายโรงงาน 2 (D6)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 08:15-12:15 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082485
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0007

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เตรียมแบบทรายโรงงาน 2 (D6) T24AT757-0007
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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SAMPLING SOURCE : พื้นที่เตรียมแบบทรายโรงงาน 2 (D6)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 08:16-12:16 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082486
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0008

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เตรียมแบบทรายโรงงาน 2 (D6) (คุณศักดิ์ลา สิวพรรค) T24AT757-0008
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เคาะแบบชิ้นงานโรงงาน 1 (D3)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 08:20-12:20 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082487
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0009

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เคาะแบบชิ้นงานโรงงาน 1 (D3) T24AT757-0009
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เคาะแบบชิ้นงานโรงงาน 1 (D3)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 08:22-12:22 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082488
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0010

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เคาะแบบชิ้นงานโรงงาน 1 (D3) (คุณวรยุทธ แสนกุล) T24AT757-0010
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เคาะแบบชิ้นงานโรงงาน 2 (D4)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 08:24-12:24 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082489
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0011

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เคาะแบบชิ้นงานโรงงาน 2 (D4) T24AT757-0011
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เคาะแบบชิ้นงานโรงงาน 2 (D4)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 08:25-12:25 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082490
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0012

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เคาะแบบชิ้นงานโรงงาน 2 (D4) (ตุลเชุเกียรติ โกมลนพร) T24AT757-0012
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ANALYSIS REPORT

CUSTOMER NAME : KIRIU (THAILAND) CO.,LTD
ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ GRINDING (D7) (BARINDER)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 13:00-17:00 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082491
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0013

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ GRINDING (D7) (BARINDER) T24AT757-0013
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ GRINDING (D7) (BARINDER)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 13:01-17:01 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082492
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0014

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ GRINDING (D7) (BARINDER) (คุณศักดิ์กร เลิศปานumas) T24AT757-0014
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CUSTOMER NAME : KIRIU (THAILAND) CO.,LTD
ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ DRUMBLAST NO.1 (D8)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 13:04-17:04 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082493
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0015

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ DRUMBLAST NO.1 (D8) T24AT757-0015
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ DRUMBLAST NO.1 (D8)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 13:05-17:05 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082494
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0016

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ DRUMBLAST NO.1 (D8) (ชุดการันตี มยผ.) T24AT757-0016
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ SHOT BLAST NO.1&2 (D9)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 13:08-17:08 HOUR
SAMPLING BY : MR. BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082495
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0017

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ SHOT BLAST NO.1&2 (D9) T24AT757-0017
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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SAMPLING SOURCE : พื้นที่บริเวณ SHOT BLAST NO.1&2 (D9)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 13:09-17:09 HOUR
SAMPLING BY : MR. BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082496
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0018

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ SHOT BLAST NO.1&2 (D9) (คุณอรทัย คำสละรัง) T24AT757-0018
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ANALYSIS REPORT

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ APRON FINSHING 1 (D10)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 13:12-17:12 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082497
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0019

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ APRON FINSHING 1 (D10) T24AT757-0019
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ APRON FINSHING 1 (D10)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 13:13-17:13 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082498
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0020

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ APRON FINSHING 1 (D10) (จุดตรวจวัด สำรอกใจ) T24AT757-0020
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ APRON FINSHING 2 (D11)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 13:18-17:18 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082499
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0021

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ APRON FINSHING 2 (D11) T24AT757-0021
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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SAMPLING SOURCE : พื้นที่บริเวณ APRON FINSHING 2 (D11)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : AUGUST 28, 2024
SAMPLING TIME : 13:19-17:19 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : AUGUST 29, 2024
ANALYTICAL DATE : AUGUST 29 - SEPTEMBER 4, 2024
ISSUE DATE : SEPTEMBER 6, 2024
REPORT NO. : 2024-U082500
WORK NO. : 2023-010094
ANALYSIS NO. : T24AT757-0022

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ APRON FINSHING 2 (D11) (ผลการพินิจ การตรวจ) T24AT757-0022
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เตาหลอมโรงงาน 1 (D1)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 08:33-12:33 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113787
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เตาหลอมโรงงาน 1 (D1) T24BB984-0001
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เตาหลอมโรงงาน 1 (D1)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 08:34-12:34 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113788
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เตาหลอมโรงงาน 1 (D1) (คุณเจษฎา วรรณภาส) T24BB984-0002
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เดาหลอมโรงงาน 2 (D2)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 08:46-12:46 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113789
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เดาหลอมโรงงาน 2 (D2) T24BB984-0003
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เดาหลอมโรงงาน 2 (D2)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 08:47-12:47 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113790
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0004

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เดาหลอมโรงงาน 2 (D2) (คุณบุญเย็น โพธิ์กุล) T24BB984-0004
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CUSTOMER NAME : KIRIU (THAILAND) CO.,LTD
ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เตรียมแบบทราจโรงงาน 1 (D5)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 08:30-12:30 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113791
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เตรียมแบบทราจโรงงาน 1 (D5) T24BB984-0005
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เตรียมแบบทราจโรงงาน 1 (D5)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 08:31-12:31 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113792
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0006

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เตรียมแบบทราจโรงงาน 1 (D5) (อุณหภูมิห้อง แกรวม) T24BB984-0006
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เตรียมแบบทราจโรงงาน 2 (D6)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 08:43-12:43 HOUR
SAMPLING BY : MR. BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113793
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0007

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เตรียมแบบทราจโรงงาน 2 (D6) T24BB984-0007
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เตรียมแบบทราจโรงงาน 2 (D6)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 08:44-12:44 HOUR
SAMPLING BY : MR. BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113794
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0008

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เตรียมแบบทราจโรงงาน 2 (D6) (คุณวันชัย วงศ์เตส) T24BB984-0008
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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(MISS BUDSAKORN LERDPANUMAS)
LABORATORY SUPERVISOR

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ANALYSIS REPORT

CUSTOMER NAME : KIRIU (THAILAND) CO.,LTD
ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เคาะแบบขี้นงานโรงงาน 1 (D3)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 13:00-17:00 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113795
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0009

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เคาะแบบขี้นงานโรงงาน 1 (D3) T24BB984-0009
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เคาะแบบขี้นงานโรงงาน 1 (D3)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 13:01-17:01 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113796
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0010

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เคาะแบบขี้นงานโรงงาน 1 (D3) (คุณเชี่ยชนะ พาลจันทร์) T24BB984-0010
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CUSTOMER NAME : KIRIU (THAILAND) CO.,LTD
ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เคาะแบบขี้นงานโรงงาน 2 (D4)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 08:40-12:40 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113798
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0011

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เคาะแบบขี้นงานโรงงาน 2 (D4) T24BB984-0011
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่เคาะแบบขี้นงานโรงงาน 2 (D4)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 08:41-12:41 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113800
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0012

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่เคาะแบบขี้นงานโรงงาน 2 (D4) (คลุมเชื้ม พลซา) T24BB984-0012
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นพื้นบริเวณ GRINDING (D7) (BARINDER)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 13:12-17:12 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113802
WORK NO. : 2023-010094
ANALYSIS NO. : T248B984-0013

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นพื้นบริเวณ GRINDING (D7) (BARINDER) T248B984-0013
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CUSTOMER NAME : KIRIU (THAILAND) CO.,LTD
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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นพื้นบริเวณ GRINDING (D7) (BARINDER)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 13:13-17:13 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113803
WORK NO. : 2023-010094
ANALYSIS NO. : T248B984-0014

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นพื้นบริเวณ GRINDING (D7) (BARINDER) (จุดตรวจจุดสำรวจ) T248B984-0014
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ DRUMBLAST NO.1 (D8)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 13:09-17:09 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113804
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0015

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ DRUMBLAST NO.1 (D8) T24BB984-0015
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ DRUMBLAST NO.1 (D8)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 13:10-17:10 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113805
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0016

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ DRUMBLAST NO.1 (D8) (จุดวิเคราะห์ แสงทอ) T24BB984-0016
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ SHOT BLAST NO.1&2 (D9)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 13:06-17:06 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113806
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0017

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ SHOT BLAST NO.1&2 (D9) T24BB984-0017
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ SHOT BLAST NO.1&2 (D9)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 13:07-17:07 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113807
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0018

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ SHOT BLAST NO.1&2 (D9) (ชุดเอทึม ค่าเฉลี่ย) T24BB984-0018
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ APRON FINSHING 1 (D10)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 13:03-17:03 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113808
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0019

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ APRON FINSHING 1 (D10) T24BB984-0019
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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SAMPLING SOURCE : พื้นที่บริเวณ APRON FINSHING 1 (D10)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 13:04-17:04 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT

RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113809
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0020

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ APRON FINSHING 1 (D10) (จุดการรับมี นกขี้จิ้ง) T24BB984-0020
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ APRON FINSHING 2 (D11)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 08:37-12:37 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113811
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0021

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ APRON FINSHING 2 (D11) T24BB984-0021
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

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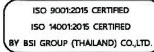
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ADDRESS : 300/37 TA SIT PLUAK DAENG RAYONG 21140
CONTACT INFORMATION : TEL : 08 5024 0558 e-mail : k-supapan@kiriuthailand.com
SAMPLING SOURCE : พื้นที่บริเวณ APRON FINSHING 2 (D11)
SAMPLE TYPE : WORKPLACE
SAMPLING DATE : NOVEMBER 27, 2024
SAMPLING TIME : 08:38-12:38 HOUR
SAMPLING BY : MR BOONYARIT KONSIN
ANALYZED BY : MISS JETJARIN TUMSA-AT
RECEIVED DATE : NOVEMBER 28, 2024
ANALYTICAL DATE : NOVEMBER 28 - DECEMBER 2, 2024
ISSUE DATE : DECEMBER 4, 2024
REPORT NO. : 2024-U113812
WORK NO. : 2023-010094
ANALYSIS NO. : T24BB984-0022

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT
			พื้นที่บริเวณ APRON FINSHING 2 (D11) (คุณเชษฐเกียรติ โกมินทร์) T24BB984-0022
SILICA (QUARTZ)	mg/m ³	VISIBLE ABSORPTION SPECTROPHOTOMETRIC METHOD (NIOSH METHOD 7601)	< 0.01
SAMPLE CONDITION			COMPLETE

REMARK
RESULT : REFERENCE CONDITION IS 25 DEGREE CELSIUS AT 1 ATMOSPHERE.

Budsakorn ✓
(MISS BUDSAKORN LERDPANUMAS)
LABORATORY SUPERVISOR



• PROHIBITED TO PARTIALLY COPY ANALYSIS REPORT PRIOR TO WRITTEN PERMISSION BY THE LABORATORY.
• THIS ANALYSIS REPORT APPROVES ONLY FOR THE SAMPLES AS RECEIVED.



ภาคผนวก ค-7

ระดับเสียงในสถานที่ทำงาน



Analysis / Test Report

Client : Kiri (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140

P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2493538

Date Received : Aug 28, 2024

Date Reported : Aug 30, 2024

Report Number: 3097511-1

Page 1 of 1

Sample Number 2493538-1
Parameter Noise (Leq 8 hrs.)
Location พื้นที่เดาหลอม รง.1 (N3)
Measurement Date Aug 27, 2024
Measurement by Sawai Tonpho

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	86.1	103.7	78.0
10:00 AM - 11:00 AM	88.8	108.7	76.7
11:00 AM - 12:00 PM	82.4	102.7	76.6
12:00 PM - 01:00 PM	85.8	104.8	77.9
01:00 PM - 02:00 PM	88.6	108.2	78.4
02:00 PM - 03:00 PM	84.7	104.5	77.2
03:00 PM - 04:00 PM	85.8	104.1	78.0
04:00 PM - 05:00 PM	89.0	109.2	80.5

Leq Average 8 hrs. (dB(A))

86.9

Lmax (dB(A))

109.2

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
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Chonticha Subongkoch
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Supot Salamteh
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300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2493538

Date Received : Aug 28, 2024
Date Reported : Aug 30, 2024
Report Number: 3097512-1

Page 1 of 1

Sample Number 2493538-2
Parameter Noise (Leq 8 hrs.)
Location พื้นที่เดาหลอม รง.2 (N4)
Measurement Date Aug 27, 2024
Measurement by Sawai Tonpho

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	89.0	111.4	80.8
10:00 AM - 11:00 AM	85.6	102.7	81.3
11:00 AM - 12:00 PM	87.9	109.8	80.3
12:00 PM - 01:00 PM	86.1	111.0	80.0
01:00 PM - 02:00 PM	87.7	102.5	82.5
02:00 PM - 03:00 PM	88.6	111.3	81.9
03:00 PM - 04:00 PM	86.9	109.9	82.3
04:00 PM - 05:00 PM	87.4	102.2	82.1

Leq Average 8 hrs. (dB(A)) 87.5
Lmax (dB(A)) 111.4
Standard (dB(A)) 90
Reference Method : ISO1996-1 and 1996-2
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
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P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2493538

Date Received : Aug 28, 2024

Date Reported : Aug 30, 2024

Report Number: 3097513-1

Page 1 of 1

Sample Number 2493538-3
Parameter Noise (Leq 8 hrs.)
Location พื้นที่ผสมทราย รง.1 (N1)
Measurement Date Aug 27, 2024
Measurement by Sawai Tonpho

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	83.4	91.5	80.0
10:00 AM - 11:00 AM	83.3	91.0	79.4
11:00 AM - 12:00 PM	83.9	91.9	80.4
12:00 PM - 01:00 PM	85.1	91.9	82.0
01:00 PM - 02:00 PM	83.4	90.2	80.4
02:00 PM - 03:00 PM	84.8	91.0	81.2
03:00 PM - 04:00 PM	84.4	95.7	80.3
04:00 PM - 05:00 PM	83.5	88.7	80.6

Leq Average 8 hrs. (dB(A))

84.0

Lmax (dB(A))

95.7

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
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P/O : PO231210109

Project Name : Monitoring

Project Location :

Lot ID: 2493538

Date Received : Aug 28, 2024

Date Reported : Aug 30, 2024

Report Number: 3097514-1

Page 1 of 1

Sample Number 2493538-4
Parameter Noise (Leq 8 hrs.)
Location พื้นที่ผสมทราย รง.2 (N2)
Measurement Date Aug 27, 2024
Measurement by Sawai Tonpho

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	84.7	95.4	82.5
10:00 AM - 11:00 AM	83.5	90.4	81.8
11:00 AM - 12:00 PM	83.6	91.1	81.9
12:00 PM - 01:00 PM	84.3	92.5	82.6
01:00 PM - 02:00 PM	84.3	93.7	82.0
02:00 PM - 03:00 PM	83.2	91.6	79.9
03:00 PM - 04:00 PM	84.3	92.3	82.7
04:00 PM - 05:00 PM	84.5	95.5	82.8

Leq Average 8 hrs. (dB(A))

84.1

Lmax (dB(A))

95.5

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
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P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2493538

Date Received : Aug 28, 2024
Date Reported : Aug 30, 2024
Report Number: 3097515-1

Page 1 of 1

Sample Number 2493538-5
Parameter Noise (Leq 8 hrs.)
Location พื้นที่เคาะแบบขึ้นงาน รง.1 (N5)
Measurement Date Aug 27, 2024
Measurement by Sawai Tonpho

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	89.1	102.7	82.5
10:00 AM - 11:00 AM	85.4	99.5	81.8
11:00 AM - 12:00 PM	85.4	98.9	79.2
12:00 PM - 01:00 PM	87.4	100.9	81.2
01:00 PM - 02:00 PM	87.3	103.7	80.1
02:00 PM - 03:00 PM	87.9	104.3	80.7
03:00 PM - 04:00 PM	86.9	95.4	84.0
04:00 PM - 05:00 PM	86.1	94.6	83.2

Leq Average 8 hrs. (dB(A))

87.1

Lmax (dB(A))

104.3

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
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P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 2493538

Date Received : Aug 28, 2024
Date Reported : Aug 30, 2024
Report Number: 3097516-1

Page 1 of 1

Sample Number 2493538-6
Parameter Noise (Leq 8 hrs.)
Location พื้นที่เคาะแบบขึ้นงาน รง.2 (N6)
Measurement Date Aug 27, 2024
Measurement by Sawai Tonpho

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	89.6	103.1	87.9
10:00 AM - 11:00 AM	89.2	102.7	87.5
11:00 AM - 12:00 PM	89.8	103.3	88.1
12:00 PM - 01:00 PM	90.0	103.5	88.3
01:00 PM - 02:00 PM	90.2	103.7	88.5
02:00 PM - 03:00 PM	89.9	106.5	85.6
03:00 PM - 04:00 PM	92.0	101.8	89.5
04:00 PM - 05:00 PM	93.0	104.5	89.4

Leq Average 8 hrs. (dB(A))

90.7

Lmax (dB(A))

106.5

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
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P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 24129332

Date Received : Nov 21, 2024

Date Reported : Nov 27, 2024

Report Number: 3178132-1

Page 1 of 1

Sample Number 24129332-1
Parameter Noise (Leq 8 hrs.)
Location พื้นที่เดาหลอม รง.1 (N3)
Measurement Date Nov 20, 2024
Measurement by Tinnakorn Kumpasee

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:13 AM - 10:13 AM	86.8	105.7	78.0
10:13 AM - 11:13 AM	89.7	109.1	77.8
11:13 AM - 12:13 PM	82.5	109.3	75.0
12:13 PM - 01:13 PM	84.9	103.3	78.1
01:13 PM - 02:13 PM	86.9	107.0	78.3
02:13 PM - 03:13 PM	86.2	106.7	76.4
03:13 PM - 04:13 PM	77.4	90.9	69.7
04:13 PM - 05:13 PM	70.1	87.5	68.7

Leq Average 8 hrs. (dB(A))

85.5

Lmax (dB(A))

109.3

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรฐานการคุ้มครองความปลอดภัย
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P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 24129332

Date Received : Nov 21, 2024
Date Reported : Nov 27, 2024
Report Number: 3178133-1

Page 1 of 1

Sample Number 24129332-2
Parameter Noise (Leq 8 hrs.)
Location พื้นที่เดาหลอม รง.2 (N4)
Measurement Date Nov 20, 2024
Measurement by Tinnakorn Kumpasee

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:21 AM - 10:21 AM	88.7	105.3	83.8
10:21 AM - 11:21 AM	90.0	105.3	85.2
11:21 AM - 12:21 PM	88.0	103.9	83.6
12:21 PM - 01:21 PM	89.8	105.6	84.7
01:21 PM - 02:21 PM	89.6	99.8	83.9
02:21 PM - 03:21 PM	87.9	107.4	83.4
03:21 PM - 04:21 PM	89.4	106.2	83.7
04:21 PM - 05:21 PM	89.6	105.4	84.5

Leq Average 8 hrs. (dB(A))

89.2

Lmax (dB(A))

107.4

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
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P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 24129332

Date Received : Nov 21, 2024

Date Reported : Nov 27, 2024

Report Number: 3178134-1

Page 1 of 1

Sample Number 24129332-3
Parameter Noise (Leq 8 hrs.)
Location พื้นที่ผสมทราย รง.1 (N1)
Measurement Date Nov 20, 2024
Measurement by Tinnakorn Kumpasee

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:09 AM - 10:09 AM	84.5	89.4	82.4
10:09 AM - 11:09 AM	82.8	89.8	79.7
11:09 AM - 12:09 PM	84.3	91.4	82.1
12:09 PM - 01:09 PM	84.6	90.7	82.2
01:09 PM - 02:09 PM	83.9	89.6	80.6
02:09 PM - 03:09 PM	84.1	90.3	81.6
03:09 PM - 04:09 PM	84.4	94.1	81.0
04:09 PM - 05:09 PM	84.3	93.3	79.8

Leq Average 8 hrs. (dB(A))

84.1

Lmax (dB(A))

94.1

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
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P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 24129332

Date Received : Nov 21, 2024

Date Reported : Nov 27, 2024

Report Number: 3178135-1

Page 1 of 1

Sample Number 24129332-4
Parameter Noise (Leq 8 hrs.)
Location พื้นที่ผสมทราย รง.2 (N2)
Measurement Date Nov 20, 2024
Measurement by Tinnakorn Kumpasee

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:20 AM - 10:20 AM	83.6	93.3	81.9
10:20 AM - 11:20 AM	83.5	90.7	81.5
11:20 AM - 12:20 PM	84.2	97.2	81.7
12:20 PM - 01:20 PM	83.8	94.1	81.7
01:20 PM - 02:20 PM	83.9	96.1	81.5
02:20 PM - 03:20 PM	83.9	93.5	82.0
03:20 PM - 04:20 PM	83.9	95.2	81.8
04:20 PM - 05:20 PM	84.4	97.4	81.9

Leq Average 8 hrs. (dB(A))

83.9

Lmax (dB(A))

97.4

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรฐานการคุ้มครองความปลอดภัย
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P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 24129332

Date Received : Nov 21, 2024

Date Reported : Nov 27, 2024

Report Number: 3178136-1

Page 1 of 1

Sample Number 24129332-5
Parameter Noise (Leq 8 hrs.)
Location พื้นที่เคาะแบบขึ้นงาน รง.1 (N5)
Measurement Date Nov 20, 2024
Measurement by Tinnakorn Kumpasee

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:04 AM - 10:04 AM	89.9	101.6	88.2
10:04 AM - 11:04 AM	88.6	97.8	83.4
11:04 AM - 12:04 PM	83.5	98.4	79.1
12:04 PM - 01:04 PM	89.9	101.6	87.9
01:04 PM - 02:04 PM	89.8	103.0	88.5
02:04 PM - 03:04 PM	89.7	101.2	87.6
03:04 PM - 04:04 PM	89.4	98.1	87.2
04:04 PM - 05:04 PM	89.2	97.2	88.4

Leq Average 8 hrs. (dB(A))

89.1

Lmax (dB(A))

