

ภาคผนวก ค

ผลการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม

ภาคผนวก ค-1

คุณภาพอากาศจากแหล่งกำเนิด



Analysis / Test Report

Client: Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
TESTING
No.0042
Lot ID: 23118680
Date Received : Oct 17, 2023
Date Reported : Oct 25, 2023
Report Number: 2802753-1

Page 1 of 1

Sample Number 23118680-1
Sample Date Oct 17, 2023
Sample Description Emission from Stationary Source
Location โรงงานผลิตยางล้อรถจักรยานยนต์
Date Analysis Commenced Oct 18, 2023
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description									
Ambient Pressure	757	mmHg	Diameter	0.94	m	Oxygen	20.9	%	Testing Location
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%	
Type of Process	Process		Stack Temperature	40.0	°C	Gas Velocity	11.3	m/s	
Type of Fuel	-		Moisture	2.58	%	Flow Rate (Actual O2)	26.00	Nm3/hr	
Analyte	Sampled Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method			
Air Testing									
Total Suspended Particulate	09:50 AM - 10:46 AM	mg/m3	0.5	<0.5	400	United States Environmental Protection Agency, EPA Method 5			Rayong

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

Sampled By : Apichart Wilars

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

Tharitat.

Technical Management

Approved by

Thanita Kulnirwong
Scientist (4)
โทรศัพท์ 3-323-9-9447

D. J. J. J.

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Senior Manager
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2272-02

S. Vajrapan, Air Stack, GL-10 (10 37AM)

Analysis / Test Report

Client: Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
TESTING
No.0042
Lot ID: 23118681
Date Received : Oct 17, 2023
Date Reported : Oct 26, 2023
Report Number: 2802757-1C1

Page 1 of 1

Sample Number 23118681-1
Sample Date Oct 17, 2023
Sample Description Emission from Stationary Source
Location โรงงานผลิตยางล้อรถจักรยานยนต์ 1-3
Date Analysis Commenced Oct 18, 2023
Condition of Sample Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one 10-L air sampling bag and one amber plastic bottle, refrigerated

Stack Description									
Ambient Pressure	757	mmHg	Diameter	0.50	m	Oxygen	11.8	%	Testing Location
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	5.2	%	
Type of Process	Combustion		Stack Temperature	79.8	°C	Gas Velocity	2.4	m/s	
Type of Fuel	Natural Gas		Moisture	7.72	%	Flow Rate (Actual O2)	1307	Nm3/hr	
Analyte	Sampled Time	Unit	LOQ (LOR)	Result at 75%O ₂	Guideline Limit	Method			
Air Testing									
Oxides of Nitrogen *	11:00 AM - 11:10 AM	ppm	1.06	21.3	200	United States Environmental Protection Agency, EPA Method 7			Rayong
Total Suspended Particulate	11:00 AM - 11:48 AM	mg/m3	0.5	<0.5	320	United States Environmental Protection Agency, EPA Method 5			Rayong

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

Sampled By : Apichart Wilars

Remark :
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Analysis / Test Report

Analysis / Test Report

Client: Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok, Bankhai, Rayong Thailand 21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

Lot ID: 23118886

Date Received : Oct 17, 2023

Date Reported : Oct 26, 2023

Report Number: 2802760-1C1

TESTING
No.0042

Sample Number 23118886-1

Sample Date Oct 17, 2023

Sample Description Emission from Stationary Source

Location อีเอ็มมิชชันจากเครื่องจักร 4

Date Analysis Commenced Oct 18, 2023

Condition of Sample

Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

Stack Description									
Ambient Pressure	757	mmHg	Diameter	0.50	m	Oxygen	5.9	%	
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	8.5	%	
Type of Process	Combustion		Stack Temperature	132	°C	Gas Velocity	2.5	m/s	
Type of Fuel	Natural Gas		Moisture	7.80	%	Flow Rate (Actual O2)	1213	Nm3/hr	
Analyte		Sampled Time	Unit	LOD	Result at 7% O ₂	Guideline Limit	Method	Testing Location	

Air Testing		01:00 PM - 01:10 PM	ppm	-	1.06	25.6	United States Environmental Protection Agency, EPA Method 7	Rayong	
Oxides of Nitrogen *									
Total Suspended Particulate		01:00 PM - 01:48 PM	mg/m3	-	0.5	<0.5	United States Environmental Protection Agency, EPA Method 5	Rayong	

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

2006 (B.E. 2549)

Sampled By : Apichart Wilars

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Technical Management

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Approved by

D. J. J.

Thanita Kulsurwong
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wtidmuauf 3-323-a-9447

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Client: Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok, Bankhai, Rayong Thailand 21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

Lot ID: 23118682

Date Received : Oct 17, 2023

Date Reported : Oct 25, 2023

Report Number: 2802777-1

Page 1 of 1

Sample Number 23118682-1

Sample Date Oct 17, 2023

Sample Description Emission from Stationary Source

Location อีเอ็มมิชชัน Polypropylene filter unit 1-4

Date Analysis Commenced Oct 18, 2023

Condition of Sample

Extracted into two amber plastic bottles, refrigerated

Stack Description									
Ambient Pressure	757	mmHg	Diameter	0.80	m	Oxygen	20.9	%	
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	0.0	%	
Type of Process	Process		Stack Temperature	37.0	°C	Gas Velocity	3.2	m/s	
Type of Fuel	-		Moisture	2.50	%	Flow Rate (Actual O2)	5323	Nm3/hr	
Analyte		Sampled Time	Unit	LOD	Result	Guideline Limit	Method	Testing Location	

Air Testing		03:00 PM - 03:48 PM	ppm	-	0.01	<0.01	25	United States Environmental Protection Agency, EPA Method 8	Rayong
Sulfuric acid									

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

2006 (B.E. 2549)

Sampled By : Apichart Wilars, Thitiyong Boaddeang

Remark :

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

Technical Management

Thanitak.

Approved by

D. J. J.

Thanita Kulsurwong
Scientist (4)

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118682
Date Received : Oct 17, 2023
Date Reported : Oct 26, 2023
Report Number: 2802777-2

Page 1 of 1

Sample Number 23118682-1
Sample Date Oct 17, 2023
Sample Description Emission from Stationary Source
Location aliastruu Poly propylene filter type 1-4
Date Analysis Commenced Oct 19, 2023
Condition of Sample Extracted into two amber plastic bottles, refrigerated

Stack Description		m		%	
Ambient Pressure	757 mmHg	Diameter	0.80	Oxygen	20.9
Ambient Temperature	32.0 °C	Shape	Circle	Carbon Dioxide	0.0
Type of Process	Process	Stack Temperature	37.0 °C	Gas Velocity	3.2 m/s
Type of Fuel	Moisture	Moisture	2.50 %	Flow Rate (Actual O2)	5323 Nm ³ /hr
Analyte	Sampled Time	Unit	LOD	Result	Method
Air Testing		mg/m ³		Testing Location	

Phosphoric acid 03:00 PM - 03:30 PM 0.05 <0.05 United States Environmental Protection Agency, EPA Method 26 Bangkok

Sampled By : Apichart Wilars , Thitipong Buadaeng
Remark :
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Approved by Orawan R.
Orawan Rakyong
Scientist (3)

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ภาคผนวก ค-2

คุณภาพอากาศในบรรยากาศ



Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok, Bangkok, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

Page 1 of 26

Sample Number	23118678-1
Sample Date	Oct 16, 2023
Sample Description	Air Quality
Location	ทางหลวงสาย 3 (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced	Oct 25, 2023
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	32.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	16/10/23 - 17/10/23	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	16/10/23 - 17/10/23	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	16/10/23 - 17/10/23	mg/m ³	-	0.002	0.046	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

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Approved by
N. Banphat
Narumon Banchongkit
Supervisor

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2372 02

Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok, Bangkok, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

Page 2 of 26

Sample Number	23118678-2
Sample Date	Oct 17, 2023
Sample Description	Air Quality
Location	ทางหลวงสาย 3 (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced	Oct 25, 2023
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	17/10/23 - 18/10/23	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	17/10/23 - 18/10/23	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	17/10/23 - 18/10/23	mg/m ³	-	0.002	0.044	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

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Narumon Banchongkit
Supervisor

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Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

Page 3 of 28

Sample Number	23118678-3								
Sampled Date	Oct 18, 2023								
Sample Description	Air Quality								
Location	ด้านถนนพหลโยธิน (A1) (GPS 47P 0742960, 1419452)								
Date Analysis Commenced	Oct 25, 2023								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	18/10/23 - 19/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	18/10/23 - 19/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	18/10/23 - 19/10/23	mg/m3	-	0.002	0.053	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

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

Sampled By : Jaikarin Manwicha

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Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

Page 4 of 28

Sample Number	23118678-4								
Sampled Date	Oct 19, 2023								
Sample Description	Air Quality								
Location	ด้านถนนพหลโยธิน (A1) (GPS 47P 0742960, 1419452)								
Date Analysis Commenced	Oct 25, 2023								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	19/10/23 - 20/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	19/10/23 - 20/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	19/10/23 - 20/10/23	mg/m3	-	0.002	0.075	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

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

Sampled By : Jaikarin Manwicha

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand

21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 23118678

Date Received : Oct 24, 2023

Date Reported : Nov 04, 2023

Report Number : 2802711-1

Page 5 of 28

Sample Number	23118678-5
Sample Date	Oct 20, 2023
Sample Description	Air Quality
Location	ถนนสุขุมวิท (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced	Oct 25, 2023
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOB)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	20/10/23 - 21/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	20/10/23 - 21/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	20/10/23 - 21/10/23	mg/m3	-	0.002	0.045	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

Sampled By : Jakkarn Manwicha

Remark :

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NIGHT SOLUTIONS PEOPLE PROTECTING

2272 03



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 23118678

Date Received : Oct 24, 2023

Date Reported : Nov 04, 2023

Report Number : 2802711-1

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Sample Number	23118678-6
Sample Date	Oct 21, 2023
Sample Description	Air Quality
Location	ถนนสุขุมวิท (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced	Oct 25, 2023
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOB)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	21/10/23 - 22/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	21/10/23 - 22/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	21/10/23 - 22/10/23	mg/m3	-	0.002	0.031	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

Sampled By : Jakkarn Manwicha

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N. Banthongkit

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2272 03



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok, Bankhai, Rayong Thailand

21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

Lot ID: 23118678

Date Received : Oct 24, 2023

Date Reported : Nov 04, 2023

Report Number : 2802711-1

TESTING
No.0042

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Sample Number	23118678-7
Sample Date	Oct 22, 2023
Sample Description	Air Quality
Location	บริเวณพื้นที่ (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced	Oct 25, 2023
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	22/10/23 - 23/10/23	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	22/10/23 - 23/10/23	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	22/10/23 - 23/10/23	mg/m ³	-	0.002	0.033	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