103.0

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๔๖

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Kiriu (Thailand) Co., Ltd.
300/37 Moo 1, T.Thasit, A.Pluakdaeng, Rayong Thailand 21140
P/O : PO231210109
Project Name : Monitoring
Project Location :

Lot ID: 24129332

Date Received : Nov 21, 2024

Date Reported : Nov 27, 2024

Report Number: 3178137-1

Page 1 of 1

Sample Number 24129332-6
Parameter Noise (Leq 8 hrs.)
Location พื้นที่เคาะแบบขึ้นงาน รง.2 (N6)
Measurement Date Nov 20, 2024
Measurement by Tinnakorn Kumpasee

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:25 AM - 10:25 AM	89.8	98.2	88.1
10:25 AM - 11:25 AM	89.7	96.9	88.3
11:25 AM - 12:25 PM	89.6	99.1	88.3
12:25 PM - 01:25 PM	89.9	98.5	88.2
01:25 PM - 02:25 PM	89.8	99.9	87.7
02:25 PM - 03:25 PM	89.8	100.1	88.2
03:25 PM - 04:25 PM	89.7	101.2	87.6
04:25 PM - 05:25 PM	89.7	96.9	88.3

Leq Average 8 hrs. (dB(A))

89.8

Lmax (dB(A))

101.2

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรฐานการคุ้มครองความปลอดภัย
ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๔๖

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Stack	Total Suspended Particulate	Console Control Unit	BKK_FS0468	10-Jul-24	10-Jan-25	6
Stack	Total Suspended Particulate	Console Control Unit	RYG_FS0315	10-Jul-24	10-Jan-25	6
Stack	Total Suspended Particulate	Console Control Unit	BKK_FS0556	10-Jul-24	10-Jan-25	6
Stack	Total Suspended Particulate	Pitot Tube	BKK_FS0473	10-Jul-24	10-Jan-25	6
Stack	Total Suspended Particulate	Pitot Tube	RYG_FS0321	10-Jul-24	10-Jan-25	6
Stack	Total Suspended Particulate	Pitot Tube	BKK_FS0561	10-Jul-24	10-Jan-25	6
Stack	Total Suspended Particulate	Flue gas Analyzer	RYG_FS0465	22-Feb-24	21-Feb-25	12
Stack	Total Suspended Particulate	Flue gas Analyzer	RYG_FS0464	8-Mar-24	7-Mar-25	12
Stack	Total Suspended Particulate	Flue gas Analyzer	RYG_FS0565	13-Nov-23	12-Nov-24	12
Stack	Total Suspended Particulate	Digital Balance	RYG_EN0003	22-Feb-24	22-Feb-25	12
Ambient	Total Suspended Particulate	High Volume	RYG_FS0664	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0394	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0393	-	-	On site Calibration
Ambient	Total Suspended Particulate	Digital Balance	RYG_EN0001	22-Feb-24	22-Feb-25	12
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0545	21-Jul-23	21-Jan-25	18
Noise	Leq 24 hrs	Sound Calibrator	RYG_FS0213	28-Feb-24	27-Feb-25	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0614	5-Jan-24	4-Jan-25	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0612	5-Jan-24	4-Jan-25	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0613	5-Jan-24	4-Jan-25	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0495	23-Feb-24	22-Feb-25	12
Noise	Leq 8 hrs	Sound Calibrator	RYG_FS0213	28-Feb-24	27-Feb-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0614	5-Jan-24	4-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0612	5-Jan-24	4-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0615	5-Jan-24	4-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0617	12-Jan-24	11-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0495	23-Feb-24	22-Feb-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0613	5-Jan-24	4-Jan-25	12
Noise	Leq 8 hrs	Sound Calibrator	RYG_FS0213	28-Feb-24	27-Feb-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0621	12-Jan-24	11-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0381	9-Oct-24	9-Oct-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0384	9-Oct-24	9-Oct-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0386	9-Oct-24	9-Oct-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0388	5-Jan-24	4-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0433	22-Feb-24	21-Feb-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0520	25-Jan-24	24-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0359	15-Jan-24	14-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0358	15-Jan-24	14-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0360	15-Jan-24	14-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0219	15-Feb-24	14-Feb-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0218	15-Feb-24	14-Feb-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0217	8-Jan-24	7-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0220	11-Jan-24	10-Jan-25	12
Rayong Lab	pH at 25 °C	pH meter	RYG_EN0183	19-Jan-24	19-Jul-25	18
Rayong Lab	Color (at Original pH)	Spectrophotometer	RYG_EN0037	18-Sep-23	18-Mar-25	18
Rayong Lab	Color (at pH 7.0)	Spectrophotometer	RYG_EN0037	18-Sep-23	18-Mar-25	18
Rayong Lab	BOD	DO meter with Sensor	RYG_EN0032	24-Jul-23	24-Jan-25	18
Rayong Lab	BOD	Incubator	RYG_EN0154	1-Nov-24	1-May-26	18
Rayong Lab	BOD	Burette	RYG_EN0216	24-Sep-24	24-Sep-25	12
Rayong Lab	COD	Spectrophotometer	RYG_EN0037	18-Sep-23	18-Mar-25	18
Rayong Lab	Total Suspended Solids	Electronic Balance	RYG_EN0002	22-Feb-24	22-Feb-25	12
Rayong Lab	Total Suspended Solids	Hot Air Oven	RYG_EN0010	21-Mar-24	21-Sep-25	18
Rayong Lab	Total Dissolved Solids 180°C	Electronic Balance	RYG_EN0002	22-Feb-24	22-Feb-25	12
Rayong Lab	Total Dissolved Solids 180°C	Hot Air Oven	RYG_EN0010	21-Mar-24	21-Sep-25	18
Rayong Lab	Oil & Grease	Electronic Balance	RYG_EN0002	22-Feb-24	22-Feb-25	12
Rayong Lab	Oil & Grease	Hot Air Oven	RYG_EN0213	21-Mar-24	21-Mar-25	12
Rayong Lab	Oil & Grease	Water Bath	RYG_EN0061	21-Mar-24	21-Sep-25	18



CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Calibration of Date : 10-Jul-24
Next Cal. Date : 10-Jan-25
Barometric Pressure (mmHg) : 749.1
Relative Humidity (%) : 46.2
Temperature (C°) : 33.8
Reference Dry Gas Meter Data
Calibration No. : C-100724-BKK_FS0468
Dry Gas Meter ID : BKK_FS0468
Serial No. : 1302005
Model No. : XC-572-V
Reference Dry Gas Meter ID : BKK_FS1122
Serial No. : A2003240
Correction Factor (Y) : 0.9824
Next Calibration Date : 7-Nov-24

ΔH (mm-H ₂ O)	Θ Minutes	Reference Dry Gas Meter Calibration						Console Control : Drygas Meter						Dry Gas Meter Correction Factor (Y)	Orifice Calibration Factor (Y)	Avg
		Vr (Liters)		Tr (°C)	Vm (Liters)		Ti (°C)	To (°C)	Avg.Im (°C)							
		Final	Initial		Final	Initial										
15	11.90	150.00	0.00	150.00	29.0	567698.0	148.00	29.0	29.0	29.0	0.9942	1.0033	43.8072			
25	8.90	150.00	0.00	150.00	31.0	567057.0	147.00	32.0	32.0	32.0	0.9941	1.0033	40.9751			
50	6.30	150.00	0.00	150.00	31.0	567208.0	148.00	32.0	32.0	32.0	0.9941	1.0031	41.0631			
80	4.94	150.00	0.00	150.00	31.0	567357.0	147.00	32.0	32.0	32.0	0.9979	1.0035	40.3985			
120	4.10	150.00	0.00	150.00	31.0	567507.0	147.00	33.0	33.0	33.0	0.9973	1.0033	41.6033			

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

ΔAvg : Orifice pressure differential that equates to 21.24 in of air @ 25 C and 760 mm of mercury, mmH₂O; tolerance for individual values ± 5.08 from average.

Procedure: 40 CFR 60 APP A METH. SEC.5.3 & 7

Calibrated by: Saksit Phaisanphist

(Mr. Saksit Phaisanphist)

RYG Field Service Scientist(4)

Approved by: Nattapon Jengwarewong

(Mr.Nattapol Jengwarewong)

RYG Field Service Specialist(1)

FORM NO. F 06-024 REVISION NO. 2 ISSUE DATE: 30 Jul 22



Stopwatch Calibration Test Report

Calibration Date : 10 Jul 24
Barometric Pressure (mmHg) : 749.1
Relative Humidity (%) : 46.2
Reference Stopwatch Data
Stopwatch ID No. : RYG_FS0540
Model : F808
Serial No. : E18061
Calibration Date : 4 Jul 24
Certificate No. : E-2407022
Next Cal. Date : 10 Jan 25
Temperature (°C) : 33.8
Console Control Meter Data
Dry Gas Meter No. : BKK_FS0468
Model : XC-572-V
Serial No. : 1302005

Run No.	Time Actual (m:ss.ms)	Time Reading (m:ss)	Diff. (ms)	Diff. (min)
1	5:00:04	5:00	3	0.00005
2	5:00:08	5:00	8	0.00013
3	5:00:07	5:00	7	0.00012
4	5:00:08	5:00	8	0.00013
5	5:00:06	5:00	6	0.00010
6	5:00:06	5:00	6	0.00010
7	5:00:06	5:00	6	0.00010
8	5:00:08	5:00	8	0.00013
9	5:00:07	5:00	7	0.00012
10	5:00:07	5:00	7	0.00012
Average			0.00011	
SD			0.00003	

Calibrate by :

Saksit Phaisanphist

Mr. Saksit Phaisanphist

RYG Field Service Scientist (4)

Approved by :

Nattapon Jengwarewong

Mr.Nattapol Jengwarewong

RYG Field Service Specialist (1)



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date : 10 Jul 24		Ambient Temperature (°C) 33.8			
Calibration sheet No. : C-100724-BKK_FS0469		Relative Humidity (%) : 46.2			
Digital Temperature ID : BKK_FS0469		Reference Temperature ID RYG_FS0681			
Serial No. : 1302005		Serial No. : 201090014918			
Model : XC-572-V		Model : Digicon-CC-VT-MS			
		Next Calibrate : 13 Nov 24			
Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass
	100	101	1	±3	Pass
	150	150	0	±3	Pass
	200	201	1	±3	Pass
	250	251	1	±3	Pass
Probe	300	301	1	±3	Pass
	500	501	1	±3	Pass
	100	101	1	±3	Pass
	120	121	1	±3	Pass
	140	141	1	±3	Pass
	100	101	1	±3	Pass
	120	121	1	±3	Pass
Oven	140	141	1	±3	Pass
	100	101	1	±3	Pass
	120	121	1	±3	Pass
Filter	140	141	1	±3	Pass
	100	101	1	±3	Pass
	120	121	1	±3	Pass
Exit	140	141	1	±3	Pass
	0	0	0	±3	Pass
	10	10	0	±3	Pass
Meter	20	20	0	±3	Pass
	0	0	0	±3	Pass
	25	25	0	±3	Pass
AUX	50	49	-1	±3	Pass
	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass

MPE : (Maximum permissible error of measurement) ค่าความผิดพลาดสูงสุดของภาวที่สอบวัด

Calibrated by :

Saksit Phaisanphist

(Mr. Saksit Phaisanphist)

RYG Field Service Scientist (4)

Approved by :

Nattapon Jengwarewong

(Mr.Nattapol Jengwarewong)

RYG Field Service Specialist (1)

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



PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

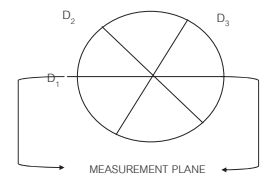
Calibration Date : 10 Jul 24		Nozzle Set ID. : BKK_FS0474			
Calibration Sheet No. : C-100724-BKK_FS0474		Vernier Caliper ID. : BKK_FS1123			
Nozzle ID #	Nozzle Diameter (cm.)			Hi - Lo	(D ₁ + D ₂ + D ₃) / 3
	D ₁	D ₂	D ₃	ΔD	D _{avg}
1	0.305	0.300	0.305	0.005	0.303
2	0.455	0.455	0.455	0.000	0.455
3	0.604	0.602	0.601	0.003	0.602
4	0.760	0.765	0.770	0.010	0.765
5	0.935	0.945	0.935	0.010	0.938
6	1.095	1.098	1.092	0.006	1.095
7	1.260	1.260	1.260	0.000	1.260
8	1.605	1.600	1.610	0.010	1.605

Where :

D₁, D₂, D₃ = There different nozzle diameters at 60 degrees to each other, each measured the nearest 0.025 mm.

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

D_{avg} = (D₁ + D₂ + D₃) / 3



Calibrated by : Saksit Phaisanphist

(Mr. Saksit Phaisanphist)

RYG Field Services Scientist (4)

Approved by : Nattapon Jengwarewong

(Mr.Nattapol Jengwarewong)

RYG Field Services Specialist

FORM NO. F 06-024 REVISION NO. 1 ISSUE DATE: 9-1-02



CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Calibration of Date : 10-Jul-24
Next Cal. Date : 10-Jan-25
Barometric Pressure (mmHg) : 752.4
Relative Humidity (%) : 64.0
Temperature (C°) : 29.2
Reference Dry Gas Meter Data
Calibration No. : C-100724-RYG_FS0315
Dry Gas Meter ID : RYG_FS0315
Serial No. : 1700091
Model No. : XC-572-V
Reference Dry Gas Meter ID : BKK_FS1122
Serial No. : A2003240
Correction Factor (Y) : 0.9824
Next Calibration Date : 7-Nov-24

ΔH (mm-H ₂ O)	Θ Minutes	Reference Dry Gas Meter Calibration				Console Control : Drygas Meter										Dry Gas Meter Correction Factor (Y)	Orifice Calibration Factor (Y)	ΔAvg
		Vr (Liters)		Tr (°C)	Vm (Liters)		Ti (°C)	To (°C)	Avg.Im									
		Final	Initial		Final	Initial			Total	Total	Total	Total	Total	Total				
15	12.60	150.00	0.00	150.00	26.0	2011497.0	2011345.0	29.0	152.00	29.0	29.0	29.0	29.0	29.0	0.9778	47.9305		
25	9.81	150.00	0.00	150.00	26.0	2011657.0	2011505.0	29.0	152.00	29.0	29.0	29.0	29.0	29.0	0.9768	48.4236		
50	6.86	150.00	0.00	150.00	26.0	2011816.0	2011665.0	29.0	151.00	29.0	29.0	29.0	29.0	29.0	0.9809	47.3595		
80	5.40	150.00	0.00	150.00	26.0	2011981.0	2011830.0	29.0	151.00	29.0	29.0	29.0	29.0	29.0	0.9760	46.9523		
120	4.43	150.00	0.00	150.00	26.0	2012141.0	2011990.0	29.0	151.00	29.0	29.0	29.0	29.0	29.0	0.9743	47.3989		
											Avg.	0.9776	47.8128					

Ratio of reading of reference to dry gas meter : tolerance for individual values ± 0.02 from average
ΔAvg : Orifice pressure differential that equates to 21.24 in of air @ 25 C and 760 mm of mercury, mmH₂O; tolerance for individual values ± 5.08 from average.

Procedure: 40 CFR 60 APP A METH. SEC.5.3 & 7

Calibrated by: Saksit Phaisanphiset

(Mr. Saksit Phaisanphiset)
RYG Field Service Scientist (4)

Approved by:

Nattaporn Jengwareewong

(Mr.Nattaporn Jengwareewong)
RYG Field Service Specialist (1)

FORM NO. F 06-024 REVISION NO. 2 ISSUE DATE: 30-Jul-22



Stopwatch Calibration Test Report

Calibration Date : 10 Jul 24
Barometric Pressure (mmHg) : 752.4
Relative Humidity (%) : 64.0
Reference Stopwatch Data
Stopwatch ID No. : RYG_FS0540
Model : F808
Serial No. : E18061
Calibration Date : 4 Jul 24
Certificate No. : E-2407022
Next Cal. Date : 10 Jan 25
Temperature (°C) : 29.2
Console Control Meter Data
Dry Gas Meter No. : RYG_FS0315
Model : XC-572-V
Serial No. : 1706091

Run No.	Time Actual (m:ss.ms)	Time Reading (m:ss)	Diff. (ms)	Diff. (min)
1	5:00:03	5:00	3	0.00005
2	5:00:08	5:00	8	0.00013
3	5:00:07	5:00	7	0.00012
4	5:00:08	5:00	8	0.00013
5	5:00:05	5:00	5	0.00008
6	5:00:06	5:00	6	0.00010
7	5:00:06	5:00	6	0.00010
8	5:00:07	5:00	7	0.00012
9	5:00:08	5:00	8	0.00013
10	5:00:07	5:00	7	0.00012
Average			0.00011	
SD			0.00003	

Calibrate by :

Saksit Phaisanphiset

Mr. Saksit Phaisanphiset

RYG Field Service Scientist (4)

Approved by :

Nattaporn Jengwareewong

Mr.Nattaporn Jengwareewong

RYG Field Service Specialist (1)



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date : 10 Jul 24		Ambient Temperature (°C) 29.2			
Calibration sheet No. : C-100724-RYG_FS0315		Relative Humidity (%) : 64			
Digital Temperature ID : RYG_FS0315		Reference Temperature ID RYG_FS0681			
Serial No. : 1706091		Serial No. : 201090014918			
Model : XC-572-V		Model : Digicon-CC-VT-MS			
Next Calibrate :		13 Nov 24			
Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass
	100	101	1	±3	Pass
	150	151	1	±3	Pass
	200	200	0	±3	Pass
	250	250	0	±3	Pass
	300	301	1	±3	Pass
Probe	500	501	1	±3	Pass
	100	102	2	±3	Pass
	120	121	1	±3	Pass
	140	141	1	±3	Pass
Oven	100	101	1	±3	Pass
	120	120	0	±3	Pass
	140	141	1	±3	Pass
Filter	100	101	1	±3	Pass
	120	121	1	±3	Pass
	140	140	0	±3	Pass
Exit	0	0	0	±3	Pass
	10	10	0	±3	Pass
	20	20	0	±3	Pass
Meter	0	-1	-1	±3	Pass
	25	24	-1	±3	Pass
	50	49	-1	±3	Pass
AUX	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass

MPE : (Maximum permissible error of measurement) ค่าความผิดพลาดสูงสุดของการวัดที่อนุญาต

Calibrated by :

Saksit Phaisanphiset

(Mr. Saksit Phaisanphiset)
RYG Field Service Scientist (4)

Approved by :

Nattaporn Jengwareewong

(Mr.Nattaporn Jengwareewong)
RYG Field Service Specialist (1)

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



PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

Calibration Date : 10 Jul 24	Nozzle Set ID. : RYG_FS0319
Calibration Sheet No. : C-100724-RYG_FS0319	Vernier Caliper ID. : BKK_FS1123

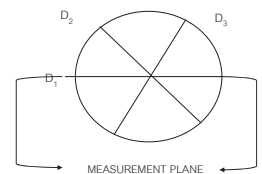
Nozzle ID #	Nozzle Diameter (cm.)			Hi - Lo ΔD	(D ₁ + D ₂ + D ₃) / 3 D _{avg}
	D ₁	D ₂	D ₃		
1	0.298	0.300	0.305	0.007	0.301
2	0.465	0.475	0.465	0.010	0.468
3	0.605	0.605	0.605	0.000	0.605
4	0.770	0.760	0.765	0.010	0.765
5	0.930	0.928	0.930	0.002	0.929
6	1.082	1.080	1.085	0.005	1.082
7	1.240	1.230	1.235	0.010	1.235
8	1.594	1.558	1.551	0.043	1.568

Where :

D₁, D₂, D₃ = There different nozzle diameters at 60 degrees to each other, each measured the nearest 0.025 mm.

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

D_{avg} = (D₁ + D₂ + D₃) / 3



Calibrated by :

Saksit Phaisanphiset

(Mr. Saksit Phaisanphiset)
RYG Field Service Scientist (4)

Approved by :

Nattaporn Jengwareewong

(Mr.Nattaporn Jengwareewong)
RYG Field Service Specialist (1)

FORM NO.: F 06-024 REVISION NO.: 2 ISSUE DATE: 16-1-2023



CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Calibration of Date : 10-Jul-24
Next Cal. Date : 10-Jan-25
Barometric Pressure (mmHg) : 749.1
Relative Humidity (%) : 46.2
Temperature (C°) : 33.8
Reference Dry Gas Meter Data
Calibration No. : C-100724-BKK_FS0556
Dry Gas Meter ID : BKK_FS0556
Serial No. : 1606041
Model No. : XC-572-V
Reference Dry Gas Meter ID : BKK_FS1122
Serial No. : A2003240
Correction Factor (Y) : 0.9824
Next Calibration Date : 7-Nov-24

ΔH (mm-H ₂ O)	Θ Minutes	Reference Dry Gas Meter Calibration					Console Control : Drygas Meter										Dry Gas Meter Correction Factor (Y)	Orifice Calibration Factor (Y)	ΔAvg
		Vr (Liters)		Tr (°C)	Vm (Liters)		Ti (°C)	To (°C)	Avg Tm (°C)										
		Final	Initial		Final	Initial				Total									
15	11.75	150.00	0.00	150.00	29.0	303548.0	303400.0	148.00	30.0	30.0	30.0	30.0	0.9975	42.5698					
25	9.24	150.00	0.00	150.00	29.0	303697.0	303550.0	147.00	30.0	30.0	30.0	31.0	1.0033	43.8741					
50	6.53	150.00	0.00	150.00	29.0	303848.0	303700.0	148.00	31.0	31.0	31.0	31.0	0.9974	43.6807					
80	5.19	150.00	0.00	150.00	30.0	303997.0	303850.0	147.00	31.0	31.0	31.0	31.0	0.9979	44.4416					
120	4.20	150.00	0.00	150.00	30.0	304146.0	304000.0	146.00	31.0	31.0	31.0	31.0	1.0009	43.6901					
													Avg.	0.9984	43.6442				

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

ΔAvg : Orifice pressure differential that equates to 21.24 lm of air @ 25 C and 760 mm of mercury , mmH₂O : tolerance for individual values ± 5.08 from average .

Procedure: 40 CFR 60 APP A METH. SEC.5.3 & 7

Calibrated by :

Saksit Phaisanphisit

(Mr. Saksit Phaisanphisit)

RYG Field Service Scientist(4)

Approved by :

Nattapon Jengwareewong

(Mr.Nattapon Jengwareewong)

RYG Field Service Specialist(1)

FORM NO.1 06-024 REVISION NO.2 ISSUE DATE:30 Jul 22



Stopwatch Calibration Test Report

Calibration Date : 10 Jul 24
Barometric Pressure (mmHg) : 749.1
Relative Humidity (%) : 46.2
Next Cal. Date : 10 Jan 25
Temperature (°C) : 33.8
Reference Stopwatch Data
Stopwatch ID No. : RYG_FS0540
Model : F808
Serial No. : E18061
Calibration Date : 4 Jul 24
Certificate No. : E-2407022
Console Control Meter Data
Dry Gas Meter No. : BKK_FS0556
Model : XC-572-V
Serial No. : 1606041

Run No.	Time Actual (m:ss.ms)	Time Reading (m:ss)	Diff. (ms)	Diff. (min)
1	5:00:03	5:00	3	0.00005
2	5:00:07	5:00	7	0.00012
3	5:00:07	5:00	7	0.00012
4	5:00:08	5:00	8	0.00013
5	5:00:05	5:00	5	0.00008
6	5:00:07	5:00	7	0.00012
7	5:00:06	5:00	6	0.00010
8	5:00:08	5:00	8	0.00013
9	5:00:08	5:00	8	0.00013
10	5:00:07	5:00	7	0.00012
Average			0.00011	
SD			0.00003	

Calibrate by :

Saksit Phaisanphisit

Mr. Saksit Phaisanphisit

RYG Field Service Scientist (4)

Approved by :

Nattapon Jengwareewong

Mr.Nattapon Jengwareewong

RYG Field Service Specialist (1)



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date : 10 Jul 24		Ambient Temperature (°C) 33.8			
Calibration sheet No. : C-100724-BKK_FS0557		Relative Humidity (%) : 46.2			
Digital Temperature ID : BKK_FS0557		Reference Temperature ID RYG_FS0681			
Serial No. : 1606041		Serial No. : 201090014918			
Model : XC-572-V		Model : Digicon-CC-VT-MS			
Next Calibrate :		13 Nov 24			
Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	±3	Pass
	25	24	-1	±3	Pass
	50	49	-1	±3	Pass
	100	99	-1	±3	Pass
	150	149	-1	±3	Pass
	200	199	-1	±3	Pass
	250	249	-1	±3	Pass
Probe	300	299	-1	±3	Pass
	500	499	-1	±3	Pass
	100	99	-1	±3	Pass
	120	119	-1	±3	Pass
	140	139	-1	±3	Pass
	100	99	-1	±3	Pass
	120	119	-1	±3	Pass
Oven	140	139	-1	±3	Pass
	100	99	-1	±3	Pass
	120	119	-1	±3	Pass
Filter	140	139	-1	±3	Pass
	100	100	0	±3	Pass
	120	120	0	±3	Pass
Exit	140	141	1	±3	Pass
	0	0	0	±3	Pass
	10	10	0	±3	Pass
Meter	20	20	0	±3	Pass
	0	0	0	±3	Pass
	25	25	0	±3	Pass
AUX	50	50	0	±3	Pass
	0	0	0	±3	Pass
	25	24	-1	±3	Pass
	50	49	-1	±3	Pass

MPE : (Maximum permissible error of measurement) ค่าความผิดพลาดสูงสุดของภาววัตถุที่สอบวัด

Calibrated by :

Saksit Phaisanphisit

Mr. Saksit Phaisanphisit
RYG Field Service Scientist (4)

Approved by :

Nattapon Jengwareewong

Mr.Nattapon Jengwareewong
RYG Field Service Specialist (1)

FORM NO.: 06-027 REVISION NO.:2 ISSUE DATE: 9 Feb 23



PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

Calibration Date : 10 Jul 24	Nozzle Set ID. : BKK_FS0562
Calibration Sheet No. : C-100724-BKK_FS0562	Vernier Caliper ID. : BKK_FS1123

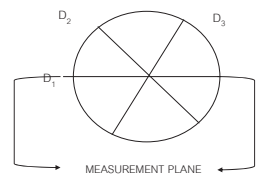
Nozzle ID #	Nozzle Diameter (cm.)			Hi - Lo ΔD	(D ₁ + D ₂ + D ₃) / 3 D _{avg}
	D ₁	D ₂	D ₃		
1	0.305	0.302	0.302	0.003	0.303
2	0.485	0.475	0.485	0.010	0.482
3	0.620	0.635	0.635	0.015	0.630
4	0.765	0.765	0.765	0.000	0.765
5	0.970	0.980	0.975	0.010	0.975
6	1.085	1.085	1.081	0.004	1.084
7	1.275	1.275	1.275	0.000	1.275
8	1.610	1.610	1.615	0.005	1.612

Where :

D₁, D₂, D₃ = There different nozzle diameters at 60 degrees to each other, each measured the nearest 0.025 mm.

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

D_{avg} = (D₁ + D₂ + D₃) / 3



Calibrated by :

Saksit Phaisanphisit

(Mr. Saksit Phaisanphisit)
RYG Field Service Scientist (4)

Approved by :

Nattapon Jengwareewong

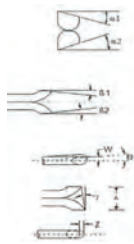
(Mr.Nattapon Jengwareewong)
RYG Field Service Specialist (1)

FORM NO.1 06-024 REVISION NO.1 ISSUE DATE: 9-1-020



Type S Pitot Tube Calibration

Date Calibration 10-Jul-24 Due Date 10-Jan-25
Pitot ID BKK_FS0473 Inclinator ID BKK_FS1131
Pitot SN - Vernier ID RYG_FS0539



Parameter	Value	Allowable Range	Check
$\alpha 1$	2.5	$-10^\circ < \alpha 1 < +10^\circ$	OK
$\alpha 2$	1.4	$-10^\circ < \alpha 2 < +10^\circ$	OK
$\beta 1$	-0.8	$-5^\circ < \beta 1 < +5^\circ$	OK
$\beta 2$	-0.4	$-5^\circ < \beta 2 < +5^\circ$	OK
γ	0.3	-	-
θ	0.2	-	-
$Z = A \tan \gamma$	0.005	$Z \leq 0.125''$	OK
$W = A \tan \theta$	0.003	$W \leq 0.031''$	OK
Dt	0.310	0.188" to 0.375"	OK
A/2Dt	1.484	$1.05 \leq PA/Dt \leq 1.5$	OK
A	0.92	$2.1Dt \leq A \leq 3Dt$	OK

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

Calibrated by : Saksit Phaisanphut
(Mr. Saksit Phaisanphut)
RYG Field Services Scientist (4)

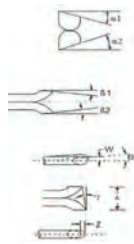
Approved By : Nattapong Jengwareewong
(Mr.Nattapong Jengwareewong)
RYG Field Services Specialist (1)

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



Type S Pitot Tube Calibration

Date Calibration 10-Jul-24 Due Date 10-Jan-25
Pitot ID RYG_FS0321 Inclinator ID BKK_FS1131
Pitot SN - Vernier ID RYG_FS0539



Parameter	Value	Allowable Range	Check
$\alpha 1$	-1.4	$-10^\circ < \alpha 1 < +10^\circ$	OK
$\alpha 2$	-0.2	$-10^\circ < \alpha 2 < +10^\circ$	OK
$\beta 1$	0.8	$-5^\circ < \beta 1 < +5^\circ$	OK
$\beta 2$	-0.4	$-5^\circ < \beta 2 < +5^\circ$	OK
γ	0.8	-	-
θ	0.5	-	-
$Z = A \tan \gamma$	0.013	$Z \leq 0.125''$	OK
$W = A \tan \theta$	0.008	$W \leq 0.031''$	OK
Dt	0.310	0.188" to 0.375"	OK
A/2Dt	1.484	$1.05 \leq PA/Dt \leq 1.5$	OK
A	0.92	$2.1Dt \leq A \leq 3Dt$	OK

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

Calibrated by : Saksit Phaisanphut
(Mr. Saksit Phaisanphut)
RYG Field Services Scientist (4)

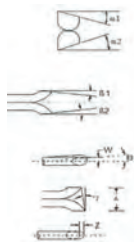
Approved By : Nattapong Jengwareewong
(Mr.Nattapong Jengwareewong)
RYG Field Services Specialist (1)

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



Type S Pitot Tube Calibration

Date Calibration 10-Jul-24 Due Date 10-Jan-25
Pitot ID BKK_FS0561 Inclinator ID BKK_FS1131
Pitot SN - Vernier ID RYG_FS0539



Parameter	Value	Allowable Range	Check
$\alpha 1$	-2.4	$-10^\circ < \alpha 1 < +10^\circ$	OK
$\alpha 2$	-1.2	$-10^\circ < \alpha 2 < +10^\circ$	OK
$\beta 1$	-2.0	$-5^\circ < \beta 1 < +5^\circ$	OK
$\beta 2$	1.3	$-5^\circ < \beta 2 < +5^\circ$	OK
γ	0.3	-	-
θ	0.2	-	-
$Z = A \tan \gamma$	0.005	$Z \leq 0.125''$	OK
$W = A \tan \theta$	0.003	$W \leq 0.031''$	OK
Dt	0.310	0.188" to 0.375"	OK
A/2Dt	1.468	$1.05 \leq PA/Dt \leq 1.5$	OK
A	0.91	$2.1Dt \leq A \leq 3Dt$	OK

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

Calibrated by : Saksit Phaisanphut
(Mr. Saksit Phaisanphut)
RYG Field Services Scientist (4)

Approved By : Nattapong Jengwareewong
(Mr.Nattapong Jengwareewong)
RYG Field Services Specialist (1)

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



Calibration Certificate



Certificate No: G 670124
Date of issue : 22-Feb-24

Instrument description : Fluor Gas Analyzer
Instrument model : Testo 340
Control unit serial no. :
Instrument serial no. : 62150585
ID no. or control no. : RYG_FS0465
Manufacturer : Testo SE & Co. KGaA
Probe description :
Probe model :
Probe serial no. :
Customer name : ALS LABORATORY GROUP (THAILAND) CO.,LTD.
Customer address : 104 Phutthasarak 40, Phutthasarak Road, Khwaeng Phutthasarak, Khet Suan Luang, Bangkok, 10250 Thailand

Total pages of certificate : 2 Pages
Receiving no. : L-240604
Receiving date. : 19-Feb-24
Parameter of calibration : Gas Calibration(Oxygen 2.50,10.04,21.02 %vol, Carbon Monoxide 80.14,302,1003 ppm) Nitric Oxide 30.01,151.5,322.5 ppm, Sulphur Dioxide 50.36,100.8,600.8 ppm)
Condition of UUC : Used
Ambient condition : All of the Measurement were carried out the stabilized laboratory
Temperature : 23 \pm 5 °C
Humidity : 55 \pm 15 %RH

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

Calibration procedure no. : This instrument was calibrated by comparison with Standard gas mixture according to calibration Work Instruction no. WI-CL-2B-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.
This certificate is applied only to item under test Environmental condition.
This Calibration Certificate may not be reproduced other than in full except with the permission of the issuing laboratory.
Calibration certificates without signature and seal not valid and The results relate only to the items tested/calibrated.
This calibration certificate documents are traceability to national standards, which realize measurement according to the International System of Units (SI).
Date of calibration : 22-Feb-24

Kwanthap
Mr. Kwanthap Khamsung
Calibration Technician

Wattana
Mrs. Nongluck Wongsettee
Technical Manager

FM-CL-09-C Rev.6.

Page 1 of 2

Issued Date 28/02/24

Entech Industrial Solution Co.,Ltd.

17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Lakes, Bangkok 10210 THAILAND Tel. 0-2779-8888 Calibration@entech.co.th
Fax ID : 0105536038591 www.entech.co.th

Certificate No.: G 670124

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.50 % Vol	2412/23	Linde	27-Aug-27
Oxygen (O ₂) 10.04 % Vol	CG-0153-21	Nimt	18-Nov-26
Oxygen (O ₂) 21.02 % Vol	CG-0041-22	Nimt	10-Feb-27
Carbon monoxide (CO) 80.14 ppm	CG-0040-22	Nimt	14-Feb-27
Carbon monoxide (CO) 302 ppm	1915/23	Linde	16-Jun-25
Carbon monoxide (CO) 1003 ppm	2584/23	Linde	10-Sep-25
Nitric Oxide (NO) 30.01 ppm	CG-0014-23	Nimt	19-Feb-25
Nitric Oxide (NO) 151.5 ppm	0161/23	Linde	22-Jan-25
Nitric Oxide (NO) 322.5 ppm	1974/23	Linde	17-Jul-25
Sulphur Dioxide (SO ₂) 50.36 ppm	2004/23	Linde	17-Jul-25
Sulphur Dioxide (SO ₂) 100.8 ppm	3507/22	Linde	09-Nov-24
Sulphur Dioxide (SO ₂) 600.8 ppm	2003/23	Linde	17-Jul-25

Measured room conditions

Temperature : 22.7 °C Humidity : 60.2 %RH Pressure : 1011.8 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 600 ml/min Gas pressure : 1014.1 mbar

Calibration Results (Without adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.50	2.44	-0.06	0.15
O ₂ (%Vol)	10.04	9.92	-0.12	0.20
O ₂ (%Vol)	21.02	21.11	0.09	0.30
CO (ppm)	80.14	81	0.86	3.0
CO (ppm)	302	303	1	6.0
CO (ppm)	1003	1003	0	12
NO (ppm)	30.01	29	-1.01	8.0
NO (ppm)	151.5	151	-0.5	8.0
NO (ppm)	322.5	321	-1.5	12
SO ₂ (ppm)	50.36	52	1.64	6.0
SO ₂ (ppm)	100.8	102	1.2	6.0
SO ₂ (ppm)	600.8	604	3.2	13

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

End of Report

FM-CL-09-C Rev.8

Page 2 of 2

Issued Date 26/02/16

Entech Industrial Solution Co.,Ltd.

17/121 Soi Niamwongwan 47 Yaek 48, Toongsonghong, Lakki, Bangkok 10210 THAILAND Tel: 0-2779-8888 Calibration@entech.co.th
Tax ID : 010559035591 www.entech.co.th

Certificate No.: G 670176
Date of issue : 08-Mar-24

Instrument description

Instrument model : Testo 350 New

Control unit serial no. : 03401649/1119

Instrument serial no. : 62887344/1119

ID no. or control no. : RYG_F50464

Manufacturer : Testo SE & Co. KGaA

Probe description : -

Probe model : -

Probe serial no. : -

Customer name : ALS LABORATORY GROUP (THAILAND) CO.,LTD.

Customer address : 104 Phatthanasak Road, Kluayung Phatthanasak,

Khet Suan Luang, Bangkok, 10250 Thailand.

Total pages of certificate : 3 Pages

Receiving no. : L-240885

Receiving date. : 04-Mar-24

Parameter of calibration : Gas Calibration(Oxygen 2.50,10.04,21.02 %vol, Carbon Monoxide 80.14,302,1003 ppm,

Nitrogen Dioxide 30.34,81.32, 201.9 ppm, Nitric Oxide 30.01, 151.5, 322.5 ppm,

Sulphur Dioxide 50.36, 100.8, 600.8 ppm)

Condition of UUC. : Used

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

Temperature : 23 ± 5 °C

Humidity : 55 ± 15 %RH

Calibration place : 17/121 Soi Niamwongwan 47 Yaek 48, Toongsonghong, Lakki, Bangkok 10210

Calibration procedure no. : This instrument was calibrated by comparison with Standard gas mixture according

to calibration Work Instruction no. WI-CL-28-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. This certificate is applied only to item under test Environmental condition.

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

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

Date of calibration : 08-Mar-24

Kwanchee K.

Mr. Kwanchee Kiamdang
Calibration Technician

P. Wuttu

Mrs. Nongluck Wongtattae
Technical Manager

FM-CL-09-C Rev.8

Page 1 of 3

Issued Date 26/02/16

Entech Industrial Solution Co.,Ltd.

17/121 Soi Niamwongwan 47 Yaek 48, Toongsonghong, Lakki, Bangkok 10210 THAILAND Tel: 0-2779-8888 Calibration@entech.co.th
Tax ID : 010559035591 www.entech.co.th

Certificate No.: G 670176

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.50 % Vol	2412/23	Linde	27-Aug-27
Oxygen (O ₂) 10.04 % Vol	CG-0153-21	Nimt	18-Nov-26
Oxygen (O ₂) 21.02 % Vol	CG-0041-22	Nimt	10-Feb-27
Carbon monoxide (CO) 80.14 ppm	CG-0040-22	Nimt	14-Feb-27
Carbon monoxide (CO) 302 ppm	1915/23	Linde	16-Jun-25
Carbon monoxide (CO) 1003 ppm	2584/23	Linde	10-Sep-25
Nitrogen Dioxide (NO ₂) 30.34 ppm	2703/22	Linde	22-Aug-24
Nitrogen Dioxide (NO ₂) 81.32 ppm	3546/23	Linde	14-Jan-26
Nitrogen Dioxide (NO ₂) 201.9 ppm	1975/23	Linde	17-Jul-25
Nitric Oxide (NO) 30.01 ppm	CG-0014-23	Nimt	19-Feb-25
Nitric Oxide (NO) 151.5 ppm	0161/23	Linde	22-Jan-25
Nitric Oxide (NO) 322.5 ppm	1974/23	Linde	17-Jul-25
Sulphur Dioxide (SO ₂) 50.36 ppm	2004/23	Linde	17-Jul-25
Sulphur Dioxide (SO ₂) 100.8 ppm	3507/22	Linde	09-Nov-24
Sulphur Dioxide (SO ₂) 600.8 ppm	2003/23	Linde	17-Jul-25

Measured room conditions

Temperature : 23.6 °C Humidity : 65.2 %RH Pressure : 1011.2 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 1,300 ml/min Gas pressure : 1017.1 mbar

Calibration Results (Before adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.50	2.45	-0.05	0.15
O ₂ (%Vol)	10.04	9.93	-0.11	0.20
O ₂ (%Vol)	21.02	21.10	0.08	0.30
CO (ppm)	80.14	81	0.86	3.0
CO (ppm)	302	305	3	6.0
CO (ppm)	1003	1009	6	12
NO ₂ (ppm)	30.34	24.2	-6.14	8.0
NO ₂ (ppm)	81.32	76.9	-4.42	8.0
NO ₂ (ppm)	201.9	188.7	-13.2	12
NO (ppm)	30.01	27	-3.01	8.0
NO (ppm)	151.5	144	-7.5	8.0
NO (ppm)	322.5	304	-18.5	12
SO ₂ (ppm)	50.36	50	-0.36	6.0
SO ₂ (ppm)	100.8	98	-2.8	6.0
SO ₂ (ppm)	600.8	597	-3.8	13

FM-CL-09-C Rev.8

Page 2 of 2

Issued Date 26/02/16

Entech Industrial Solution Co.,Ltd.

17/121 Soi Niamwongwan 47 Yaek 48, Toongsonghong, Lakki, Bangkok 10210 THAILAND Tel: 0-2779-8888 Calibration@entech.co.th
Tax ID : 010559035591 www.entech.co.th

Certificate No.: G 670176

Calibration Results (After adjustment) (Table 3)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.500	2.45	-0.05	0.15
O ₂ (%Vol)	10.04	9.93	-0.11	0.20
O ₂ (%Vol)	21.02	21.10	0.08	0.30
CO (ppm)	80.14	81	0.86	3.0
CO (ppm)	302	305	3	6.0
CO (ppm)	1003	1009	6	12
NO ₂ (ppm)	30.34	29.5	-0.84	8.0
NO ₂ (ppm)	81.32	82.4	1.08	8.0
NO ₂ (ppm)	201.9	202.4	0.5	12
NO (ppm)	30.01	29	-1.01	8.0
NO (ppm)	151.5	152	0.5	8.0
NO (ppm)	322.5	321	-1.5	12
SO ₂ (ppm)	50.36	50	-0.36	6.0
SO ₂ (ppm)	100.8	98	-2.8	6.0
SO ₂ (ppm)	600.8	597	-3.8	13

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

End of Report

FM-CL-09-C Rev.8

Page 3 of 3

Issued Date 26/02/16

Entech Industrial Solution Co.,Ltd.

17/121 Soi Niamwongwan 47 Yaek 48, Toongsonghong, Lakki, Bangkok 10210 THAILAND Tel: 0-2779-8888 Calibration@entech.co.th
Tax ID : 010559035591 www.entech.co.th

Certificate No.: G 660705
Date of issue : 14-Nov-23

Instrument description : Flue Gas Analyzer
Instrument model : Testo 340
Control unit serial no. :
Instrument serial no. : 63119028
ID no. or control no. : RYG_F50565
Manufacturer : Testo SE & Co. KGaA
Probe description :
Probe model :
Probe serial no. :
Customer name : ALS LABORATORY GROUP (THAILAND) CO.,LTD.
Customer address : 104 Phatthanakan 40, Phatthanakan Road, Khwaeng Phatthanakan, Khet Suan Luang, Bangkok, 10250 Thailand
Total pages of certificate : 3 Pages
Receiving no. : L-233748
Receiving date : 08-Nov-23
Parameter of calibration : Gas Calibration(Oxygen 2.498,10.04,21.02 %Vol, Carbon Monoxide 80.14,302,1003 ppm, Nitric Oxide 30.01, 151.5, 322.5 ppm,Sulphur Dioxide 50.36, 100.8, 600.8 ppm)

Condition of UUC : Used
Ambient condition : All of the Measurement were carried out the stabilized laboratory
Temperature : 23 ± 5 °C
Humidity : 55 ± 15 %RH
Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsongkhong, Laksa, Bangkok 10210
Calibration procedure no. : This instrument was calibrated by comparison with Standard gas mixture according to calibration Work Instruction no. WI-CL-28-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.
This certificate is applied only to item under test Environmental condition.
This Calibration Certificate may not be reproduced other than in full except with the permission of the issuing laboratory.
Calibration certificates without signature and seal not valid and The results relate only to the items tested/calibrated.
This calibration certificate documents are traceability to national standards, which realize measurement according to the International System of Units (SI).