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

Sampled By : Jakkarin Hanwicha

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2023-03



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok, Bankhai, Rayong Thailand

21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

Lot ID: 23118678

Date Received : Oct 24, 2023

Date Reported : Nov 04, 2023

Report Number : 2802711-1

TESTING
No.0042

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Sample Number	23118678-8
Sample Date	Oct 16, 2023
Sample Description	Air Quality
Location	บริเวณพื้นที่ (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced	Oct 25, 2023
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	32.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	16/10/23 - 17/10/23	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	16/10/23 - 17/10/23	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	16/10/23 - 17/10/23	mg/m ³	-	0.002	0.048	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

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

Sampled By : Jakkarin Hanwicha

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21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
TESTING
No.0042
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

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Sample Number 23118678-9
Sample Date Oct 17, 2023
Sample Description Air Quality
Location อู่เรือในตำบล (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced Oct 25, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	17/10/23 - 18/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	17/10/23 - 18/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	17/10/23 - 18/10/23	mg/m3	-	0.002	0.045	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

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Approved by
N. Banthit
Nanum Banthit
Supervisor

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21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
TESTING
No.0042
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

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Sample Number 23118678-10
Sample Date Oct 18, 2023
Sample Description Air Quality
Location อู่เรือในตำบล (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced Oct 25, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	18/10/23 - 19/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	18/10/23 - 19/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	18/10/23 - 19/10/23	mg/m3	-	0.002	0.046	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

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Nanum Banthit
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No.0042

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21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
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Sample Number	23118678-11								
Sample Date	Oct 19, 2023								
Sample Description	Air Quality								
Location	พื้นที่บ้าน (A2) (GPS 47P 0742003, 1417397)								
Date Analysis Commenced	Oct 25, 2023								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	19/10/23 - 20/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	19/10/23 - 20/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	19/10/23 - 20/10/23	mg/m3	-	0.002	0.068	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

Guideline :
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Sampled By : Jakkarin Manwicha

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Analysis / Test Report

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21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

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Sample Number	23118678-12								
Sample Date	Oct 20, 2023								
Sample Description	Air Quality								
Location	พื้นที่บ้าน (A2) (GPS 47P 0742003, 1417397)								
Date Analysis Commenced	Oct 25, 2023								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	20/10/23 - 21/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	20/10/23 - 21/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	20/10/23 - 21/10/23	mg/m3	-	0.002	0.050	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

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

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21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 23118678

Date Received : Oct 24, 2023

Date Reported : Nov 04, 2023

Report Number : 2802711-1

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Sample Number	23118678-13
Sample Date	Oct 21, 2023
Sample Description	Air Quality
Location	Uwunthun (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced	Oct 25, 2023
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	21/10/23 - 22/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	21/10/23 - 22/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	21/10/23 - 22/10/23	mg/m3	-	0.002	0.034	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

Guideline :

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Analysis / Test Report

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129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand

21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 23118678

Date Received : Oct 24, 2023

Date Reported : Nov 04, 2023

Report Number : 2802711-1

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Sample Number	23118678-14
Sample Date	Oct 22, 2023
Sample Description	Air Quality
Location	Uwunthun (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced	Oct 25, 2023
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	22/10/23 - 23/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	22/10/23 - 23/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	22/10/23 - 23/10/23	mg/m3	-	0.002	0.036	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

Guideline :

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

Sampled By : Jakkarin Manwicha

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Analysis / Test Report

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21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1
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Sample Number	23118678-15									
Sampled Date	Oct 16, 2023									
Sample Description	Air Quality									
Location	ท่าเรือ (A3) (GPS 47P 0744066, 1420470)									
Date Analysis Commenced	Oct 25, 2023									
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated									
Barometric Pressure	757 mmHg									
Atmospheric Temperature	32.0 °C									
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOG)	Result	Guideline Limit	Method	Guideline	Testing Location	
Air Testing										
Phosphoric acid *	16/10/23 - 17/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok	
Sulfuric acid *	16/10/23 - 17/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok	
Total Suspended Particulate	16/10/23 - 17/10/23	mg/m3	-	0.002	0.045	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong		

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

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Analysis / Test Report

TESTING
No.0042

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129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1
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Sample Number	23118678-16								
Sample Date	Oct 17, 2023								
Sample Description	Air Quality								
Location	Taanwari (A3) (GPS 47P 0744066, 1420470)								
Date Analysis Commenced	Oct 25, 2023								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOQ)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	17/10/23 - 18/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	17/10/23 - 18/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	17/10/23 - 18/10/23	mg/m3	-	0.002	0.043	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

Guideline :
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Sampled By : Jakkarin Manwicha

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Approved by

N. Banphit

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Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :

Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

Page 17 of 26

Sample Number	23118678-17							
Sampled Date	Oct 18, 2023							
Sample Description	Air Quality							
Location	บ้านนาหว้า (A3) (GPS 47P 0744066, 1420470)							
Date Analysis Commenced	Oct 25, 2023							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	18/10/23 - 19/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Sulfuric acid *	18/10/23 - 19/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Total Suspended Particulate	18/10/23 - 19/10/23	mg/m3	-	0.002	0.045	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

Remark :
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N. Banphit
Narumon Banchongkit
Supervisor

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Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :

Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

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Sample Number	23118678-18							
Sampled Date	Oct 19, 2023							
Sample Description	Air Quality							
Location	Ban Na Wa (A3) (GPS 47P 0744066, 1420470)							
Date Analysis Commenced	Oct 25, 2023							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	19/10/23 - 20/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Sulfuric acid *	19/10/23 - 20/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Total Suspended Particulate	19/10/23 - 20/10/23	mg/m3	-	0.002	0.048	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

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Analysis / Test Report

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Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

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Sample Number	23118678-19							
Sampled Date	Oct 20, 2023							
Sample Description	Air Quality							
Location	ท่าเรือ (A3) (GPS 47P 0744066, 1420470)							
Date Analysis Commenced	Oct 25, 2023							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOQ)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	20/10/23 - 21/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	20/10/23 - 21/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	20/10/23 - 21/10/23	mg/m3	-	0.002	0.030	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

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2274-62



Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

Page 20 of 28

Sample Number	23118678-20							
Sampled Date	Oct 21, 2023							
Sample Description	Air Quality							
Location	ท่าเรือ (A3) (GPS 47P 0744066, 1420470)							
Date Analysis Commenced	Oct 25, 2023							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOQ)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	21/10/23 - 22/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	21/10/23 - 22/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	21/10/23 - 22/10/23	mg/m3	-	0.002	0.027	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

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Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
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21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

Page 21 of 28

Sample Number	23118678-21								
Sampled Date	Oct 22, 2023								
Sample Description	Air Quality								
Location	หน้าประตู (A3) (GPS 47P 0744066, 1420470)								
Date Analysis Commenced	Oct 25, 2023								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOB)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	22/10/23 - 23/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	22/10/23 - 23/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	22/10/23 - 23/10/23	mg/m3	-	0.002	0.036	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

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

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Analysis / Test Report

TESTING
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21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

Page 22 of 28

Sample Number	23118678-22								
Sampled Date	Oct 16, 2023								
Sample Description	Air Quality								
Location	หน้าประตู (A4) (GPS 47P 0747515, 1419157)								
Date Analysis Commenced	Oct 25, 2023								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	32.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOB)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	16/10/23 - 17/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	16/10/23 - 17/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	16/10/23 - 17/10/23	mg/m3	-	0.002	0.040	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

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

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21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

Page 21 of 28

Sample Number	23118678-23							
Sample Date	Oct 17, 2023							
Sample Description	Air Quality							
Location	ถนนสาย 1 (A1) (GPS 47P 0747515, 1419157)							
Date Analysis Commenced	Oct 25, 2023							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	17/10/23 - 18/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	17/10/23 - 18/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	17/10/23 - 18/10/23	mg/m3	-	0.002	0.038	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

Guideline :
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Analysis / Test Report

TESTING
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Client : Michelin Siam Co., Ltd.
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21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

Page 24 of 28

Sample Number	23118678-24								
Sampled Date	Oct 18, 2023								
Sample Description	Air Quality								
Location	thruksaathidu (A4) (GPS 47P 0747515, 1419157)								
Date Analysis Commenced	Oct 25, 2023								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	18/10/23 - 19/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	18/10/23 - 19/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	18/10/23 - 19/10/23	mg/m3	-	0.002	0.038	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

Guideline :
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Sampled By : Jakkarn Manwicha

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21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 23118678

Date Received : Oct 24, 2023

Date Reported : Nov 04, 2023

Report Number : 2802711-1

Page 25 of 28

Sample Number	23118678-25
Sample Date	Oct 19, 2023
Sample Description	Air Quality
Location	บ้านนาข้าว (A4) (GPS 47P 0747515, 1419157)
Date Analysis Commenced	Oct 25, 2023
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	19/10/23 - 20/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	19/10/23 - 20/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	19/10/23 - 20/10/23	mg/m3	-	0.002	0.044	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

Guideline :

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

Sampled By : Jakkarin Manwicha

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129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand

21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 23118678

Date Received : Oct 24, 2023

Date Reported : Nov 04, 2023

Report Number : 2802711-1

Page 26 of 28

Sample Number	23118678-26
Sample Date	Oct 20, 2023
Sample Description	Air Quality
Location	บ้านนาข้าว (A4) (GPS 47P 0747515, 1419157)
Date Analysis Commenced	Oct 25, 2023
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	20/10/23 - 21/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	20/10/23 - 21/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	20/10/23 - 21/10/23	mg/m3	-	0.002	0.038	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

Guideline :

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

Sampled By : Jakkarin Manwicha

Remark :

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N. Banphit

Narumon Banchoangkit
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TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

Page 27 of 28

Sample Number	23118678-27							
Sampled Date	Oct 21, 2023							
Sample Description	Air Quality							
Location	หมู่บ้านบ้านใหม่ (A4) (GPS 47° 07'47.51S, 141°19'15.7E)							
Date Analysis Commenced	Oct 25, 2023							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	21/10/23 - 22/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	21/10/23 - 22/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	21/10/23 - 22/10/23	mg/m3	-	0.002	0.029	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

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

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Approved by

N. Bangpit

Narumon Bandongkit
Supervisor

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2074-62



Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118678
Date Received : Oct 24, 2023
Date Reported : Nov 04, 2023
Report Number : 2802711-1