Date of calibration : 13-Nov-23

Kwanchai K.
Mr. Kwanchai Khamdoung
Calibration Technician

W. Wuttit
Mrs. Nongluck Wongsettee
Technical Manager

Certificate No.: G 660705

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O2) 2.498 % Vol	4219/21	Linde	30-Sep-25
Oxygen (O2) 10.04 % Vol	CG-0153-21	Nirx	18-Nov-26
Oxygen (O2) 21.02 % Vol	CG-0041-22	Nirx	10-Feb-27
Carbon monoxide (CO) 80.14 ppm	CG-0040-22	Nirx	14-Feb-27
Carbon monoxide (CO) 302 ppm	1915/23	Linde	16-Jun-25
Carbon monoxide (CO) 1003 ppm	2584/23	Linde	10-Sep-25
Nitric Oxide (NO) 30.01 ppm	CG-0014-23	Nirx	19-Feb-25
Nitric Oxide (NO) 151.5 ppm	0151/23	Linde	22-Jan-25
Nitric Oxide (NO) 322.5 ppm	1974/23	Linde	17-Jul-25
Sulphur Dioxide (SO2) 50.36 ppm	2004/23	Linde	17-Jul-25
Sulphur Dioxide (SO2) 100.8 ppm	3507/22	Linde	09-Nov-24
Sulphur Dioxide (SO2) 600.8 ppm	2003/23	Linde	17-Jul-25

Measured room conditions

Temperature : 22.4 °C Humidity : 67.8 %RH Pressure : 1010.2 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 600 ml/min Gas pressure : 1017.2 mbar

Calibration Results (Before adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of	Error	Uncertainty
				(#)
O2 (%Vol)	2.498	2.44	-0.058	0.15
O2 (%Vol)	10.04	9.96	-0.08	0.20
O2 (%Vol)	21.02	21.13	0.11	0.30
CO (ppm)	80.14	86	5.86	3.0
CO (ppm)	302	318	16	6.0
CO (ppm)	1003	1049	46	12
NO (ppm)	30.01	27	-3.01	8.0
NO (ppm)	151.5	148	-3.5	8.0
NO (ppm)	322.5	309	-13.5	12
SO2 (ppm)	50.36	52	1.64	6.0
SO2 (ppm)	100.8	103	2.2	6.0
SO2 (ppm)	600.8	604	3.2	12

Certificate No.: G 660705

Calibration Results (After adjustment) (Table 3)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty
				(#)
O2 (%Vol)	2.498	2.44	-0.058	0.15
O2 (%Vol)	10.04	9.96	-0.08	0.20
O2 (%Vol)	21.02	21.13	0.11	0.30
CO (ppm)	80.14	81	0.86	3.0
CO (ppm)	302	302	0	6.0
CO (ppm)	1003	1001	-2	12
NO (ppm)	30.01	32	1.99	8.0
NO (ppm)	151.5	153	1.5	8.0
NO (ppm)	322.5	319	-3.5	12
SO2 (ppm)	50.36	52	1.64	6.0
SO2 (ppm)	100.8	103	2.2	6.0
SO2 (ppm)	600.8	604	3.2	12

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

End of Report

Sartorius (Thailand) Co., Ltd.

129 Rama 9 Road, Huayklong, Huayklong, Bangkok 10210
Tel: +66 2643 8361-6, e-mail: service.thailand@sartorius.com



SARTORIUS

Certificate of Calibration

REVIEW BY : *Thawit*
APPROVED BY : *D. K.*
NEXT CAL DATE : 01 Oct 2025

Model Number : MSU224S-100-DU Certificate No. : 24BCI0073
Description : Analytical Balance Issued Date : Friday, February 23, 2024
Serial Number : 0031709552 Reference No. : 229196
ID No. : RYG_EN0003
Manufacturer : Sartorius Page No. : 1 of 2

Customer Name : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenam Khu, A.Pluak Daeng, Rayong 21140, Thailand.

Calibrated Place : ALS Laboratory Group (Thailand) Co., Ltd. (Balance Room)
616/10 Moo 5 T.Maenam Khu, A.Pluak Daeng, Rayong 21140, Thailand.

Calibrated By : Mr.Chonchai Inthana
Calibration Date : Thursday, February 22, 2024
Calibration Procedure No. : This calibration was conducted by Using in-house calibration procedure number (WI-003)
Based on UKAS LAB 14 : 2016

Metrological data : Capacity : 220 g Readability : 0.0001 g
Reasons for calibration : ☐ New Installation ☐ Service / Repair ☒ Re-calibration/ Maintenance
Ambients Conditions : Temperature : 23.7 °C ± 5.0 °C
Humidity : 62.0 % RH ± 10.0 % RH
Pressure :
Equipment Condition : ☒ Good Operate ☐ Fail

Measurement Method UKAS Publication Ref : Lab 14

The measurement uncertainty stated is this 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 realize the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came from list of Sartorius Metrological Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 5000g E2,YCS011-522-00	TCS	M2308197S	23-Aug-2025
MHB-382SD	Humidity/Balometer/Temp Lutron MHB-382SD	DKSH	C1923184S	23-Aug-2024

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.

Mr. Chonchai Inthana

Mr. Chonchai Inthana (Technical Manager)




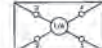


Certificate of Calibration

Certificate No. : 24BCI0073
 Issued Date : Friday, February 23, 2024
 Reference No. : 226196
 Page No. : 2 of 2

Calibration Results : Without Adjustment

Repeatability The repeatability is the ability of a weighing instrument to display nearly identical results under constant test conditions within the same load within a measurement range. It is used to express repeatability quantitatively.		Eccentricity (Off-center loading error) The off-center loading error is caused by the difference between the actual 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 R76).	
Nominal Value : (Low Load)	20.0000	200.0001	
20 g	20.0000	200.0000	
Tolerance	20.0001	200.0001	
0.0001 g	20.0000	200.0001	
	20.0000	200.0001	
Nominal Value : (High Load)	20.0000	200.0001	
200 g	19.9999	200.0001	
Tolerance	20.0000	200.0000	
0.0001 g	20.0000	200.0001	
	20.0000	200.0001	
Standard Deviation		0.00005	0.00005

Eccentricity (Off-center loading error) The off-center loading error is caused by the difference between the actual 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 R76).		Nominal value : 100 g Tolerance 0.0004 g	
		Difference	
1		-	
2		0.0000	
3		-0.0001	
4		0.0000	
		5	
		0.0001	
		6	
		-	

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

Tolerance 0.0002 g				
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
0.01	0.0100	0.0100	0.0000	0.00013
0.1	0.1000	0.1000	0.0000	0.00013
0.5	0.5000	0.5000	0.0000	0.00013
1	1.0000	1.0000	0.0000	0.00013
5	5.0000	5.0000	0.0000	0.00013
10	10.0000	10.0000	0.0000	0.00013
20	20.0000	20.0000	0.0000	0.00013
50	50.0000	50.0000	0.0000	0.00024
100	100.0000	99.9999	-0.0001	0.00018
200	200.0000	199.9999	-0.0001	0.00029

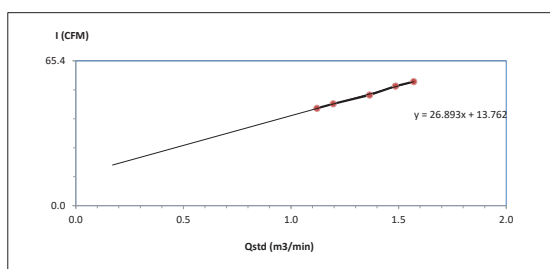
End of Report

SOP FM 33 03 February 2022

High Volume Air Sampler Calibration Worksheet

Project Site :	Kiriu (Thailand) Co.,Ltd	Barometric Pressure (mm Hg) :	756.2
Calibrate Location :	วัดจอมแจ้งพนา (A1)	Temperature (°C) :	30.1
Calibrate Date :	1-Sep-24	High Volume ID :	RYG_FS0664
CalibrationSheet No.:	C-01924-RYG_FS0664	High Volume Model :	TE-5009X
Calibrator ID:	RYG_FS0205	High Volume S/N :	6261
Calibrator Model :	TE-5028A	Calibrator Slope :	1.52567
Calibrator S/N :	1166	Calibrator Intercept :	-0.03613

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression	
1	2.8	1.1209	44	Slope :	26.8931
2	3.2	1.1958	46	Intercept :	13.7621
3	4.2	1.3647	50	Correlation Coefficient :	0.9985
4	5.0	1.4857	54		
5	5.6	1.5702	56		



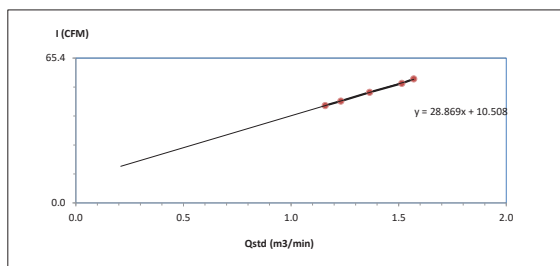
Approved by : _____
(Mr. Noppong Juntarupan)
Enviro Field Coordinator Scientist (3)

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

High Volume Air Sampler Calibration Worksheet

Project Site :	Kirtu (Thailand) Co.Ltd	Barometric Pressure (mm Hg) :	756.2
Calibrate Location :	หอดูดาว (A2)	Temperature (°C) :	30.1
Calibrate Date :	1-Sep-24	High Volume ID :	RYG_FS0394
CalibrationSheet No.:	C-010924-RYG_FS0394	High Volume Model :	TE-5170D
Calibrator ID :	RYG_FS0205	High Volume S/N :	5690
Calibrator Model :	TE-5028A	Calibrator Slope :	1.52567
Calibrator S/N :	1166	Calibrator Intercept :	-0.03613

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression	
1	3.0	1.1590	44	Slope :	28.8692
2	3.4	1.2315	46	Intercept :	10.5077
3	4.2	1.3647	50	Correlation Coefficient :	0.9996
4	5.2	1.5144	54		
5	5.6	1.5702	56		



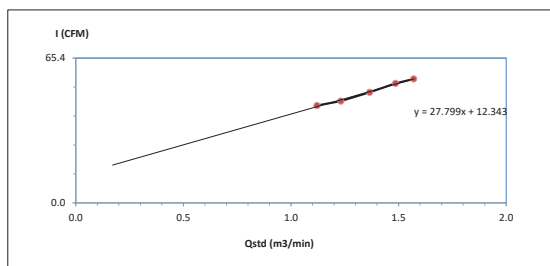
Approved by : _____
(Mr. Noppong Juntarupan)
Enviro Field Coordinator Scientist (3)

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

High Volume Air Sampler Calibration Worksheet

Project Site :	Kiritu (Thailand) Co.,Ltd	Barometric Pressure (mm Hg) :	756.2
Calibrate Location :	ห้องมาตรวัดอากาศ (A3)	Temperature (°C) :	30.1
Calibrate Date :	1-Sep-24	High Volume ID :	RYG-FS0393
CalibrationSheet No.:	C-010924-RYG-FS0393	High Volume Model :	TE-5170D
Calibrator ID:	RYG-FS0205	High Volume S/N :	5682
Calibrator Model :	TE-5028A	Calibrator Slope :	1.52567
Calibrator S/N :	1166	Calibrator Intercept :	-0.03613

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression	
1	2.8	1.1209	44	Slope :	27.7989
2	3.4	1.2315	46	Intercept :	12.3430
3	4.2	1.3647	50	Correlation Coefficient :	0.9962
4	5.0	1.4857	54		
5	5.6	1.5702	56		



Approved by : _____
(Mr. Noppong Juntarupan)
Enviro Field Coordinator Scientist (3)

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



Certificate of Calibration

Model Number : LA130S-F
Description : Analytical Balance
Serial Number : 25409864
ID No. : RYG_EN0001
Manufacturer : Sartorius
Certificate No. : 24BCI0058
Issued Date : Friday, February 23, 2024
Reference No. : 229196
Page No. : 1 of 2

Customer Name : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
618/10 Moo 5 T.Maenam Khu, A.Pluak Daeng, Rayong 21140, Thailand

Calibrated Place : ALS Laboratory Group (Thailand) Co., Ltd. (Balance Room)
618/10 Moo 5 T.Maenam Khu, A.Pluak Daeng, Rayong 21140, Thailand

Calibrated By : Mr.Chonchai Intirana
Calibration Date : Thursday, February 22, 2024
Calibration Procedure No. : This calibration was conducted by
Using in-house calibration procedure number (VI-003)
Based on UKAS LAB 14 : 2019

Metrological data :
Capacity : 150 g Readability : 0.0001 g
Reasons for calibration
☐ New Installation ☐ Service / Repair ☒ Re-calibration / Maintenance
Ambient Conditions:
Temperature : 23.6 °C ± 5.0 °C
Humidity : 54.0 % RH ± 10.0 % RH
Pressure :
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 realize the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came from list of Sartorius Metrological Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 5000g E2.YCS011-522-00	TCS	M2308197S	23-Aug-2025
MHB-382SD	Humidity/Barometer/Temp. Lutron MHB-382SD	DKSH	C19231845	23-Aug-2024

This certificate relate and apply this equipment only.
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Sartorius (Thailand) Co., Ltd.
SOP FM 33 03 February 2022
Mr.Chonchai Intirana(Technical Manager)



Certificate of Calibration

Model Number : LA130S-F
Description : Analytical Balance
Serial Number : 25409864
ID No. : RYG_EN0001
Manufacturer : Sartorius
Certificate No. : 24BCI0058
Issued Date : Friday, February 23, 2024
Reference No. : 229196
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 results 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 reproducibility quantitatively.	The off-center loading error is related by the difference between the result 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 R76).
Nominal Value : (Low Load) 10 g Tolerance 0.0001 g Nominal Value : (High Load) 100 g Tolerance 0.0001 g Standard Deviation 0.00005 0.00008	Nominal value : 50 g Tolerance 0.0004 g Difference 1 - 2 -0.0001 3 0.0001 4 0.0002 5 0.0000 6 -

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

Tolerance		0.0002 g		
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
0.01	0.0100	0.0100	0.0000	0.00020
0.05	0.0500	0.0500	0.0000	0.00021
0.1	0.1000	0.1000	0.0000	0.00021
0.5	0.5000	0.5000	0.0000	0.00021
1	1.0000	1.0000	0.0000	0.00021
2	2.0000	2.0000	0.0000	0.00021
5	5.0000	5.0000	0.0000	0.00021
10	10.0000	10.0001	0.0001	0.00024
20	20.0000	20.0001	0.0001	0.00021
100	100.0000	99.9999	-0.0001	0.00024

End of Report

SOP FM 33 03 February 2022

REVIEW BY : Jiranan P.
APPROVED BY : Jiranan P.
NEXT CAL. DATE : 21/1/25

Certificate Number

CWS-002-66

CERTIFICATE OF CALIBRATION

MEASUREMENT ITEM : Cup anemometer
MANUFACTURER : Novolyne
MODEL/TYPE : Sensor: WS-02F
Data logger: 110-WS-25DL-D
SERIAL NUMBER : Sensor: WSD-AS816
Data logger: AS816
ID NUMBER : RYG_F50545
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE : 11 Jul 2023
MEASUREMENT DATE : 21 Jul 2023
ISSUE DATE : 21 Jul 2023

ENVIRONMENTAL CONDITIONS:
Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 0.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1010 ± 10 hPa

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

CALIBRATION CONDITIONS : Wind tunnel cross-section area : 900 cm²
Win direction frontal area : 100 cm²
Diameter of mounting pipe : mm
Blockage ratio of test object : 0.111 [-]

Preconditioning : 24 hours at ambient conditions.
Measurement Condition : The average values during measurement are (23.9) °C, (45.7) %RH and (1008.2) hPa.

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

Calibrated by :
Approved signature :
Mr. Sorawit Thachalad
Mr. Parinya Booncharoen
Calibration Department Manager

Remarks:
1. Nullify cross-section area of the wind tunnel
2. Projected cross-section area of the tested object include mounting pipe
3. Diameter of mounting pipe
4. Ratio "a/b"

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

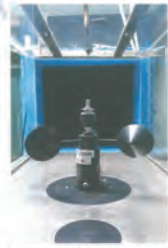
Page 2 of 2 Pages

MEASUREMENT RESULTS
The cup anemometer, Unit Under Calibration (UUC) was exercise at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 300 mm respectively away from wind tunnel nozzle. UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

V _{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V _{meas} (m/s)	Error (m/s)	U (k=2) (m/s)
1.023	23.80	23.90	0.8	-0.2	0.31
2.078	24.00	23.90	1.8	-0.2	0.31
3.021	23.78	23.90	2.8	-0.2	0.31
4.148	23.92	23.90	3.9	-0.2	0.31
5.00	23.60	23.90	4.8	-0.2	0.31
5.99	23.68	23.90	5.8	-0.2	0.31
7.03	23.50	23.90	6.8	-0.2	0.31
8.16	23.60	23.90	7.9	-0.3	0.31
9.08	23.50	23.90	8.9	-0.2	0.31
10.06	23.78	23.90	9.8	-0.3	0.31
11.13	23.50	23.90	10.9	-0.2	0.31
12.11	23.78	23.90	12.0	-0.1	0.31
13.16	23.50	23.90	12.9	-0.3	0.31
14.21	23.66	23.90	14.0	-0.2	0.31
15.18	23.50	23.90	15.0	-0.2	0.31
16.26	23.58	23.90	16.0	-0.3	0.31

Remarks:
1. Calibration results only count for the tested circumstances and environmental conditions during which calibration took place
2. Velocity of standard
3. Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



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



CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

Wind Direction Sensor

Novelynx

Sensor: WS-02F

Data logger: 110-WS-25DL-D

Sensor: WSD-AS816

Data logger: AS816

RYG_FS0545

Used item

ALS laboratory group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,

Khet Suan Luang, Bangkok 10250 Thailand.

Calibration procedure:

The wind direction sensor was calibrated against Standard Rotary Encoder, model AX4009TS-DMD4-P3-S-UD in an open test section of Eiffel-type wind tunnel with 300 cm² cross section area. The WI-CL-002 fitted on IEC-61400-23-1, Wind energy generation systems, - Part 12-1: Power performance measurements of electricity producing wind turbines, March 2017 was used as a calibration guideline.

Traceability:

This certificate provides a traceability of the measurement to the national standards, and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: DA-0043-22

Uncertainty of Measurement:

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

RECEIVED DATE : 11 Jul 2023
MEASUREMENT DATE : 21 Jul 2023
ISSUE DATE : 21 Jul 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature : 23.0 ± 3.0 °C

Relative Humidity : 55.0 ± 15.0 %RH

Atmospheric Pressure : 1010 ± 10 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITION

Wind tunnel cross-section area¹ 900 cm²

Win direction frontal area² 129 cm²

Diameter of mounting pipe³ - mm

Blockage ratio of test object⁴ 0.143 [-]

Preconditioning

24 hours at ambient conditions.

Measurement Condition

The average values during measurement are (23.8)°C, (46.9) %RH and (1012.4) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

☒ Mr. Sorawit Thachalad

☐ Miss Jitraporn Lettsomphol

Approved signatory:

Mr. Parinya Booncharoen

Calibration Department Manager

Remarks:

¹ Including cross-section area of the wind tunnel

² Projected cross-section area of the tested object include mounting pipe

³ Diameter of mounting pipe

⁴ Ratio ² to ¹

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Certificate Number

CWD-002-66

Page 2 of 2 Pages

MEASUREMENT RESULTS⁵

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

Air speed m/s	D ₁₀₀ Degree (°)	D ₁₅₀ Degree (°)	Error Degree (°)	U (k=2) Degree (°)
5.00	45.000	42	-3	1.0
	50.000	87	-3	1.0
	135.000	133	-2	1.0
	180.000	181	1	1.0
	225.000	229	4	1.0
	270.001	273	3	1.0
	315.000	317	2	1.0
	360.000	359	-1	1.0

Remark:

⁵ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place

⁶ Direction of standard

⁷ Direction of Unit Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No.: CDT-038-66

Page 1 of 2

Equipment Name: Data Logger with Temperature sensor

Manufacturer: Novelynx

Model: 110-WS-25DL-D

Serial No.: A5816

ID No.: RYG_FS0545

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: 11 Jul 2023

Calibration date: 21 Jul 2023

Issue date: 21 Jul 2023

Reference Used During Calibration

1. Standard Temperature Probe Model: STS-100 A500.

Serial No.: 667682-09, Due date: 28 Mar 2024

2. Digital Temperature Indicator Model: DTI-1000-A MK

II, Serial No.: 671407-00591. Due date: 22 July 2023

Calibration Condition

Temperature: (23±3) °C

Relative Humidity: (55±15)%

Traceability

The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT) Certificate number: TT-0038-23, Certificate number: ER-0092-22

Calibration Procedure

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

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

Calibrated by

☐ Mr. Sorawit Thachalad

☒ Miss Jitraporn Lettsomphol

☐ Miss Ruangrumpai Phoommit

Approved Signatory:

Mr. Parinya Booncharoen

Calibration Department Manager

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Certificate No.: CDT-038-66

Page 2 of 2

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20-40 °C

Function:

This equipment was connected with temperature sensor Model: HMP60 S/N: T2320595.

Dimension : Diameter 12 mm. Length 60 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.060	19.6	-0.5	0.099
70	25.055	24.6	-0.4	0.14
70	30.050	29.7	-0.4	0.099
70	35.043	34.5	-0.5	0.099
70	40.036	39.5	-0.5	0.099

UUC* : Unit Under Calibration

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

*** End of Certificate ***



CERTIFICATE OF CALIBRATION

Calibration No. : RH-02072023
Page 1 of 1 Pages

Measurement Item : Relative humidity with data logger
Manufacturer : Novalynx
Model/Type : I10-WS-25DL-D
Serial Number : A5816
ID No. : RYG_FS0545
Customer : ALS laboratory group (Thailand) Co., Ltd.
: 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Environmental Condition:
The measurement was carried out in an ambient temperature of (25±3)°C, and relative humidity of (50±15)%.

Measurement Method:
Unit Under Calibration (UUC) was calibrated by comparison method with standard chilled mirror hygrometer model: 1860-3 in the humidity generator chamber to determine the errors.

Traceability:
This instrument was calibrated using standard equipment whose accuracy is traceability through National Institute of Standards and Technology to the international system of units (SI) via MCS Calibration, Inc. Certificate number: 20926-601. Due date: Sep 26, 2024.

Measurement Date : Jul 21, 2023
Issued Date : Jul 21, 2023

Measurement Results:
This equipment was connected with Indoor air quality probe and Displayed (URI) on display. Model: HMP60, Serial number: T2320595.

Calibration was performed in the range of 20%RH to 80%RH

The results of calibration are reported in table below.

Determined (%RH)	Standard (%RH)	UUC (%RH)	Error (%RH)	Uncertainty ±(%RH)
20	20.05	17.5	-2.6	0.52
50	50.23	46.5	-3.7	0.51
80	80.25	75.5	-4.8	0.51

Performed by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol
☐ Miss Ruangsri Phoommit



Approved Signatory:
Mr. Parinya Booncharoen
Calibration Department Manager

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

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0292

MTC No. EEL. BP. 83/0267

CALIBRATION CERTIFICATE

Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
Address : 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok, 10250.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :
Description : Sound Calibrator
Manufacturer : Rion
Model : NC-74
Serial No. : 34178121 (ID: RYG_FS0213)
Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tanagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Keithley 2015-P S/N4106495.
7. Condenser Microphone B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 19 Feb. 2024

Date of Calibration : 28 Feb. 2024

The results relate only to the items tested/calibrated or value assigned.
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

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(66) 08 3219 9440
E-mail : mtg@tistr.or.th Website : www.tistr.or.th

Office
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Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
(66) 08 1889 8827

FABL.MTC.002 Rev.3

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0292

MTC No. EEL. BP. 83/0267

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

Nominal Output of Unit Under Test = 94 dB re 20μPa at 1000 Hz

Acoustic Output in dB re 20μPa, Corrected to Reference Conditions: 101.325 kPa, 23.0 °C and 50 %RH.

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	94.01	0.01	± 0.10	± 0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1003.1	3.1	± 1.5	± 1.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1.80	± 0.50	± 3.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was included at level of 0.16 dB from manual.

Calibrated by :
(Mr. Weerachai Deechaiyap)

Approved by :
(Mr. Parinya Booncharoen)
Director
Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 28 Feb. 2024

Date of Issue : 29 Feb. 2024

End of Certificate

Ref : 2011267021900719001

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The results relate only to the items tested/calibrated or value assigned.
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SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

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

Cert. No. : ACL24011
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24
Serial No. : 00623389 / 198636 / 26417
ID No. : RYG_FS0614

Condition As Found : GOOD

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

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

Received Date : 19 DECEMBER 2023
Calibration Date : 05-08 JANUARY 2024
Date of Issue : 09 JANUARY 2024

Calibrated by : Nathakorn Pisutpaisan

Approved by :
(Thanakul Petchurai)

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

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

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



Cert. No. : ACL24011
Job No. : VC67AC0044
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL-BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL-BP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL-BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAJ	34560495	AA-3002-23	14-FEB-24

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).

7. Retin

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

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



Cert. No. : ACL24011
Job No. : VC67AC0044
Pages : 3 of 8

Summary of Measurement Result :

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

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Cert. No. : ACL24011
Job No. : VC67AC0044
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.9%)	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	9.9
C - weight	16.7
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	0.1	0.1	0.1	±1.5
1000	-0.1	-0.1	-0.1	±1.0
8000	1.2	1.3	1.3	±5.0

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



Cert. No. : ACL24011
Job No. : VC67AC0044
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	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

7. Retin

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	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.8	-0.2	± 1.1

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8. Level linearity including the level range control

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

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	± 3.0
One	136.4	136.0	-0.4	± 3.0

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

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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

T. Petchur

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24
Serial No. : 00623387 / 198634 / 26415
ID No. : RYG_FS0612

Condition As Found : GOOD

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

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

Received Date : 19 DECEMBER 2023
Calibration Date : 05-08 JANUARY 2024
Date of Issue : 09 JANUARY 2024

Calibrated by : Nathakorn Pisutpaisan

Approved by : T. Petchur
(Thanakul Petchurai)

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CALIBRATION LABORATORY

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Tel: +66 2433 8331 Email: calibration@sithiphorn.com



Cert. No. : ACL24009
Job No. : VC67AC0044
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL_BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL_BP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL_BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KA1	34560495	AA-3002-23	14-FEB-24

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).

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Cert. No. : ACL24009
Job No. : VC67AC0044
Pages : 3 of 8

Summary of Measurement Result :

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

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Cert. No. : ACL24009
Job No. : VC67AC0044
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	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	11.6
C - weight	17.8
Flat	23.6

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.3	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	0.6	0.7	0.7	± 5.0

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Job No. : VC67AC0044
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	0.1	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

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Cert. No. : ACL24009
Job No. : VC67AC0044
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.8	-0.2	± 1.1

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Cert. No. : ACL24009
Job No. : VC67AC0044
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	± 1.1

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	± 3.0
One	136.4	136.3	-0.1	± 3.0

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

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Cert. No. : ACL24009
Job No. : VC67AC0044
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

T. Petchur

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Cert. No. : ACL24010
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00623388 / 198635 / 26416
ID No.: RYG_FS0613

Condition As Found : GOOD

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

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

Received Date : 19 DECEMBER 2023
Calibration Date : 05-08 JANUARY 2024
Date of Issue : 09 JANUARY 2024

Calibrated by : Nuthakorn Pisutpaisan

Approved by : T. Petchur
(Thanakul Petchur)

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

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Cert. No. : ACL24010
Job No. : VC67AC0044
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL-BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL-BP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL-BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24

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).

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Cert. No. : ACL24010
Job No. : VC67AC0044
Pages : 3 of 8

Summary of Measurement Result :

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

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Cert. No. : ACL24010
Job No. : VC67AC0044
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	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	10.8
C - weight	17.1
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	0.3	0.3	0.4	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	1.0	1.1	1.1	± 5.0

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Cert. No. : ACL24010
Job No. : VC67AC0044
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

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Cert. No. : ACL24010
Job No. : VC67AC0044
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	48.9	-0.1	±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	27.9	-0.1	±1.1
27.0	26.9	-0.1	±1.1
26.0	25.9	-0.1	±1.1
25.0	24.9	-0.1	±1.1

7. Return

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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	±1.1

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	136.3	-0.1	±3.0

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

7. Return

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Cert. No. : ACL24010
Job No. : VC67AC0044
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

7. Return



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL BP. 179/0167

CALIBRATION CERTIFICATE

Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
Address : 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre, Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :
Description : Sound Level Meter
Manufacturer : Rion
Model : NL-42
Serial No. : 00900074 (ID: RYG_FS0495)
Microphone : UC-52 No.188467
Preamplifier : NH-24 No.01736

Ambient Environment
Temperature : (23 ± 3) °C
Relative Humidity : (50 ± 15) %
Ambient Pressure : (101.325 ± 1.5) kPa

Standards used :

1. Band Pass Filter Wavetek 752A S/N 90010494.
2. Condenser Microphone Brüel&Kjær 4180 S/N 2889871.
3. Decade Attenuator Ando AL-205 S/N 00464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
6. Digital Multimeter Fluke 8520A S/N 4985007.
7. Pistonphone Rion NC-72 S/N 00402446.
8. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.

Date of Receipt : 24 Jan. 2024

Date of Calibration : 23 Feb. 2024 - 1 Mar. 2024

1 / 9

REVIEW BY *Manan P.*
APPROVED BY *Manan P.*
NEXT CAL. DATE: 02/02/25

The service is provided only to the client who has been calibrated or tested within the scope of the TISTR. Advertising the Result/Certificate is prohibited for the result, except in full, is prohibited unless written permission is obtained from the TISTR.

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL. BP. 179/0167

9. Power Amplifier Brüel&Kjær 2706 S/N 1517650.
10. Speaker Tannoy Limited, Great Britain British Patent No. 215300.
11. Digital Multimeter Agilent 34401A S/N MY44005560.
12. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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

Date of Calibration : 23 Feb.2024-1 Mar.2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL. BP. 179/0167

1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)		Deviation value (dB)	Acceptance limit Class 2 (dB)	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
	Before adjust	After adjust		(\pm dB)	(\pm dB)	(\pm dB)
113.94	114.1	113.9	0.0	1.0	0.30	N/A

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 124.2 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (\pm dB)
16.5	0.10	N/A

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

Frequency Weighting	Measured value (dB)	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (\pm dB)
A-Weight	11.7	0.10	N/A
C-Weight	17.2	0.10	N/A
Flat	22.5	0.10	N/A

Date of Calibration : 23 Feb.2024-1 Mar.2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL. BP. 179/0167

3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2		Maximum-permitted uncertainty of measurement (\pm dB)
	A-weight	C-weight	Flat	(\pm dB)	(\pm dB)	
125	0.2	0.3	0.3	1.5	0.45	0.6
1 000	-0.2	-0.2	-0.2	1.0	0.45	0.6
8 000	-0.7	-0.8	-0.8	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2		Maximum-permitted uncertainty of measurement (\pm dB)
	A-weight	C-weight	Flat	(\pm dB)	(\pm dB)	
63	-0.1	-0.1	0.0	2.0	0.20	0.6
125	-0.1	0.0	0.0	1.5	0.20	0.6
250	-0.1	0.0	0.0	1.5	0.20	0.6
500	0.0	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	-0.1	-0.1	0.0	2.0	0.20	0.6
4 000	-0.1	-0.1	0.0	3.0	0.20	0.6
8 000	0.0	0.0	0.0	5.0	0.20	0.7

Date of Calibration : 23 Feb.2024-1 Mar.2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL. BP. 179/0167

5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (dB)	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (dB)	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.0	0.0	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (dB)	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

Date of Calibration : 23 Feb.2024-1 Mar.2024

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Request No. 21-67/0232

MTC No. EEL. BP. 179/0167

7. Level linearity on the reference level range

Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
136	136.0	0.0	1.1	0.30	0.3
135	135.0	0.0	1.1	0.30	0.3
134	134.0	0.0	1.1	0.30	0.3
133	133.0	0.0	1.1	0.30	0.3
132	132.0	0.0	1.1	0.30	0.3
131	131.0	0.0	1.1	0.30	0.3
130	130.0	0.0	1.1	0.30	0.3
129	129.0	0.0	1.1	0.30	0.3
124	124.0	0.0	1.1	0.30	0.3
119	119.0	0.0	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.0	0.0	1.1	0.30	0.3
79	79.0	0.0	1.1	0.30	0.3
74	74.0	0.0	1.1	0.30	0.3
69	68.9	-0.1	1.1	0.30	0.3

Date of Calibration : 23 Feb.2024-1 Mar.2024

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Request No. 21-67/0232

MTC No. EEL. BP. 179/0167

7. Level linearity on the reference level range (cont.)

Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
64	63.9	-0.1	1.1	0.30	0.3
59	58.9	-0.1	1.1	0.30	0.3
54	53.9	-0.1	1.1	0.30	0.3
49	48.9	-0.1	1.1	0.30	0.3
44	43.9	-0.1	1.1	0.30	0.3
39	38.9	-0.1	1.1	0.30	0.3
34	33.9	-0.1	1.1	0.30	0.3
29	28.9	-0.1	1.1	0.30	0.3
28	27.9	-0.1	1.1	0.30	0.3
27	26.9	-0.1	1.1	0.30	0.3
26	25.9	-0.1	1.1	0.30	0.3
25	24.8	-0.2	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
30-130	94.0	94.0	0.0	1.1	0.30	0.3

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Request No. 21-67/0232

MTC No. EEL. BP. 179/0167

8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
30-130	35.0	35.0	0.0	1.1	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	126.0	0.0	±1.0	0.20	0.3
	2	108.9	-0.1	+1.0; -2.5	0.20	0.3
	0.25	99.9	-0.1	+1.5; -5.0	0.20	0.3
Slow	200	119.6	0.0	±1.0	0.20	0.3
	2	100.0	0.0	+1.0; -5.0	0.20	0.3
	0.25	90.8	-0.2	+1.5; -5.0	0.20	0.3

Date of Calibration : 23 Feb.2024-1 Mar.2024

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Request No. 21-67/0232

MTC No. EEL. BP. 179/0167

10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.4	0.0	3.0	0.20	0.35
Positive half cycle	124.4	124.1	-0.3	2.0	0.20	0.35
Negative half cycle	124.4	124.1	-0.3	2.0	0.20	0.35

11. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle				
135.0	135.0	0.0	1.5	0.20	0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by :

(Mr. Tawikiat Iamsanran)

Approved by :

(Mr. Prawat Khunyan)

Electrical and Electronic Standards Laboratory

Date of Calibration : 23 Feb.2024-1 Mar.2024

Industrial Metrology and Testing Service Centre

Date of Issue : 1 Mar. 2024

Ref : 201 (2670) 2400347009

End of Certificate

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Cert. No. : ACL24012
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24
Serial No. : 00623390 / 198637 / 26418
ID No. : RYG_FS0615

Condition As Found : GOOD

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

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

Received Date : 19 DECEMBER 2023
Calibration Date : 05-08 JANUARY 2024
Date of Issue : 09 JANUARY 2024

Calibrated by : Nathakorn Pisurpaisan

Approved by :

T. Petchur
(Thanakul Petchur)

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

Cert. No. : ACL24012
Job No. : VC67AC0044
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EELBP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EELBP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EELBP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24

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. : ACL24012
Job No. : VC67AC0044
Pages : 3 of 8

Summary of Measurement Result :

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

Cert. No. : ACL24012
Job No. : VC67AC0044
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	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	19.2
Flat	24.8

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	±1.5
1000	0.0	0.0	0.0	±1.0
8000	1.0	1.1	1.1	±5.0

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

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	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.8	-0.2	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

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	±1.1

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepack (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	136.3	-0.1	±3.0

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

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	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

Cert. No. : ACL24033
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00623392 / 198639 / 26420
ID No.: RYG_FS0617

Condition As Found : GOOD

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

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

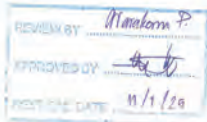
Received Date : 05 JANUARY 2024
Calibration Date : 12-15 JANUARY 2024
Date of Issue : 16 JANUARY 2024

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchuraj
(Thanakul Petchuraj)

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

Cert. No. : ACL24033
Job No. : VC67AC0052
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL_BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL_BP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL_BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAi	34560495	AA-3002-23	14-FEB-24

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

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

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

T. Petchuraj

Cert. No. : ACL24033
Job No. : VC67AC0052
Pages : 3 of 8

Summary of Measurement Result :

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

T. Petchuraj

Cert. No. : ACL24033
Job No. : VC67AC0052
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	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	13.8
C - weight	20.6
Flat	26.1

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	0.1	0.1	0.1	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	1.2	1.3	1.3	±5.0

T. Petchuraj

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

T. Petch

7. Level linearity on the reference level range

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

T. Petch

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	±1.1

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	136.0	-0.4	±3.0

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

T. Petch

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.7	89.7	0.0	±1.5

12. High level stability

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

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

End of Calibration Certificate

T. Petch

Cert. No. : ACL24037
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00623396 / 198643 / 26424
ID No.: RYG_FS0621

Condition As Found : GOOD

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

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

Received Date : 05 JANUARY 2024
Calibration Date : 12-15 JANUARY 2024
Date of Issue : 16 JANUARY 2024



Calibrated by : Nathakorn Pisutpaisan

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

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

Cert. No. : ACL24037
Job No. : VC67AC0052
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EELBP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EELBP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EELBP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24

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

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

3.1 National Institute of Metrology (Thailand).

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

*T. Petchurai*Cert. No. : ACL24037
Job No. : VC67AC0052
Pages : 3 of 8Cert. No. : ACL24037
Job No. : VC67AC0052
Pages : 4 of 8

Summary of Measurement Result :

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

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	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	10.8
C - weight	18.7
Flat	23.6

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.1	0.1	0.1	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	0.4	0.5	0.5	± 5.0

*T. Petchurai**T. Petchurai*

Cert. No. : ACL24037
Job No. : VC67AC0052
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	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

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Job No. : VC67AC0052
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	33.9	-0.1	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.8	-0.2	± 1.1

T. Petch

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Job No. : VC67AC0052
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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	±1.1

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	136.3	-0.1	±3.0

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

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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	89.6	0.1	±1.5

12. High level stability

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

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

End of Calibration Certificate

T. Petch

Cert. No. : ACL24304
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Calibration Certificate

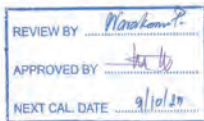
Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00873057 / 171591 / 73333
ID No.: RYG_FS0381

Condition As Found : GOOD

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

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

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



Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchuraj
(Thanakul Petchuraj)

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other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL24304
Job No. : VC67AC0164
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

3.1 National Institute of Metrology (Thailand).

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

*T. Petchuraj*Cert. No. : ACL24304
Job No. : VC67AC0164
Pages : 3 of 8

Summary of Measurement Result :

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

*T. Petchuraj*Cert. No. : ACL24304
Job No. : VC67AC0164
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value: (dB)
16.7

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

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

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 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	1.1	1.2	1.2	±5.0

T. Petchuraj

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Job No. : VC67AC0164
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

T. Petch

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Job No. : VC67AC0164
Pages : 6 of 8

7. Level linearity on the reference level range

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

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Cert. No. : ACL24304
Job No. : VC67AC0164
Pages : 7 of 8

8. Level linearity including the level range control

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

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	30.0	30.1	0.1	±1.1

9. Tone burst response

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

T. Petch

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Job No. : VC67AC0164
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	135.9	-0.5	±3.0

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

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	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

T. Petch

Cert. No. : ACL24305
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00873109 / 171842 / 73485
ID No.: RYG_FS0384

Condition As Found : GOOD

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

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

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

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchu.
(Thanakul Petchurai)

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other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL24305
Job No. : VC67AC0164
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

3.1 National Institute of Metrology (Thailand).

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

Cert. No. : ACL24305
Job No. : VC67AC0164
Pages : 3 of 8

Summary of Measurement Result :

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

Cert. No. : ACL24305
Job No. : VC67AC0164
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
16.1

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

Frequency Weighting (dB)	Weighting (dB)
A - weight	13.1
C - weight	19.8
Flat	25.1

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.4	0.5	0.5	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	-1.4	-1.3	-1.3	± 5.0

Cert. No. : ACL24305
Job No. : VC67AC0164
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

T. Petch.

Cert. No. : ACL24305
Job No. : VC67AC0164
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.1	0.1	± 1.1
27.0	27.2	0.2	± 1.1
26.0	26.2	0.2	± 1.1
25.0	25.2	0.2	± 1.1

T. Petch.

Cert. No. : ACL24305
Job No. : VC67AC0164
Pages : 7 of 8

8. Level linearity including the level range control

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

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	30.0	30.1	0.1	±1.1

9. Tone burst response

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

T. Petch.

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	136.2	-0.2	±3.0

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

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

T. Petch.

Cert. No. : ACL24307
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No.: 01073423 / 169513 / 73684
ID No.: RYG_FS0386

Condition As Found : GOOD

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

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

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



Calibrated by : Nathakorn Pisutpaisan

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

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Cert. No. : ACL24307
Job No. : VC67AC0164
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

3.1 National Institute of Metrology (Thailand).

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

Cert. No. : ACL24307
Job No. : VC67AC0164
Pages : 3 of 8

Summary of Measurement Result :

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

Cert. No. : ACL24307
Job No. : VC67AC0164
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.7

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

Frequency Weighting (dB)	Weighting (dB)
A - weight	14.8
C - weight	21.2
Flat	26.6

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.1	0.1	0.1	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	0.3	0.4	0.4	± 5.0

Cert. No. : ACL24307
Job No. : VC67AC0164
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	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

T. Petch

Cert. No. : ACL24307
Job No. : VC67AC0164
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.1	0.1	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.1	0.1	± 1.1
28.0	28.1	0.1	± 1.1
27.0	27.2	0.2	± 1.1
26.0	26.2	0.2	± 1.1
25.0	25.3	0.3	± 1.1

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Cert. No. : ACL24307
Job No. : VC67AC0164
Pages : 7 of 8

8. Level linearity including the level range control

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

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	30.0	29.9	-0.1	±1.1

9. Tone burst response

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

T. Petch

Cert. No. : ACL24307
Job No. : VC67AC0164
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	136.3	-0.1	±3.0

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

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

T. Petch

Cert. No. : ACL24007
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No. : 01173609 / 172170 / 74021
ID No. : RYG_FS0388

Condition As Found : GOOD

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

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

Received Date : 19 DECEMBER 2023
Calibration Date : 05-08 JANUARY 2024
Date of Issue : 09 JANUARY 2024



Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchurai
(Thanakul Petchurai)

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

Cert. No. : ACL24007
Job No. : VC67AC0044
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL-BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL-BP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL-BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24

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. : ACL24007
Job No. : VC67AC0044
Pages : 3 of 8Cert. No. : ACL24007
Job No. : VC67AC0044
Pages : 4 of 8

Summary of Measurement Result :

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

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	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	13.4
C - weight	19.9
Flat	25.3

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	0.8	0.9	0.9	±5.0

T. Petchurai

T. Petchurai

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

Z. Petch

7. Level linearity on the reference level range

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

Z. Petch

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	±1.1

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	136.3	-0.1	±3.0

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

Z. Petch

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

Z. Petch



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL. BP. 173/0167

CALIBRATION CERTIFICATE

Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.