Page 28 of 28

Sample Number	23118678-28							
Sampled Date	Oct 22, 2023							
Sample Description	Air Quality							
Location	หมู่บ้านหิญา (A4) (GPS 47° 07'47.51S, 141°19'15.7)							
Date Analysis Commenced	Oct 25, 2023							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	22/10/23 - 23/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Sulfuric acid *	22/10/23 - 23/10/23	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Total Suspended Particulate	22/10/23 - 23/10/23	mg/m3	-	0.002	0.026	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

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

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N. Bangpit

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2074-62



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lai-Lok-Banthal Road, Nong-Lai-Lok, Bangkok, Rayong Thailand 21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

Lot ID: 23118824

Date Received : Oct 24, 2023

Date Reported : Oct 30, 2023

Report Number: 2802722-1

Page 1 of 1

Sample Description		Air Quality													
Location		สถานีตรวจวัดคุณภาพอากาศ (A1) (GPS 47P 07429560, 1419452)													
Parameter		Nitrogen dioxide (ppm)													
Measurement Date		Oct 16, 2023 - Oct 23, 2023													
Measurement by		Jakkarin Manwicha													
Time		23118824-1		23118824-2		23118824-3		23118824-4		23118824-5		23118824-6		23118824-7	
09:00 AM - 10:00 AM		0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
10:00 AM - 11:00 AM		0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
11:00 AM - 12:00 PM		0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
12:00 PM - 01:00 PM		0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
01:00 PM - 02:00 PM		0.001	0.001	0.002	0.001	0.002	0.001	0.001	0.001	0.001	0.001	<0.001	0.001	0.001	0.001
02:00 PM - 03:00 PM		0.002	0.001	0.001	0.002	0.002	0.001	0.002	0.001	0.001	0.001	0.001	0.002	0.001	0.001
03:00 PM - 04:00 PM		0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001
04:00 PM - 05:00 PM		0.002	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001
05:00 PM - 06:00 PM		0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001
06:00 PM - 07:00 PM		0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.004	0.002	0.002	0.002	0.001	0.001	0.001
07:00 PM - 08:00 PM		0.002	0.001	0.001	0.002	0.002	0.002	0.005	0.005	0.002	0.002	0.001	0.001	0.001	0.001
08:00 PM - 09:00 PM		0.004	0.002	0.002	0.002	0.002	0.002	0.007	0.007	0.001	0.001	0.001	0.001	0.002	0.002
09:00 PM - 10:00 PM		0.003	0.001	0.001	0.001	0.002	0.002	0.005	0.004	0.005	0.002	0.001	0.002	0.001	0.002
10:00 PM - 11:00 PM		0.003	0.002	0.002	0.003	0.003	0.004	0.004	0.004	0.002	0.002	0.002	0.001	0.001	0.001
11:00 PM - 12:00 AM		0.002	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.001	0.001	0.001	0.001	0.001
12:00 AM - 01:00 AM		0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001
01:00 AM - 02:00 AM		0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001
02:00 AM - 03:00 AM		0.002	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001
03:00 AM - 04:00 AM		0.002	0.001	0.001	0.002	0.002	0.009	0.009	0.001	0.001	0.002	0.001	0.001	0.001	0.001
04:00 AM - 05:00 AM		0.002	0.001	0.001	0.005	0.005	0.009	0.002	0.002	0.002	0.002	0.002	0.006	0.006	0.006
05:00 AM - 06:00 AM		0.002	0.002	0.006	0.006	0.006	<0.001	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002
06:00 AM - 07:00 AM		0.003	0.004	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.001	0.001
07:00 AM - 08:00 AM		0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.002	0.002	0.002	0.001	0.001	0.001
08:00 AM - 09:00 AM		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001
Average		0.002	0.002	0.002	0.002	0.002	0.003	0.009	0.003	0.002	0.002	0.001	0.001	0.001	0.001
1hr - Maximum		0.004	0.004	0.004	0.006	0.006	0.009	0.009	0.009	0.004	0.004	0.002	0.002	0.006	0.006
Standard 1hr - Average		0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
Standard Reference Method		: Notification of the National Environment Board No. 33, 2009 (B.E. 2552). : US EPA Method Part 50 App. F (Chemiluminescence)													



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand 21120

P/O : 4510433115

Project Name : Environment : EIA

Lot ID: 23118824

Date Received : Oct 24, 2023

Date Reported : Oct 30, 2023

Report Number: 2820207-1

Page 1 of 1

Sample Description		Air Quality		Measurement by									
Location	Parameter	Measurement Date	Measurement by	23118824-15	23118824-16	23118824-17	23118824-18	23118824-19	23118824-20	23118824-21			
				Oct 16, 2023	Oct 17, 2023	Oct 18, 2023	Oct 19, 2023	Oct 20, 2023	Oct 21, 2023	Oct 22, 2023			
Jakkur Manjicha													
Nitrogen dioxide (ppm)													
11:00 AM - 12:00 PM				<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001			
12:00 PM - 01:00 PM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
01:00 PM - 02:00 PM				<0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001			
02:00 PM - 03:00 PM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
03:00 PM - 04:00 PM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
04:00 PM - 05:00 PM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
05:00 PM - 06:00 PM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
06:00 PM - 07:00 PM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
07:00 PM - 08:00 PM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
08:00 PM - 09:00 PM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
09:00 PM - 10:00 PM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
10:00 PM - 11:00 PM				<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001			
11:00 PM - 12:00 AM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
12:00 AM - 01:00 AM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002			
01:00 AM - 02:00 AM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002			
02:00 AM - 03:00 AM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
03:00 AM - 04:00 AM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
04:00 AM - 05:00 AM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001			
05:00 AM - 06:00 AM				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
06:00 AM - 07:00 AM				<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001			
07:00 AM - 08:00 AM				<0.001	<0.001	<0.001	0.001	0.002	<0.001	<0.001			
08:00 AM - 09:00 AM				0.002	<0.001	<0.001	0.001	<0.001	<0.001	<0.001			
09:00 AM - 10:00 AM				<0.001	0.001	<0.001	0.002	0.001	<0.001	<0.001			
10:00 AM - 11:00 AM				0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
Average				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
1hr - Maximum				0.002	0.003	<0.001	0.002	0.004	0.002	0.002			
Standard 1hr - Average				0.170	0.170	0.170	0.170	0.170	0.170	0.170			
Standard				Notification of the National Environment Board No. 33, 2009 (B.E. 2552).									
Reference Method				: US EPA Method Part 50 Ann. F. (Chemiluminescence)									