Address : 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.

Sri 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Level Meter

Manufacturer : Rion

Model : NL-42

Serial No. : 00296516 (ID: RYG_FS0433)

Microphone : Type UC-52 No.180412

Preamplifier : Type NH-24 No.88182

Ambient Environment

Temperature : (23 ± 3) °C

Relative Humidity : (50 ± 15) %

Ambient Pressure : (101.325 ± 1.5) kPa



Standards used :

1. Band Pass Filter Wavetek 752A S/N 90010494.
2. Condenser Microphone Brüel&Kjær 4180 S/N 2889871.
3. Decade Attenuator Ando AL-205 S/N 00464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
6. Digital Multimeter Fluke 8520A S/N 4985007.
7. Pistonphone Rion NC-72 S/N 00402446.
8. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.

Date of Receipt : 24 Jan. 2024

Date of Calibration : 22-28 Feb. 2024

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The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

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FABL.MTC.002 Rev.4



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL. BP. 173/0167

9. Power Amplifier Brüel&Kjær 2706 S/N 1517650.

10. Speaker Tannoy Limited, Great Britain British Patent No. 215300.

11. Digital Multimeter Agilent 34401A S/N MY44005560.

12. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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

Date of Calibration : 22-28 Feb. 2024

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Amphoe Muang, Changwat Samutprakan 10280, Thailand
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Office
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Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

FABL.MTC.002 Rev.4



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL. BP. 173/0167

1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)		Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	Before adjust	After adjust				
113.96	114.1	113.9	-0.1	1.0	0.30	N/A

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 124.1 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
18.9	0.10	N/A

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

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-Weight	12.3	0.10	N/A
C-Weight	17.7	0.10	N/A
Flat	23.1	0.10	N/A

Date of Calibration : 22-28 Feb. 2024

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The results relate only to the items tested/calibrated or value assigned.

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FABL.MTC.002 Rev.4



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL. BP. 173/0167

3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
125	0.0	0.2	0.1	1.5	0.45	0.6
1 000	0.0	0.0	0.0	1.0	0.45	0.6
8 000	-0.3	-0.3	-0.3	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
63	-0.1	0.0	0.0	2.0	0.20	0.6
125	-0.1	0.0	0.0	1.5	0.20	0.6
250	0.0	0.0	0.0	1.5	0.20	0.6
500	0.0	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	0.0	0.0	0.0	2.0	0.20	0.6
4 000	0.0	0.0	0.0	3.0	0.20	0.6
8 000	0.0	0.0	0.0	5.0	0.20	0.7

Date of Calibration : 22-28 Feb. 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL. BP. 173/0167

5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.1	0.1	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

Date of Calibration : 22-28 Feb. 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL. BP. 173/0167

7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
137	137.1	0.1	1.1	0.30	0.3
136	136.1	0.1	1.1	0.30	0.3
135	135.1	0.1	1.1	0.30	0.3
133	133.1	0.1	1.1	0.30	0.3
132	132.1	0.1	1.1	0.30	0.3
131	131.0	0.0	1.1	0.30	0.3
130	130.0	0.0	1.1	0.30	0.3
129	129.0	0.0	1.1	0.30	0.3
124	124.0	0.0	1.1	0.30	0.3
119	119.0	0.0	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.1	0.1	1.1	0.30	0.3
79	79.0	0.0	1.1	0.30	0.3
74	74.0	0.0	1.1	0.30	0.3
69	69.0	0.0	1.1	0.30	0.3
64	64.0	0.0	1.1	0.30	0.3
59	59.0	0.0	1.1	0.30	0.3

Date of Calibration : 22-28 Feb. 2024

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Request No. 21-67/0232

MTC No. EEL. BP. 173/0167

7. Level linearity on the reference level range (cont.)

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
54	54.0	0.0	1.1	0.30	0.3
49	48.9	-0.1	1.1	0.30	0.3
44	44.0	0.0	1.1	0.30	0.3
39	38.9	-0.1	1.1	0.30	0.3
34	33.9	-0.1	1.1	0.30	0.3
29	28.8	-0.2	1.1	0.30	0.3
28	27.8	-0.2	1.1	0.30	0.3
27	26.9	-0.1	1.1	0.30	0.3
26	25.9	-0.1	1.1	0.30	0.3
25	24.8	-0.2	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
30-130	94.0	94.0	0.0	1.1	0.30	0.3

Date of Calibration : 22-28 Feb. 2024

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Request No. 21-67/0232

MTC No. EEL. BP. 173/0167

8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
30-130	25	25.0	0.0	1.1	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	126.0	0.0	±1.0	0.20	0.3
	2	108.9	-0.1	+1.0; -2.5	0.20	0.3
	0.25	100.0	0.0	+1.5; -5.0	0.20	0.3
Slow	200	119.5	-0.1	±1.0	0.20	0.3
	2	100.0	0.0	+1.0; -5.0	0.20	0.3

Date of Calibration : 22-28 Feb. 2024

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Request No. 21-67/0232

MTC No. EEL. BP. 173/0167

10. Peak C' sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.5	0.1	3.0	0.20	0.35
Positive half cycle	124.4	124.1	-0.3	2.0	0.20	0.35
Negative half cycle	124.4	124.1	-0.3	2.0	0.20	0.35

11. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle				
135.4	135.4	0.0	1.5	0.55	0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by:
(Mr. Pannasit Phasingsri)Approved by:
(Mr. Prawate Klueppa)
Director
Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 22-28 Feb. 2024

Date of Issue : 29 Feb. 2024

Ref: 201 1267012400347003

End of Certificate

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FABLMTC.002 Rev.4



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NSC-TISI-TIS 17025
CALIBRATION 0367Temperature measurement laboratory
Calibration services department.NSC - TISI - TIS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No. : CDT-028-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 20032240
ID NUMBER : RVG_F50520
CONDITION AS-RECEIVED : Used Item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phatthanakan Rd.,
Khwang Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.RECEIVED DATE : 24 Jan 2024
MEASUREMENT DATE : 25 Jan 2024
ISSUE DATE : 30 Jan 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:
The table on next page give the measured values.Approved signatory:
Mr. Parinya Booncharoen
Calibration Department ManagerTHIS CERTIFICATE MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED
IN WRITING FROM THE LABORATORY

Continuation of Certificate of Calibration Number CDT-028-67

Page 2 of 2 Pages

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 21001213.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.054	20.1	0.0	0.099
80	25.054	25.2	0.1	0.099
80	30.046	30.2	0.2	0.099
80	35.043	35.2	0.2	0.099
80	40.033	40.2	0.2	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 21001245.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.054	20.1	0.0	0.099
110	25.055	25.1	0.0	0.099
110	30.046	30.1	0.1	0.099
110	35.043	35.1	0.1	0.099
110	40.033	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 21001785.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.053	20.1	0.0	0.16
75	25.055	25.0	-0.1	0.099
75	30.046	30.0	0.0	0.099
75	35.043	35.0	0.0	0.099
75	40.033	39.9	-0.1	0.099

UUC: Unit Under Calibration

Remark: The reported uncertainty of measurement is 0.16, based on standard uncertainty multiplied by a coverage factor k=2.25 providing a level of confidence of approximately 95%.

End of Certificate of Calibration



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NSC-TISI-TIS 17025
CALIBRATION 0367Temperature measurement laboratory
Calibration services department.NSC - TISI - TIS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No. : CDT-021-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 18018314
ID NUMBER : RVG_F50359
CONDITION AS-RECEIVED : Used Item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phatthanakan Rd.,
Khwang Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.RECEIVED DATE : 11 Jan 2024
MEASUREMENT DATE : 15 Jan 2024
ISSUE DATE : 17 Jan 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:
The table on next page give the measured values.Approved signatory:
Mr. Parinya Booncharoen
Calibration Department ManagerTHIS CERTIFICATE MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED
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Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 18021465.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.038	20.0	0.0	0.099
80	25.047	25.0	0.0	0.099
80	30.042	30.0	0.0	0.099
80	35.037	35.0	0.0	0.099
80	40.030	40.0	-0.1	0.14

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 20008280.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.038	20.0	0.0	0.099
110	25.047	25.0	0.0	0.14
110	30.042	30.1	0.1	0.099
110	35.037	35.1	0.1	0.099
110	40.031	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 18021262.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.038	20.1	0.0	0.14
75	25.047	24.9	-0.1	0.099
75	30.042	29.8	-0.2	0.099
75	35.037	34.8	-0.2	0.099
75	40.031	39.7	-0.3	0.099

UUC*: Unit Under Calibration

Remark: The reported uncertainty of measurement is 0.14, based on standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%.

End of Certificate of Calibration



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

Temperature measurement laboratory
Calibration services department.



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-020-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 18018313
ID NUMBER : RYG_F50358
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 11 Jan 2024
MEASUREMENT DATE : 15 Jan 2024
ISSUE DATE : 17 Jan 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.



Approved signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

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IN WRITING FROM THE LABORATORY

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

Traceability:
The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT).
Certificate number: TT-0038-23, Certificate number: ER-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 AS00, Serial No.: 667682-09,
Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTI-1000-A MK II, Serial No.: 671407-00591 Due date: 14 Sep 2024

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 18021467.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.039	20.1	0.1	0.099
80	25.051	25.1	0.0	0.099
80	30.045	30.0	0.0	0.099
80	35.036	35.1	0.1	0.099
80	40.030	40.0	0.0	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 18020497.
Dimension: Diameter 3.3 mm. Length 205 mm.

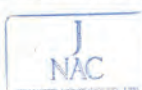
Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.039	20.1	0.1	0.099
110	25.051	25.1	0.0	0.099
110	30.045	30.1	0.1	0.099
110	35.036	35.1	0.1	0.099
110	40.030	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 18021270.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.039	20.2	0.2	0.099
75	25.051	25.1	0.0	0.099
75	30.045	30.1	0.1	0.099
75	35.036	35.0	0.0	0.099
75	40.030	39.9	-0.1	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



Jiranatee Associates Co.,Ltd.
63/14-15, 63/15-16
Petchburi 17/1, Rd. Wattana, Bangkok.
Bangkok 10600(Thailand)
Tel: +6628880812
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E-mail: jnac-calibration@jiranatee.com
Web site: www.jiranatee.com

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

Temperature measurement laboratory
Calibration services department.



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-022-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 18018316
ID NUMBER : RYG_F50360
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 11 Jan 2024
MEASUREMENT DATE : 15 Jan 2024
ISSUE DATE : 17 Jan 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.



Approved signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

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

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

Traceability:
The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT).
Certificate number: TT-0038-23, Certificate number: ER-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 AS00, Serial No.: 667682-09,
Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTI-1000-A MK II, Serial No.: 671407-00591 Due date: 14 Sep 2024

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 18021471.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.060	20.0	-0.1	0.099
80	25.051	25.0	-0.1	0.099
80	30.041	30.0	0.0	0.099
80	35.035	35.0	0.0	0.099
80	40.024	40.0	0.0	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 18020502.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.060	20.1	0.0	0.099
110	25.051	25.1	0.0	0.099
110	30.041	30.1	0.1	0.099
110	35.036	35.1	0.1	0.099
110	40.025	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 18021266.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.060	20.1	0.0	0.099
75	25.051	25.0	-0.1	0.099
75	30.041	29.8	-0.2	0.099
75	35.036	34.7	-0.3	0.099
75	40.025	39.6	-0.4	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



Jiranatee Associates Co.,Ltd.
63/14-15, 63/15-16
Petchburi 7,71, Rd. Wattana, Bangkok.
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Tel: +668880812
Mobile: +66883999432
E-mail: jnac-calibration@jiranatee.com
Web site: www.jiranatee.com

Temperature measurement laboratory
Calibration services department.

CERTIFICATE OF CALIBRATION

Certificate No. : CDT-055-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 15006714
ID NUMBER : RYG_F50219
CONDITION AS-RECEIVED : Used Item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwang Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 12 Feb 2024
MEASUREMENT DATE : 15 Feb 2024
ISSUE DATE : 20 Feb 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.



Approved signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 22035263.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.063	20.4	0.3	0.099
80	25.054	25.4	0.3	0.099
80	30.040	30.4	0.4	0.099
80	35.026	35.4	0.4	0.099
80	40.018	40.4	0.4	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 17023217.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.064	20.3	0.2	0.099
110	25.054	25.3	0.2	0.099
110	30.040	30.3	0.3	0.099
110	35.027	35.3	0.3	0.099
110	40.018	40.3	0.3	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015491.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.064	20.5	0.4	0.099
75	25.054	25.4	0.3	0.099
75	30.041	30.4	0.4	0.099
75	35.026	35.3	0.3	0.099
75	40.018	40.2	0.2	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



Jiranatee Associates Co.,Ltd.
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Web site: www.jiranatee.com

Temperature measurement laboratory
Calibration services department.

CERTIFICATE OF CALIBRATION

Certificate No. : CDT-054-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 15006713
ID NUMBER : RYG_F50218
CONDITION AS-RECEIVED : Used Item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwang Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 12 Feb 2024
MEASUREMENT DATE : 15 Feb 2024
ISSUE DATE : 20 Feb 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.



Approved signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 22035270.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.064	20.1	0.0	0.099
80	25.053	25.1	0.0	0.099
80	30.043	30.1	0.1	0.099
80	35.033	35.1	0.1	0.099
80	40.018	40.1	0.1	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 22035462.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.064	20.1	0.0	0.099
110	25.053	25.1	0.1	0.16
110	30.043	30.2	0.2	0.099
110	35.033	35.2	0.2	0.099
110	40.018	40.2	0.2	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015499.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.064	20.3	0.2	0.099
75	25.053	25.2	0.1	0.099
75	30.043	30.0	0.0	0.099
75	35.033	35.0	0.0	0.099
75	40.019	39.8	-0.2	0.099

UUC*: Unit Under Calibration

Remark: The reported uncertainty of measurement is 0.16, based on standard uncertainty multiplied by a coverage factor k=2.1 providing a level of confidence of approximately 95%.

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-010-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 15006711
ID NUMBER : RYG_F50217
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwang Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 05 Jan 2024
MEASUREMENT DATE : 08 Jan 2024
ISSUE DATE : 09 Jan 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.



Approved signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 16008206.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.059	20.2	0.1	0.099
80	25.051	25.2	0.1	0.099
80	30.047	30.2	0.2	0.099
80	35.039	35.2	0.2	0.099
80	40.035	40.2	0.2	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 17015123.
Dimension: Diameter 3.3 mm. Length 205 mm.

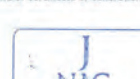
Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.059	20.2	0.1	0.099
110	25.052	25.2	0.1	0.099
110	30.047	30.2	0.2	0.099
110	35.039	35.2	0.2	0.099
110	40.035	40.2	0.2	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 17003390.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.059	20.2	0.1	0.099
75	25.052	25.1	0.0	0.099
75	30.047	29.9	-0.1	0.099
75	35.040	34.8	-0.2	0.099
75	40.036	39.7	-0.3	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-015-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 15006715
ID NUMBER : RYG_F50220
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwang Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 11 Jan 2024
MEASUREMENT DATE : 11 Jan 2024
ISSUE DATE : 17 Jan 2024

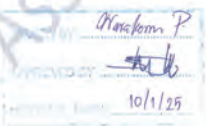
ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.



Approved signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 17022563.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.050	20.0	0.0	0.099
80	25.042	25.0	0.0	0.099
80	30.040	30.0	0.0	0.099
80	35.034	35.0	0.0	0.099
80	40.026	40.0	0.0	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 20019632.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.050	20.0	0.0	0.099
110	25.042	25.0	0.0	0.099
110	30.040	30.1	0.1	0.099
110	35.034	35.1	0.1	0.099
110	40.026	40.0	0.0	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015507.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.050	20.2	0.2	0.099
75	25.042	25.0	0.0	0.099
75	30.040	30.0	0.0	0.099
75	35.034	35.0	0.0	0.099
75	40.026	39.9	-0.1	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



Cert.No.: 24CH96
Page.: 1 of 3

Certificate of Calibration

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : SevenCompact S220
Serial No. : C104059480
ID No. : RYG_EN0183
Condition As-Received:
Received Date : 18 January 2024
Calibration Date : 19 January 2024
Reference : 2401-0578DSC-2
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5, T.Maenam Khu,
A.Puakdaeng, Rayong 21140, Thailand

Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In-house method
- CP-CH5 by direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM)
- CP-CH8 by comparison with temperature standard

Calibrated by : Warakorn Lemagatrakul

Approved by :
Approved Signatory

(✓) Sallhip Maangmai
() Warakorn Lemagatrakul
() Porpan Paipim

Issue Date : 24 January 2024

The Uncertainties are for a confidence probability of approximately 95%.

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A 0062854



Cert.No.: 24CH96
Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	23E2802	27 Aug 2024
2) Ref. Standard Thermometer	4982054	110RC044	23I908	26 July 2024

This certification is traceable to the International System of Unit maintained through:-
- Technology Promotion Association (Thailand-Japan)

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	840102	27 Nov 2025
pH 6.866	CPA chem	840104	02 Nov 2024
pH 9.997	CPA chem	840106	02 Nov 2024

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

Calibration Results

Function : mV Measurement

Performing standard curve by 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.: C104059480	4.000	177.48	177.4	4.000	0.058	2.00
	7.000	0.00	0.0	7.000	0.058	2.00
	10.000	+177.48	-177.5	10.000	0.058	2.00



Cert.No.: 24CH96
Page.: 3 of 3

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4.01,7.00,10.01)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor k
pH Electrode S/N.: 3225367	4.008	4.013	176.0	0.0054	2.07
	6.866	6.983	2.2	0.0084	2.00
	9.997	9.995	-174.1	0.0065	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe:

- Model : InLab®Expert Pro-ISM
- Serial No. : 3225367

Dimension of probe

- Length : 120 mm.
- Diameter : 12 mm.
- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.001	25.2	0.199	0.13	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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1198287

1198286



Certificate of Calibration

Certificate No.: 24E289
Page: 1 of 2

Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: SevenCompact S220
Serial No.: C104059480
ID No.: RYQ_EN0183
Condition As-Received: Used Item
Received Date: 18 January 2024
Calibration Date: 23 January 2024
Reference: 2401-0575DSC Submitted by: ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 10) %
Procedure used: Calibration were conducted using calibration procedure No. CP-E17 According to EURAMET 0-15.

Condition of this result of calibration

1. Reference standards instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Multi-Product Calibrator	5500A	6315011	E209300035	29 May 2024
2) This result of calibration was made on request at the point specified by customer.				
3) The certificate is valid only to the item calibrated on date and place of calibration.				
4) This Calibration is traceable to the International System of Unit maintained through:-				
-NA Calibrations Co., Ltd., ANAB Accredited No. Calibration AC-2638				

Calibrated by: Wulchansorn Wongchakrarn Approved Signatory:
Issue Date: 24 January 2024

0333296

Result of calibration

Function: DC voltage measurement	Range: 2000 mV	Standard Value	UUC* Reading	Error	Uncertainty
		(mV)	(mV)	(mV)	(± μV)
		-200.0000	-200.0	0.0	68
		-150.0000	-150.0	0.0	65
		-100.0000	-100.0	0.0	63
		-50.0000	-50.0	0.0	61
		0.0000	0.0	0.0	58
		50.0000	50.0	0.0	61
		100.0000	99.9	-0.1	63
		150.0000	149.9	-0.1	65
		200.0000	199.9	-0.1	68

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

UUC* = Unit Under Calibration.

-000-

1198963



Certificate of Calibration

Equipment: SPECTROPHOTOMETER
Model: DR6000
Serial No. (or ID.): 1627845 (RYG_EN0037)
Manufacturer: HACH
Condition: In Condition
Customer: ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenam Khu,
A.Pluakdaeng, Rayong 21140, Thailand.
Environment Condition: Temperature 23.9 °C ± 0.2
Humidity 65.3 %RH ± 1.4
Calibration Place: ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch) (Wet Chemistry)
616/10 Moo 5 T.Maenam Khu,
A.Pluakdaeng, Rayong 21140, Thailand.
Calibration By: Mr.Nattapat Rungrueang
Calibration Date: 18 September 2023
The Method used: In house method, CAL-WI-24, base on ASTM E 275-08 and ASTM E 387-04
Traceability: This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Stama Scientific Limited.
The standard for Wavelength Certificate No. 111583 and 111584
The standard for Photometric Certificate No. 9114984 and 111588
The standard for Stray light Certificate No. 111586 and 111585
The standard for Spectral resolution Certificate No. 111587

REVIEW BY: N. Benjart
APPROVED BY: D. K.
%RH
NEXT CAL. DATE: 18/12/25

(Mr. Nattapat Rungrueang)
Person in charge

(Mr. Nitinun Srihawan)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor ($k=2$) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

DKSH Technology Limited
2533 Sukhumvit Road, Bangkok, Thailand 10260
Phone: +66 2696 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth - in Asia and Beyond.