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Approved by

Orawan R.
Orawan Rakpong
Scientist (3)

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Substrate: Air SCXNDx mV (1.481PM)



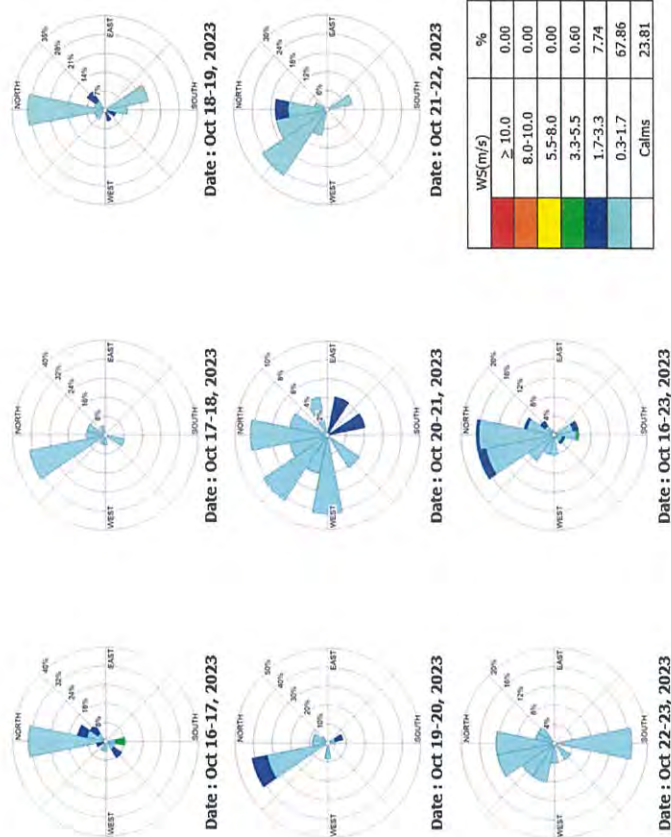
Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lao
P/O : 4510433115
Project Name : Environment :
Project Location :

Lot ID: 23118825
Date Received :Oct 24, 2023
Date Reported :Oct 31, 2023
Report Number :2802725-1