CAL-FM-C06-15: 12 Sep 2022



Calibration Results:

Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 2 nm and UUC at 2 nm				
Standard Wavelength	Unit Under Calibration	Correction	Uncertainty	
418.61	418.3	0.31	0.13	
536.66	536.6	0.06	0.13	
637.98	638.3	-0.32	0.13	
748.48	748.7	-0.22	0.13	
807.03	807.4	-0.37	0.13	
Photometric Accuracy (Absorbance)				
Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.2930	0.289	0.0040	0.0045
	0.5168	0.519	-0.0022	0.0045
	1.0298	1.029	0.0008	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.2867	0.283	0.0037	0.0045
	0.5073	0.509	-0.0017	0.0045
	1.0083	1.007	0.0013	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.2516	0.250	0.0016	0.0045
	0.4595	0.462	-0.0025	0.0045
	0.9334	0.933	0.0004	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.2461	0.245	0.0011	0.0045
	0.4652	0.468	-0.0008	0.0045
	0.9468	0.946	0.0008	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.2594	0.259	0.0004	0.0045
	0.5040	0.505	-0.0010	0.0045
	1.0032	1.002	0.0012	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.2579	0.257	0.0009	0.0045
	0.4971	0.497	0.0001	0.0045
	0.9720	0.971	0.0010	0.0045

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Delivering Growth - in Asia and Beyond.

CAL-FM-C06-15: 12 Sep 2022

Calibration Results:
Without Adjustment

Photometric Accuracy (Absorbance)				
Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0080
	0.7355	0.737	-0.0015	0.0080
257 nm	0.0000	0.000	0.0000	0.0080
	0.8574	0.857	0.0004	0.0080
313 nm	0.0000	0.000	0.0000	0.0080
	0.2884	0.290	-0.0036	0.0080
350 nm	0.0000	0.000	0.0000	0.0080
	0.6374	0.637	0.0004	0.0080
Stray light *				
Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%T)	Absorbance (A)	
260.62 +/- 0.11 nm	260.6	1.3	1.886	
391.44 +/- 0.11 nm	391.4	1.3	1.886	
Spectral Resolution *				
Nominal Concentration 0.02 % w/v	Peak	Trough	Ratio	SBW
Standard Wavelength (nm)	268.66	266.69	1.38	2.00
UUC: Wavelength (nm)	268.2	266.1		
Std Absorbance (A)	0.4566	0.2780		
Absorbance (A)	0.413	0.300		

* Calibration Marked "Not TISI Accredited" in this Certificate have been included for completeness.

The End of Certificate

บริษัท ดีเคเอสเอช (ประเทศไทย) จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
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Delivering Growth - in Asia and Beyond.

CAL-FM-C08-15: 12 Sep 2022

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: WO-00005382

ชนิดเครื่องมือ: SPECTROPHOTOMETER รุ่น: DR6000

หมายเลขเครื่อง: 1627845

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
18 Sep 2023			18 Sep 2023		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
General					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด – เปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Spectrophotometer					
<input type="checkbox"/>	<input type="checkbox"/>	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ควบคุมเลือกความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	*
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9.2 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	741.5 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. ช่องวัดหลายตัวอย่าง (Carousel Module)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
pH Meter and Conductivity Meter					
<input type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาตั้งอิเล็กโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
Turbidimeter					
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่องสว่างของแสง (>= 2.5 ไมล์ 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
Automatic titrator					
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาว Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

เงื่อนไขข้อแนะนำ: *656.1nm=656.1nm

*486.0nm=485.5nm

Mr.Nattapat Rungueang
Service Engineer

บริษัท ดีเคเอสเอช (ประเทศไทย) จำกัด
DKSH Technology Limited
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CAL-FM-R31-03: 20 Jul 2022



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

Cert.No.: 23TW168
Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102796
ID No. : RYG_EN0032
Received Date : 21 July 2023
Test Date : 24 July 2023
Reference : 2307-0713DSC-1
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
Rayong Branch
616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng,
Rayong 21140, Thailand
Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In - house method : CP-CH9
by Comparison Technique with Azide Modification Method
Tested by : Walalak Sirithean
Approved by :
Approved Signatory
() Malee Butkruea
(x) Saitthip Meangmai
() Warakorn Lemgagtrakul

Issue Date : 26 July 2023

B 0320211

Cert.No.: 23TW168
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :
This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1) Burette	-	130BU10	23CG1172	22 Mar 2025
2) Balance	1126143764	140RC004	22MM50	20 Sep 2023

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: 15E100464

Titration Method (Azide Modification Method)	DO Meter Reading	Standard Deviation
(mg/L)	(mg/L)	(mg/L)
8.18	8.17	0.0055

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 1172155



Cert. No.: 23LM125
Page.: 1 of 2

Certificate of Calibration

Equipment : DO Meter with Sensor
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102796
ID No. : RYG_EN0032
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
Rayong Branch
616/10 Moo 5 T. Maenam Khu, A. Pluakdaeng,
Rayong 21140 Thailand
Location : TPA On Site Calibration Laboratory
Received Order : 25 July 2023
Calibrated Date : 27 July 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Preecha Hiahb
Approved by :
() Pornthippa Tameyakul
() Malee Butkruea
(✓) Suwit Imjai
Issue Date : 31 July 2023

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 0053616



Equipment : DO Meter with Sensor
Condition As-Received : Used Item
Reference : 2307-0713DSC-2

Cert. No.: 23LM125
Page.: 2 of 2

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Digital Thermometer	2188080	2211285	TPA	21 Oct 2023

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

3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function : Temperature measurement.

This instrument was connected with temperature sensor, S/N.: 1228475367

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
20.00	100	20.01	19.91	-0.101 °	0.15	2.00

UUC* : Unit Under Calibration

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

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a 1159515



Cert. No.: 24TM1663
Page : 1 of 3

Certificate of Calibration

Equipment : Low Temp. Incubator
Manufacturer : Memmert
Model : IPP750
Serial No. : V818.0084
ID No. : RYG_EN0154
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch
616/10 Moo 5, T.Maenam Khu,
A.Pluaekdaeng,
Rayong 21140, Thailand
Location : BOD Room
Received Order : 01 November 2024
Calibration Date : 01 November 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Krisda Malee
Approved by :
() Ponpan Paipim
() Suwit Imjai
(✓) Kunchit Promprat
Issue Date : 07 November 2024

REVIEW BY
APPROVED BY
NEXT CAL DATE.....01/05/26

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.



Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2411-0002OC-1

Cert. No.: 24TM1663
Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY44073381	24LM73	TPA	18 May 2025

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

3. This certification is traceable to the International System of Unit.

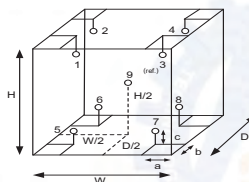
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	24	25
REL.Humid. (%)	55	53
AC Supply (Volt)	220	221



Probe Installation Details :

a = 10 cm
b = 10 cm
c = 10 cm

Dimension of Chamber :

D = 0.60 m
W = 1.0 m
H = 1.2 m
Capacity = 0.72 m³

Position :	Ref. Std. ID No.:
1	1RTD-2/1
2	1RTD-2/2
3	22-01RTD-03
4	1RTD-2/4
5	1RTD-2/5
6	1RTD-2/6
7	23-01RTD-07
8	1RTD-2/8
9 (ref.)	23-01RTD-09



Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2411-0002OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 24TM1663
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
20.0	20.0	20.0	0.026	0.26	0.53	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (±°C)
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	20.071	19.915	20.273	20.179	19.977	19.782	20.056	20.026	20.033	0.30

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

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



Certificate of Calibration

Cert.No.: 24CG3711
Page.: 1 of 2

Equipment : Burette
Capacity : 50 mL
Serial No. : -
ID. No. : RYG_EN0216
Manufacturer : Witeg
Made in : Germany
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
Rayong Branch
616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng
Rayong 21140, Thailand

Ambient Temperature : (20 ± 2.5) °C
Relative Humidity : (50 ± 10) %
Barometric Pressure : 756 mmHg
Calibration Procedure : ASTM E 542 - 01

Calibrated by : Sa-ngeunkam Wongsu

Approved by :
Approved Signatory

(√) Srisuda Khamtha
() Ponpan Paipim
() Unnopphol Harachai

Issue Date : 24 September 2024

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Burette
Received Date : 19 September 2024
Condition As-Received : Used Item
Calibration Date : 24 September 2024
Reference : 2409-0756DSC-3

Cert.No.: 24CG3711
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

Instruments	Model	Serial No.	ID. No.	Certificate No.	Traceability	Due date
1) Balance	XP205	B134206712	140RC007	24MM316	TPA	15 July 2025
2) Data Logger	HL-20D	20683159	140EC012	23H2174	TPA	10 Oct 2024
3) Thermometer	-	1594592	140EC010	241175	TPA	20 Feb 2025

This certification is traceable to SI Unit

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

3. True value is converted to true volume at the standard temperature of 20 °C

Calibration result :

Nominal capacity (mL)	Reading (mL)	Uncertainty (± mL)	k Factor
10	10.0259	0.0082	2.00
20	20.0214	0.0085	2.00
30	30.0006	0.0089	2.00
40	40.0003	0.0094	2.00
50	49.9988	0.011	2.00

Remark mL = 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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Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2542 6561-6, e-mail: service.thailand@sartorius.com



SARTORIUS

Certificate of Calibration

REVIEW BY :
APPROVED BY :
NEXT CAL DATE : 02/02/2025

Model Number : MSE224S-100-DU
Description : Analytical Balance
Serial Number : 0026207039
ID No. : RYG_EN0002
Manufacturer : Sartorius
Certificate No. : 24BC30059
Issued Date : Friday, February 23, 2024
Reference No. : 229198
Page No. : 1 of 2

Customer Name : ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenam Khu, A.Pluak Daeng, Rayong 21140, Thailand

Calibrated Place : ALS Laboratory Group (Thailand) Co., Ltd.(Balance Room)
616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng, Rayong 21140, Thailand

Calibrated By : Mr.Chonchai Inthana
Calibration Date : Thursday, February 22, 2024
Calibration Procedure No. : This calibration was conducted by Using in-house calibration procedure number (WI-003) Based on UKAS LAB 14 : 2019

Metrological data :
Capacity : 220 g Readability : 0.0001 g
Reasons for calibration
☐ New Installation ☐ Service / Repair ☒ Re-calibration/ Maintenance
Ambient Conditions:
Temperature : 24.2 °C ± 5.0 °C
Humidity : 57.0 % RH ± 10.0 % RH
Pressure : ±
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 from list of Sartorius Metrological Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 5000g E2 YCS011-522-00	TCS	M2308197S	23-Aug-2025
MHB-382SD	Humidity/Balometer/Temp. Lutron MHB-382SD	DKSH	C19231845	23-Aug-2024

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.

SOP FM 33 03 February 2022

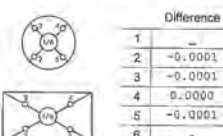
Mr.chonchai Inthana(Technical Manager)



Certificate of Calibration

Model Number : MSE224S-100-DU Certificate No. : 24BC10069
Description : Analytical Balance Issued Date : Friday, February 23, 2024
Serial Number : 0026207038 Reference No. : 229196
ID No. : RYG_EN0002
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 consistent 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 reproducibility quantitatively.			The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/3 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 R76).					
Nominal Value : (Low Load)	20.0000	199.9999	Nominal value :	100	g			
20 g	20.0000	200.0000	Tolerance	0.0004	g			
Tolerance	0.0001	0.0000						
0.0001 g	0.0000	0.0000						
Nominal Value : (High Load)	19.9999	200.0000						
200 g	20.0000	200.0000						
Tolerance	0.0001	0.0000						
0.0001 g	0.0000	0.0000						
Standard Deviation	0.00007	0.00005						


Linearity					
The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.					
Tolerance	0.0002	g			
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty	
(g)	(g)	(g)	(g)	(g)	
0.01	0.0100	0.0100	0.0000	0.00018	
0.05	0.0500	0.0500	0.0000	0.00018	
0.1	0.1000	0.1000	0.0000	0.00018	
0.5	0.5000	0.5000	0.0000	0.00018	
1	1.0000	1.0000	0.0000	0.00018	
5	5.0000	5.0000	0.0000	0.00018	
10	10.0000	10.0000	0.0000	0.00018	
20	20.0000	20.0000	0.0000	0.00024	
50	50.0000	49.9999	-0.0001	0.00019	
100	100.0000	100.0000	0.0000	0.00023	
200	200.0000	199.9999	-0.0001	0.00032	
End of Report					

SOP FM 33.05 February 2022



Certificate of Calibration

Cert. No.: 24TM632
Page : 1 of 3

Equipment : Hot Air Oven
Manufacturer : Memmert
Model : UFE 500
Serial No. : G511.1572
ID No. : RYG_EN0010
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5 T. Maenam Khu,
A. Pluakdaeng,
Rayong 21140 Thailand
Location : Oven Room
Received Order : 21 March 2024
Calibration Date : 21 March 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Man Pattanapongpaiboon
Approved by : 
Approved Signatory
() Pongthippa Tameyakul
() Unnopphol Harachai
(x) Suwit Imjai

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.



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2403-0563OC-1

Cert. No.: 24TM632
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 Resistance Temperature Detector (RTD) and 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 MY57013711 23LM115 TPA 11 Jul 2024

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

3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

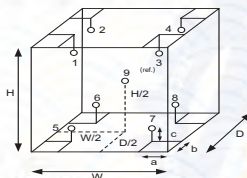
Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	27	27
REL.Humid. (%)	57	59
AC Supply (Volt)	222	224

Ref. Std. ID No. : @ Calibration Point		
Position :	(180) °C	(104) °C
1	18-18TC-01	18-18RTD-01
2	18-18TC-02	18-18RTD-02
3	18-18TC-03	18-18RTD-03
4	18-18TC-04	18-18RTD-04
5	18-18TC-05	18-18RTD-05
6	18-18TC-06	23-18RTD-06
7	18-18TC-07	18-18RTD-07
8	18-18TC-08	22-18RTD-08
9 (ref.)	18-18TC-09	18-18RTD-09

Probe Installation Details : Dimension of Chamber :
a = 5.0 cm D = 0.40 m
b = 5.0 cm W = 0.56 m
c = 5.0 cm H = 0.48 m
Capacity = 0.11 m³



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2403-0563OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 24TM632
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
104.0	104.0	104.0	0.051	0.59	0.62	2
180.0	180.0	180.0	0.15	1.3	1.7	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	103.921	103.786	103.757	103.759	103.950	103.817	104.213	103.672	103.673	0.42
180.0	179.614	179.270	179.145	179.599	180.001	180.423	180.293	180.629	179.429	1.1

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

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Certificate of Calibration

Cert. No.: 24TM634
Page : 1 of 3

Equipment : Hot Air Oven

Manufacturer : Memmert

Model : UF 110

Serial No. : B423.0853

ID No. : RYG_EN0213

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

Location : Oven Room

Received Order : 21 March 2024

Calibration Date : 21 - 22 March 2024

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Man Pattanapongpaiboon

Approved by :
Approved Signatory

() Pornthippa Tameyakul
() Unnophol Harachai
(✓) Suwit Imjai

Issue Date : 23 March 2024

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.



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2403-0563OC-3

Cert. No.: 24TM634
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 Resistance Temperature Detector (RTD) and 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	MY57013711	23LM115	TPA	11 Jul 2024

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

3. This certification is traceable to the International System of Unit.

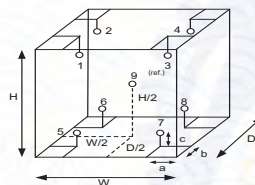
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :-

(*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



Environment during calibration		
	Beginning	Finished
Temp. (°C)	27	27
REL.Humid. (%)	59	59
AC Supply (Volt)	224	223

Ref. Std. ID No. : @ Calibration Point		
Position :	(180) °C	(104) °C
1	18-18TC-01	18-18RTD-01
2	18-18TC-02	18-18RTD-02
3	18-18TC-03	18-18RTD-03
4	18-18TC-04	18-18RTD-04
5	18-18TC-05	18-18RTD-05
6	18-18TC-06	23-18RTD-06
7	18-18TC-07	18-18RTD-07
8	18-18TC-08	22-18RTD-08
9 (ref.)	18-18TC-09	18-18RTD-09

Probe Installation Details : Dimension of Chamber :
a = 5.0 cm D = 0.40 m
b = 5.0 cm W = 0.56 m
c = 5.0 cm H = 0.48 m
Capacity = 0.11 m³



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2403-0563OC-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 24TM634
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
104.0	104.0	104.0	0.065	0.52	0.90	2
180.0	180.0	180.0	0.20	1.2	2.0	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	104.169	103.506	103.898	103.712	103.772	103.730	104.289	103.805	103.798	0.42
180.0	180.701	179.239	179.935	179.999	180.127	180.138	180.895	179.313	180.211	1.1

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

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Certificate of Calibration

Cert. No.: 24TM635
Page : 1 of 3

Equipment : Water Bath

Manufacturer : Memmert

Model : WNB22

Serial No. : L513.0648

ID No. : RYG_EN0061

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

Location : Wet Chemistry Lab

Received Order : 21 March 2024

Calibration Date : 21 March 2024

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Man Pattanapongpaiboon

Approved by :
Approved Signatory

() Pornthippa Tameyakul
() Unnophol Harachai
(✓) Suwit Imjai

Issue Date : 23 March 2024

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2403-0563OC-4
Procedure Used :-

Cert. No.: 24TM635
Page : 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT04 Based on ASTM E715 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

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	MY57013711	23LM115	TPA	11 Jul 2024

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

3. This certification is traceable to the International System of Unit.

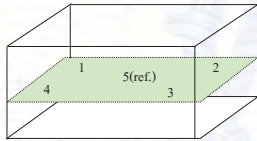
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	25	55	222
Finished of Calibration	25	57	223



Front

Position :	Ref. Std. ID No.:
1	4803988-001
2	4803988-002
3	4803988-003
4	4803988-004
5(ref.)	4803988-005



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2403-0563OC-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Cert. No.: 24TM635
Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)					Uncertainty (± °C)
			Position					
			1	2	3	4	5 (ref.)	
85.0	85.0	85.0	84.428	84.424	84.489	84.507	84.477	0.18

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
85.0	0.19	0.11	2

Average* : The average of 30 values in each position.

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.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

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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ภาคผนวก จ

สำเนาหนังสือใบอนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน



ที่ อก ๐๓๑๐(๑)/ ๑๖๑๖๘

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๐ พฤศจิกายน ๒๕๖๖

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๔ สิงหาคม ๒๕๖๖

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

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐
ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด
ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

- ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ ๑๘๑ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูล
หรือวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กันยายน ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อ
กรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นสุดอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



(นายสิระ จันทน์เลิศ)

นักวิทยาศาสตร์เชี่ยวชาญ วิชาการการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@div.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



สิ่งที่ส่งมาด้วย ๑

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ว-๒๐๔

ที่ อก ๐๓๑๐(๑)/ ๑๖๑๖๘

ลงวันที่ ๒๐ พฤศจิกายน ๒๕๖๖

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย

๑) นางสาวยุพาพร จันทร์เปล่ง

ทะเบียนเลขที่ ว-๒๐๔-ค-๐๐๐๑

๒) นางสาวชนัญ โคมารกุล ณ นคร

ทะเบียนเลขที่ ว-๒๐๔-ค-๐๐๐๒

๓) นายศรายุทธ จิตรานนท์

ทะเบียนเลขที่ ว-๒๐๔-ค-๐๐๐๓

๔) นางสาวกนกกร เอนก

ทะเบียนเลขที่ ว-๒๐๔-ค-๐๐๐๔

๕) นายสุริยา สอนแก้ว

ทะเบียนเลขที่ ว-๒๐๔-ค-๐๐๐๕

๖) นายวิชาญ ชุนทรัด

ทะเบียนเลขที่ ว-๒๐๔-ค-๐๐๐๖



เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ว-๒๐๔

ที่ อก ๐๓๑๐(๑)/ ๑๖๑๖๘ ลงวันที่ ๒๐ พฤศจิกายน ๒๕๖๖

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๘๑ ราย

๑) นายกาจบัณฑิต กิตติคุณวัฒน์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๑
๒) นายภัทรพล สว่างใจธรรม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๒
๓) นายนราธิป เทือกชัยคำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๓
๔) นายศิริโชค พงษ์ประสม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๔
๕) นายณัฐวุฒิ ดัวงแพง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๕
๖) นางสาวจินดา ไชยธรรม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๖
๗) นางสาวสาวิตรี น้อยแสงี่ยม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๗
๘) นางสาวชนัญญาญจน์ อัมมขม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๘
๙) นางสาวนรินทร์ สายเสียง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๙
๑๐) นางสาวนันทวดี สมบูรณ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๐
๑๑) นางสาวศรัณยา เฉลิมธารังค์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๑
๑๒) นางสาวธัญญธร มงคลจิรวุฒิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๒
๑๓) นางสาวศิริลักษณ์ บุญนาค	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๓
๑๔) นายณพพงศ์ จันทร์พันธุ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๔
๑๕) นายณเรศสรณ์ โกมลาลัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๕
๑๖) นายธินา จริยา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๖
๑๗) นางสาวเกศรินทร์ แก้วมัน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๗
๑๘) นางสาวสุวิมล ชัยเรืองวุฒิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๘
๑๙) นางสาวสุชาดา ธรรมถาวร	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๙
๒๐) นางสาวเปมิกา ชัยเดชธนกุล	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๐
๒๑) นางสาวศศิธร หนูสวัสดิ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๑
๒๒) นางสาวเสาวลักษณ์ ภูนาอำพร	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๒
๒๓) นายอภิสิทธิ์ สิงหา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๓
๒๔) นายศักดิ์สิทธิ์ โพธิ์สุทนต์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๔
๒๕) ว่าที่ร้อยตรีหญิง พรรณีภา ขำเจริญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๕
๒๖) นางจิตตา คำแก้ว	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๖
๒๗) นางสาวอรรพรรณ รักยง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๗
๒๘) นางสาวนพรัตน์ แยมกรานต์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๘
๒๙) นายจุลเดช วารินทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๙
๓๐) นางสาวดาญรัตน์ ร้องคำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๐
๓๑) นายพรมมี ศรีรัตนตร	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๑
๓๒) นายอุทิศ อุณสิม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๒
๓๓) ว่าที่ร้อยตรี เฉลิมเกียรติ อมรศรีเสริม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๓
๓๔) นางสาววริยา สร้างนา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๔
๓๕) นายอนุพงศ์ รัตนศรีประเสริฐ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๕

วิมล

๓๖) นางสาวจุฑารัตน์...