Page 2 of 2

Wind Rose



Time	Oct 16 - Oct 17, 2023		Oct 17 - Oct 18, 2023		Oct 18 - Oct 19, 2023		Oct 19 - Oct 20, 2023		Oct 20 - Oct 21, 2023		Oct 21 - Oct 22, 2023		Oct 22 - Oct 23, 2023								
	WS	WD	WS	WD	WS	WD	WS	WD	WS	WD	WS	WD	WS	WD							
	(m/s)	(deg)	(m/s)	(deg)	(m/s)	(deg)	(m/s)	(deg)	(m/s)	(deg)	(m/s)	(deg)	(m/s)	(deg)							
09:00 AM - 10:00 AM	0.1	-	0.5	0.0	N	2.0	48.0	NE	1.0	39.0	NE	0.6	287.0	WNW	0.1	-	0.4	293.0	WNW		
10:00 AM - 11:00 AM	2.0	45.0	NE	0.2	-	0.1	-	-	2.0	150.0	SSE	0.8	32.0	NNE	0.8	294.0	WNW	0.4	53.0	NE	
11:00 AM - 12:00 PM	1.6	19.0	NNE	0.8	17.0	NNE	3.1	248.0	WSW	0.3	175.0	S	2.3	121.0	ESE	0.4	168.0	SSE	0.1	-	
12:00 PM - 01:00 PM	1.5	284.0	WNW	0.8	17.0	NNE	3.1	248.0	WSW	0.3	175.0	S	2.3	121.0	ESE	0.4	168.0	SSE	0.1	-	
01:00 PM - 02:00 PM	1.6	194.0	SSW	0.6	195.0	WNW	1.0	21.0	NNE	0.1	-	-	2.0	163.0	ESE	0.3	168.0	SSE	1.3	177.0	S
02:00 PM - 03:00 PM	0.2	-	0.6	64.0	ENE	0.4	22.0	NNE	0.4	22.0	NNE	0.4	60.0	ENE	0.2	-	1.5	185.0	S	-	
03:00 PM - 04:00 PM	1.7	233.0	SW	0.6	193.0	SSW	0.8	0.0	N	1.2	30.0	NNE	1.6	219.0	SW	0.2	-	1.5	259.0	W	-
04:00 PM - 05:00 PM	0.8	171.0	S	0.3	265.0	W	1.5	2.0	N	1.2	7.0	N	0.0	-	-	0.1	-	1.1	219.0	SW	-
05:00 PM - 06:00 PM	3.8	188.0	S	0.3	347.0	WNW	1.4	4.0	N	1.0	5.0	N	0.4	305.0	NW	1.0	311.0	NW	0.2	-	-
06:00 PM - 07:00 PM	1.1	225.0	SW	1.0	344.0	NNW	1.4	179.0	S	0.2	-	-	0.5	2.0	N	1.0	324.0	NW	0.4	188.0	S
07:00 PM - 08:00 PM	0.2	-	0.6	347.0	NNW	1.3	190.0	S	0.7	344.0	NNW	0.5	359.0	N	1.0	316.0	NW	0.3	178.0	S	-
08:00 PM - 09:00 PM	2.0	12.0	NNE	0.2	-	1.6	161.0	SSE	1.2	344.0	NNW	0.4	321.0	NNW	1.0	356.0	N	0.2	-	-	-
09:00 PM - 10:00 PM	2.0	339.0	NNW	0.2	-	1.6	163.0	SSE	1.7	344.0	NNW	0.8	270.0	W	1.0	350.0	N	0.2	-	-	-
10:00 PM - 11:00 PM	0.4	354.0	N	0.2	-	1.5	161.0	SSE	1.8	344.0	NNW	0.7	271.0	W	1.0	344.0	NNW	0.2	-	-	-
11:00 PM - 12:00 AM	0.3	354.0	N	0.1	-	1.5	161.0	SSE	0.1	-	-	0.1	-	0.2	-	0.2	-	4.0	N	-	-
12:00 AM - 01:00 AM	1.0	359.0	N	0.1	-	1.5	359.0	N	1.0	343.0	NNW	0.1	-	-	1.0	284.0	WNW	0.4	1.0	N	-
01:00 AM - 02:00 AM	0.5	359.0	N	0.1	-	0.2	-	-	0.8	344.0	NNW	0.1	-	-	1.0	355.0	N	0.4	296.0	WNW	-
02:00 AM - 03:00 AM	0.5	277.0	W	1.2	330.0	NNW	0.2	-	0.5	343.0	NNW	0.1	-	-	0.3	341.0	NNW	0.4	307.0	NW	-
03:00 AM - 04:00 AM	0.5	349.0	N	1.2	327.0	NNW	0.2	-	-	0.9	344.0	NNW	0.1	-	-	0.3	323.0	NW	0.4	315.0	NW
04:00 AM - 05:00 AM	0.5	359.0	N	1.2	330.0	NNW	0.3	345.0	NNW	0.3	344.0	NNW	0.1	-	-	1.3	317.0	NW	0.4	344.0	NNW
05:00 AM - 06:00 AM	0.5	5.0	N	1.2	328.0	NNW	0.3	359.0	N	0.5	344.0	NNW	0.1	-	-	1.1	325.0	NW	0.4	344.0	NNW
06:00 AM - 07:00 AM	0.5	352.0	N	1.2	294.0	SSW	0.3	312.0	NW	1.0	278.0	W	0.1	-	-	1.1	348.0	NNW	0.4	30.0	NNE
07:00 AM - 08:00 AM	0.5	30.0	NNE	0.8	5.0	N	0.3	350.0	N	0.7	260.0	W	0.1	-	-	1.2	343.0	NNW	0.4	355.0	N
08:00 AM - 09:00 AM	0.7	41.0	NE	0.8	333.0	NNW	0.3	340.0	NE	0.1	-	-	0.1	-	-	0.5	24.0	NNE	0.3	345.0	NNW

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by _____

Sarayuth Jittranont
Assistant General Manager

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Approved by

Sarayuth Jittranont
Assistant General Manager

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Date Received : Oct 24, 2023
Date Reported : Oct 31, 2023
Report Number : 2802725-1

Project Name : Environment : EIA
Project Location :