๓๖) นางสาวจุฑารัตน์ โอนสันเทียะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๖
๓๗) นางสาวจรรุวรรณ พิมพ์ภักดิ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๗
๓๘) นางสาวปรางค์ทิพย์ กิจไพศาลศักดิ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๘
๓๙) นางสาวเดือนใจ ทางกลาง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๙
๔๐) นางสาวจิราพร ศิริเวช	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๐
๔๑) นายวรารักษ์ ผูกักษ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๑
๔๒) นายทง วิริยะสทกิจ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๒
๔๓) นายธนิต เจนจบ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๓
๔๔) นายณิศกร ข้าเพชร	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๔
๔๕) นายภูวิช พรหมสะอาด	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๕
๔๖) นายธนเดช โกศาพิพัฒน์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๖
๔๗) นายชวฤทธิ์ วงษ์จันทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๗
๔๘) นายอาทิตย์ ศรีแสน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๘
๔๙) นายเจษฎินทร์ คงศักดิ์ไทย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๙
๕๐) นายจรัส บุญยิ่ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๐
๕๑) นายธนาณัติ เอนก	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๑
๕๒) นายอภิวัฒน์ ทุมหนู	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๒
๕๓) นางสาวสุภาขวัญ มาก	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๓
๕๔) นางสาวพัทธพร ขวาลสมบูรณ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๔
๕๕) นางสาวธิดา บุญเพ็ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๕
๕๖) นางสาวกานมาศ นามวัฒน์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๖
๕๗) นางสาวอุไรรัตน์ ทั้งสร้างแป้น	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๗
๕๘) นายธีรวัฒน์ ปวงสุข	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๘
๕๙) นายอิทธิพล ยะโส	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๙
๖๐) นายประพนธ์ วรรณสุขชัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๐
๖๑) นายชยธร พวงทิพย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๑
๖๒) นางสาวกนกวรรณ จันทบาล	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๒
๖๓) นายสิทธิโชค ธงเงิน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๓
๖๔) นางศิวารณ ใจบุญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๔
๖๕) นางสาวพรรณธิดา ทุมคง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๕
๖๖) นายณวัตร ศรีวิริยะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๖
๖๗) นายสุวิชา ทองอ่อน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๗
๖๘) นายวิญญู บุญตะนัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๘
๖๙) นายสมบูรณ์ บุตรจันทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๙
๗๐) นายวิรัตน์ ไชยชนะรา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๐
๗๑) นายนฤเบศน์ เพิ่มพูน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๑
๗๒) นายจิรณัฐ ขวาละออ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๒
๗๓) นายอัคริ นามบุรี	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๓
๗๔) นายอัคริเรศ จอสา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๔

วิมล

๗๕) นายประเสริฐ...

๗๕) นายประเสริฐ สุระขันธ
๗๖) นายบุญกุล จันทร์นิยม
๗๗) นายพีรพงษ์ ทองคุณปรีดา
๗๘) นายณฤพล ทองนุช
๗๙) นายอนุวัฒน์ ม่วงแพร่
๘๐) นายเจตศราวุฒิ ปัตตะมะ
๘๑) นายกฤษณะ สายวรรณ
๘๒) นายพิชัย บุญยงค์
๘๓) นายภานุพงศ์ โหมวงศ์
๘๔) นายสามารถ คุ้มปลี
๘๕) นายสัญญาชัย โกศรีนาม
๘๖) นายณัฐวุฒิ ศรีประเสริฐ
๘๗) นายชวลิต นาคพนม
๘๘) นายพชรชัย ชัยทิพย์
๘๙) นายสิทธิโชค ทาสีดา
๙๐) นายธนากร อินสุตา
๙๑) นางสาววรรณิษา ขาดิวันชัย
๙๒) นางสาวพิมพ์ตะวัน มินากุล
๙๓) นางสาวเพชรรัตน์ สิงห์สมบูรณ์
๙๔) นางสาวชญาณีน พรหมจันทร์
๙๕) นายกิตติ ทวีราช
๙๖) นายจักริน หมั่นวิชา
๙๗) นายฉัตรชัย สุขเปี้ย
๙๘) นายณรรณห์ ต๊ะทองคำ
๙๙) นายศุภพล สนนอก
๑๐๐) นายทักษ์ดนัย อุบลศรี
๑๐๑) นายธนศวรร นามะกุลณา
๑๐๒) นายฉัตรพงศ์ บัวแดง
๑๐๓) นายณนทชัย อุบลัมภ์
๑๐๔) นายณัฐพล คุณสุทธิ
๑๐๕) นายณัฏฐวัฒน์ สาริน
๑๐๖) นายปิยะนัฐ พลมะศรี
๑๐๗) นายพงศ์สิริ โสมเขียว
๑๐๘) นายพีรพัฒน์ กำคำ
๑๐๙) นายภาณุพงศ์ มานิตย์
๑๑๐) นายมงคล ผลาทิพย์
๑๑๑) นายสิรินันท์ ทองอ้น
๑๑๒) นายอนเษ ทันสมัย
๑๑๓) นายอดิศักดิ์ ผมไผ

ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๐๗๕
ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๐๗๖
ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๐๗๗
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ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๐๒
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ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๐๖
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ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๐๘
ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๐๙
ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๑๐
ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๑๑
ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๑๒
ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๑๓

รวม

๑๑๔) นายอนันตชัย...

๑๑๔) นายอนันตชัย วิสุม
๑๑๕) นายวรวัช ตีนัก
๑๑๖) นายแสงตะวัน นະตะสັต
๑๑๗) นายยุทธพงศ์ รัตนะ
๑๑๘) นายชัยวุฒิ ไชยชนะนิจ
๑๑๙) นายวิศรุต ศรีธรรมมา
๑๒๐) นายณนทกร เผือกผ่อง
๑๒๑) นายกำชัย สุทธะ
๑๒๒) นางสาวณัฐภรณ์ บุญตะนัย
๑๒๓) นางสาวพัชรินทร์ แสนสร้อย
๑๒๔) นายไพโรจน์ เปี่ยมพิมาย
๑๒๕) นางสาวศุภมาศ ทองมาก
๑๒๖) นางสาวลลิตา จิตรสว่าง
๑๒๗) นางสาวไข่มพร เล็กภูเขียว
๑๒๘) นางสาวกฤติมาพร คำมีแก่น
๑๒๙) นางสาวสกุลรัตน์ ภาคภูมิ
๑๓๐) นางสาวไพรินทร์ ศรีรูปี
๑๓๑) นางสาวทิพนตร ผุยปัญญา
๑๓๒) นางสาวสาธิตา ปานทอง
๑๓๓) นางสาวอริสา ทองนวล
๑๓๔) นางสาวอรรยา คำคล่อง
๑๓๕) นางสาวชุตาภรณ์ สุนทรสนาน
๑๓๖) นางสาวอัญชลี คำจันทร์
๑๓๗) นายบุญฤทธิ์ เอี่ยมเทศ
๑๓๘) นางสาวศุภรดา บัณมยุรา
๑๓๙) นางสาวพาดิถี คุณน่าน
๑๔๐) นางสาวจิราเจต ฟ่องดา
๑๔๑) นางสาวอารยา มีชัย
๑๔๒) นางสาววิษุตา นาคผจญ
๑๔๓) นางสาวนันทิยา จันทะลุน
๑๔๔) นายกิตติพงศ์ แซ่ลี
๑๔๕) นายอนุวัติ ภูถวิล
๑๔๖) นายธีรพล แสงทอง
๑๔๗) นายศักดิ์พิพัฒน์ บุญมัน
๑๔๘) นายธิตะวัตร เอมอุไร
๑๔๙) นายชัยณรงค์ ศรีบุรินทร์
๑๕๐) นางสาวอัจฉราวรรณ สอนสนอง
๑๕๑) นางสาวณัฐราพร สิงหา
๑๕๒) นายกัมเรศ แหมมโต

ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๑๔
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ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๕๒

รวม

๑๕๓) นางสาวอุบล...

๑๕๓) นางสาวอุบล เด็กศิริ
๑๕๔) นางสาวโนรัตน์ ทองบุตร
๑๕๕) นายภาคภูมิ แทนไทย
๑๕๖) นางสาวสุภาณัฐ เมล์พ่วง
๑๕๗) นางสาวพรทิวา สาดาชนม์
๑๕๘) นายเอกวิทย์ วันทะนา
๑๕๙) นายไตรมณฑล ทิพย์วรรณ
๑๖๐) นายจิรเมธ ประเสริฐสิริพงศ์
๑๖๑) นายจิรายุส เกษมสุข
๑๖๒) นายจิรศักดิ์ ศรีวิชัย
๑๖๓) นายณัฐกฤษณ์ สะพานแก้ว
๑๖๔) นายบูรณศักดิ์ ปะที
๑๖๕) นายปณณวิชญ์ เสมอทรัพย์
๑๖๖) นายพิษณุพงษ์ ไชยา
๑๖๗) นายภัทรพงษ์ มณฑาทอง
๑๖๘) นายวสันต์ ตรีนกุล
๑๖๙) นายภาณุเดช เพชรอุด
๑๗๐) นายอนุกุล วิละแสง
๑๗๑) นายภัทรพงษ์ มีสุข
๑๗๒) นางสาวนุชรี ลีละทีป
๑๗๓) นางสาวสุภาวดี โกศรีนาม
๑๗๔) นางสาวอรณิชา เทียนคำ
๑๗๕) นางสาวพรเพ็ญ ขอบสอน
๑๗๖) นางสาววันวิสา ขอนพิกุล
๑๗๗) นางสาวอรรวรรณ เถาว์ทอง
๑๗๘) นางสาวอัยย์ลีน เมอร์วินณ์
๑๗๙) นางสาววิสรา คุ่ยครอง
๑๘๐) นายวุฒิกิจ ศิริวรรณ
๑๘๑) นางสาวจรรววรรณ กระจางพันธุ์

ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๕๓
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ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๘๐
ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๘๑

วิมล

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ว-๒๐๔
ที่ อก ๐๓๐๑(๑)/ ๑๖๑๖๘ ลงวันที่ ๒๐ พฤศจิกายน ๒๕๖๖

ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๗๔ รายการ
น้ำเสีย จำนวน 60 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldicarb	High-Performance Liquid Chromatographic Method ^[4]
2	Aldicarb Sulfone	High-Performance Liquid Chromatographic Method ^[4]
3	Aldicarb Sulfoxide	High-Performance Liquid Chromatographic Method ^[4]
4	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
5	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
6	Barium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
7	α-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
8	β-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
9	δ-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
10	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
11	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method ^[4] 2) 5-Day BOD Test, Membrane Electrode Method ^[4]
12	Carbaryl	High-Performance Liquid Chromatographic Method ^[4]
13	Carbofuran	High-Performance Liquid Chromatographic Method ^[4]
14	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
15	Chemical Oxygen Demand	1) Closed Reflux, Colorimetric Method ^[4] 2) Closed Reflux, Titrimetric Method ^[4]
16	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
17	Chromium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
18	Color	ADMI Weighted-Ordinate Spectrophotometric Method ^[4]

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

40 Manganese...

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

น้ำใต้ดิน...

น้ำใต้ดิน จำนวน 126 รายการ

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

18 Bis(2-ethylhexyl)phthalate...

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

36 Chrysene...

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

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

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

94 N-Nitrosodiphenylamine...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
95	N-Nitrosodi-n-Propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB 1242 - PCB 1248 - PCB 1254 - PCB 1260	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
98	pH	Electrometric Method ^[4]
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
100	Phenol	1) Distillation, Chloroform Extraction Method ^[4] 2) Distillation, Direct Photometric Method ^[4] 3) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
102	Selenium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
103	Silver	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
104	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
105	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
106	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
107	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
108	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
109	TPH (C ₅ -C ₈)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,25]

110 TPH (C₈-C₁₆)...

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

อากาศเสีย...

อากาศเสีย (ปล่อยระบาย) จำนวน 28 รายการ

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

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

วิธีวิเคราะห์

27 Vanadium...

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

สิ่งปลูกสรหรือวัตถุที่ไม่ใช่แล้ว จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26]
2	Antimony	2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26]
3	Arsenic	3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16]
		2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17]
		3) Digestion, Inductively Coupled Plasma Method ^[7,16]
		4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]
		1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16]
		2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17]
		3) Digestion, Inductively Coupled Plasma Method ^[7,16]
		4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]
		1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16]
		2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17]
		3) Digestion, Inductively Coupled Plasma Method ^[7,16]
		4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]

5 Beryllium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17] 3) Digestion, Inductively Coupled Plasma Method ^[7,16] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17] 3) Digestion, Inductively Coupled Plasma Method ^[7,16] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17] 3) Digestion, Inductively Coupled Plasma Method ^[7,16] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]
9	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method ^[1,6,16,19] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method ^[1,6,17,19] 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[7,8,16,19] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[7,8,17,19]

10 Chromium (VI)...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^[1,6,19] 2) Alkaline Digestion, Colorimetric Method ^[8,19]
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17] 3) Digestion, Inductively Coupled Plasma Method ^[7,16] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17] 3) Digestion, Inductively Coupled Plasma Method ^[7,16] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26]

2) Soxhlet...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Dieldrin	2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26] 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
20	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17] 3) Digestion, Inductively Coupled Plasma Method ^[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,17]
21	Lindane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[1,6,20] 2) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^[1,6,30] 3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[20] 4) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^[30] 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^[21]
23	Methoxychlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic /Mass Spectrometric Method ^[11,26]
24	Mirex	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic /Mass Spectrometric Method ^[11,26]
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17] 3) Digestion, Inductively Coupled Plasma Method ^[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,17]
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17] 3) Digestion, Inductively Coupled Plasma Method ^[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,17]
27	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[11,26]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	<ul style="list-style-type: none"> - 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5-Trichlorobiphenyl - 2,4',5-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3,3',4,6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5,6-Heptachlorobiphenyl - 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl - Pentachlorophenol 	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26] Electrometric Method ^[23,24]
29	pH	
30	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17] 3) Digestion, Inductively Coupled Plasma Method ^[7,16] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17] 3) Digestion, Inductively Coupled Plasma Method ^[7,16] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17] 3) Digestion, Inductively Coupled Plasma Method ^[7,16] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17] 3) Digestion, Inductively Coupled Plasma Method ^[7,16] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]
35	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,17] 3) Digestion, Inductively Coupled Plasma Method ^[7,16] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]

ดิน จำนวน 125 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
2	Acetone	1)Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25] 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^[13]
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
4	Anthracene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ^[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,17]
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,17]
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
8	Barium	1) Digestion, Inductively Coupled Plasma Method ^[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,17]
9	Benz(a)anthracene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25]

11 Benzo(b)fluoranthene

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

23 Cadmium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,17]
24	Carbazole	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25]
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25]
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
28	p-Chloroaniline	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25]
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25]
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25]
32	2-Chlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ^[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,17]
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[7,8,16,19] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[7,8,17,19]
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^[8,19]

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

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

63 Di-n-Octyl Phthalate...

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

73 n-Hexane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
74	α -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
75	β -HCH	2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
76	γ -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
77	Hexachlorocyclopentadiene	2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
78	Hexachloroethane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
79	Indeno(1,2,3-cd)pyrene	2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
80	Isophorone	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26]
81	Lead	2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ^[7,16]
83	Mercury	2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,17]
		1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[20]
		2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry ^[21]
		3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^[30]

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

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3,3',4',6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5'-Heptachlorobiphenyl - 2,2',3,3',4,4',5'-Heptachlorobiphenyl - 2,2',3,4,4',5',6-Heptachlorobiphenyl - 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
97	Pentachlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
98	Phenanthrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]

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

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
115	2,4,5-Trichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
116	2,4,6-Trichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,26]
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25]
118	Vanadium	1) Digestion, Inductively Coupled Plasma Method ^[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,17]
119	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25]
120	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25]
121	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25]
122	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25]
123	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25]
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[15,25]
125	Zinc	1) Digestion, Inductively Coupled Plasma Method ^[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,17]

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กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐๔ สิงหาคม ๒๕๖๗

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๗ พฤษภาคม ๒๕๖๗

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด จำนวน ๓ แผ่น

ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๓๒๓ สถานที่ตั้งเลขที่ ๖๑๖/๑๐ หมู่ที่ ๕ ตำบลแม่่น้ำคู อำเภอลำลูกเกด จังหวัดระยอง ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน

- | | |
|--------------------------|----------------------------|
| ๑) นายเดช ช้างชน | ทะเบียนเลขที่ ว-๓๒๓-ค-๐๐๐๑ |
| ๒) นางวิลาวัลย์ บริรักษ์ | ทะเบียนเลขที่ ว-๓๒๓-ค-๐๐๐๒ |
| ๓) นายสุพจน์ สลามเต๊ะ | ทะเบียนเลขที่ ว-๓๒๓-ค-๐๐๐๓ |

ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน

- | | |
|--------------------------------|----------------------------|
| ๑) นายณัฐพงษ์ เพ็ชรวานา | ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๐๑ |
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| ๕) นายสรรเสริญ คุ้มยศ | ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๐๕ |
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| ๘) นายสิทธิวิทย์ สุวรรณรัตน์ | ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๐๘ |
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| ๑๑) นายสุรวิทย์ นราพงษ์ | ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๑ |
| ๑๒) นายณัฐพล เจริญวิรัช | ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๓ |
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- ๑๘) นายวสันต์ คินันต์
- ๑๙) นายวิญญู นิมพาลี
- ๒๐) นายศุภณัฐ สกฤตติมศักดิ์
- ๒๑) นายเอกชัย ถันทอง
- ๒๒) นายพงษ์เทพ สิทธิเลาะ
- ๒๓) นายทินกร กุมภาชี
- ๒๔) นางสาวนันทยา เบญจจันทร์
- ๒๕) นายสิทธิชัย ยันพิมาย
- ๒๖) นางสาวปภาณิน หลอดทอง
- ๒๗) นางสาวพจนา สีดา
- ๒๘) นางสาวธรรณิศา กุลศิริวงศ์
- ๒๙) นายพิทยา ทองแดง
- ๓๐) นางสาวชลธิชา สุปงกช
- ๓๑) ว่าที่ร้อยตรี รมชัย ม่วงมา
- ๓๒) นายวรารุณ พับพา
- ๓๓) นายศักดิ์นรินทร์ จรัสกาย
- ๓๔) นายสุรศักดิ์ สาจีน
- ๓๕) นายสถาพร ถาแก้ว
- ๓๖) นายสุทธิดำรง โชคปิตินันท์
- ๓๗) นายวัลลภ หันไชยเนาว์
- ๓๘) นางสาววนาลี เจริญตระกูล
- ๓๙) นายธนะสิทธิ์ วงศ์ไชย
- ๔๐) นายชัยนุสรณ์ เลิศนันทกุลชัย
- ๔๑) นายสังจา เพ็ชรแสวง
- ๔๒) นายกัมภณ มณีสัมพันธ์
- ๔๓) นายธารินทร์ อ็อกจินดา
- ๔๔) นายศุภชัย วงศ์สุริยฉาย
- ๔๕) นายโสว ดันโพธิ์
- ๔๖) นางสาวกิตติยา สัญญาอริยาภรณ์
- ๔๖) นางสาวธิดารัตน์ ศิริมงคลโร
- ๔๗) นายพิพัฒน์ นิภัทร์เศรษฐ์
- ๔๘) นายศิริวิทย์ เรืองสม
- ๔๙) นายปารามศ สัตยาคุณ
- ๕๐) นายณฤนาท ธรรมสระโร
- ๕๑) นางสาวศุภรัตน์ โสจันทร์

- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๗
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๘
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๙
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๐
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- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๒
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- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๖
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๗
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- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๓
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๔
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๕
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๖
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๗
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๘
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๙
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๐
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๑
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๒
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๓
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๔
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๕
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๖
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๗
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๘
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๙
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๐
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๑
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๒
- ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๓

๕๒) นายพชรกร...

๕๒) นายพชรกร เจ็งเจริญ	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๔
๕๓) นายทิวากร เชื้อมาก	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๕
๕๔) นายอนุรักษ ทองขจรศักดิ์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๖
๕๕) นายอภิชาติ วิชาศ	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๗
๕๖) นายจรัสศรี ศรีรักษา	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๘
๕๘) นายประสานมิตร เชื้อนเพชร	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๙
๕๙) นายภาณุวัฒน์ วังบง	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๖๐
๖๐) นายสันติ ชัยชนะ	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๖๑
๖๑) นายทินกร กุลชาติ	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๖๒

ค. ขอบข่ายชนิดสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสียตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒๘ มิถุนายน ๒๕๗๑ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๖๐ วัน ก่อนวันสิ้นสุดอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ


(นายพรยศ กลั่นกรอง)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

โทร. ๐ ๓๓๑๓ ๖๐๕๙ ต่อ ๕๐๐๑-๒

ไปรษณีย์อิเล็กทรอนิกส์ eirw@div.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ว-๓๒๓
ที่ ๐๓๒๐/ ๗ ๙๓ ๘ ลงวันที่ ๐๔ สิงหาคม ๒๕๖๗

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๔ รายการ
น้ำเสีย จำนวน 14 รายการ

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

น้ำใต้ดิน จำนวน 3 รายการ

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

อากาศเสีย...

อากาศเสีย (ปล่อยระบาย) จำนวน 7 รายการ

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

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