Page 1 of 2

Sample Number	23118825-8 to 14
Parameter	Wind Speed / Wind Direction
Location	จันทน์ไทร (A2) (GPS 479 0742003, 1417397)
Sampling Date	Oct 16 - Oct 23, 2023
Sampling by	Jakkarin Maniwicha
Time	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) WS (m/s) WD (deg)
10:00 AM - 11:00 AM	0.4 331.0 NNW 0.4 358.0 N 1.5 331.0 NNW 0.2 - - 1.2 349.0 N 0.9 347.0 NNW 0.8 322.0 NNW
11:00 AM - 12:00 PM	0.1 - - 0.9 358.0 N 0.5 357.0 N 0.6 322.0 NNW 1.0 344.0 NNW 1.0 340.0 NNW
12:00 PM - 01:00 PM	0.4 324.0 NW 0.6 350.0 N 0.7 335.0 NNW 1.0 333.0 NNW 0.7 283.0 NNW 0.5 326.0 NNW
01:00 PM - 02:00 PM	1.1 319.0 NW 0.8 338.0 NNW 0.8 332.0 NNW 0.5 332.0 NNW 1.3 332.0 NNW 0.7 337.0 NNW 0.7 328.0 NNW
02:00 PM - 03:00 PM	0.8 334.0 NNW 0.6 353.0 N 0.8 349.0 N 0.4 339.0 NNW 0.7 339.0 NNW 0.9 342.0 NNW 0.4 322.0 NNW
03:00 PM - 04:00 PM	0.3 335.0 NNW 0.8 337.0 NNW 0.4 346.0 NNW 0.8 285.0 NNW 0.3 285.0 NNW 0.9 335.0 NNW 1.2 337.0 NNW
04:00 PM - 05:00 PM	0.3 321.0 NW 0.5 346.0 NNW 0.1 - - 0.6 354.0 N 0.3 269.0 W 0.5 345.0 NNW 2.4 337.0 NNW
05:00 PM - 06:00 PM	0.4 351.0 N 0.6 340.0 NNW 0.0 - - 1.4 329.0 NNW 0.5 329.0 NNW 0.6 352.0 N 0.5 352.0 N
06:00 PM - 07:00 PM	1.6 354.0 N 0.6 319.0 NW 0.4 327.0 NNW 0.1 - - 0.5 326.0 NNW 0.4 342.0 NNW 0.0 - -
07:00 PM - 08:00 PM	0.4 344.0 NNW 0.0 - - 1.0 343.0 NNW 0.4 281.0 W 0.4 281.0 W 1.0 339.0 NNW 0.0 - -
08:00 PM - 09:00 PM	1.0 334.0 NNW 0.3 327.0 NNW 1.2 322.0 NNW 0.0 - - 0.3 232.0 SW 1.1 330.0 NNW 1.3 317.0 NNW
09:00 PM - 10:00 PM	0.2 - - 0.3 327.0 NNW 0.8 337.0 NNW 0.9 354.0 N 0.2 - - 0.3 323.0 NW 0.6 337.0 NNW
10:00 PM - 11:00 PM	0.4 333.0 NNW 0.6 338.0 NNW 1.5 334.0 NNW 0.4 326.0 NNW 0.7 326.0 NNW 0.3 335.0 NNW 1.3 317.0 NNW
11:00 PM - 12:00 AM	1.1 348.0 NNW 0.3 335.0 NNW 1.9 338.0 NNW 0.1 - - 0.5 323.0 NNW 0.0 - - 1.2 318.0 NNW
12:00 AM - 01:00 AM	0.6 341.0 NNW 0.1 - - 0.6 355.0 N 0.4 355.0 N 0.0 - - 0.4 327.0 NNW 0.6 316.0 NNW
01:00 AM - 02:00 AM	0.6 351.0 N 0.4 343.0 NNW 0.2 - - 1.0 336.0 NNW 0.0 - - 0.4 312.0 NW 0.5 318.0 NNW
02:00 AM - 03:00 AM	0.1 - - 0.4 328.0 NNW 0.0 - - 1.2 335.0 NNW 0.2 - - 0.1 - - 0.5 318.0 NNW
03:00 AM - 04:00 AM	0.7 324.0 NW 0.1 - - 0.0 - - 0.0 - - 0.4 305.0 NW 0.3 315.0 NW 0.5 319.0 NNW
04:00 AM - 05:00 AM	0.6 338.0 NNW 0.1 - - 0.5 321.0 NW 0.4 321.0 NW 0.0 - - 0.1 - - 0.6 318.0 NNW
05:00 AM - 06:00 AM	1.7 350.0 N 1.1 340.0 NNW 0.8 309.0 NW 0.6 309.0 NW 0.0 - - 0.4 334.0 NNW 0.4 342.0 NNW
06:00 AM - 07:00 AM	1.0 352.0 N 0.1 - - 0.9 333.0 NNW 0.8 333.0 NNW 0.1 - - 0.5 326.0 NNW 0.1 - -
07:00 AM - 08:00 AM	1.3 321.0 NW 0.4 333.0 NNW 0.6 344.0 NNW 0.5 344.0 NNW 0.5 328.0 NNW 0.3 354.0 N 0.6 335.0 NNW
08:00 AM - 09:00 AM	1.2 335.0 NNW 0.4 323.0 NW 0.5 350.0 N 0.9 350.0 N 1.0 320.0 NW 0.8 300.0 NNW 0.6 315.0 NW
09:00 AM - 10:00 AM	1.4 343.0 NNW 0.4 324.0 NW 0.7 335.0 NNW 1.2 335.0 NNW 1.1 343.0 NNW 0.7 328.0 NNW 0.5 327.0 NNW

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

The above results are valid only for the used and 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) Private Limited recommends that this report is not reproduced except in full.

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Sarayuht Jitranont
Assistant General Manager

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Approved by

Sarayuht Jitranont
Assistant General Manager



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Date Received : Oct 24, 2023
Date Reported : Oct 31, 2023
Report Number : 2802725-1

Project Name : Environment : EIA
Project Location :

Page 2 of 2

Wind Rose



Date : Oct 16-17, 2023



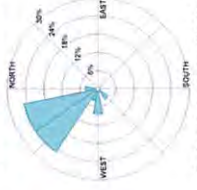
Date : Oct 17-18, 2023



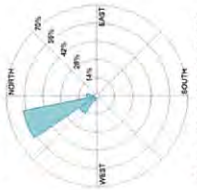
Date : Oct 18-19, 2023



Date : Oct 19-20, 2023



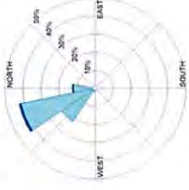
Date : Oct 20-21, 2023



Date : Oct 21-22, 2023

WS (m/s)	%
≥ 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	0.00
1.7-3.3	1.79
0.3-1.7	79.76
Calms	18.45

Date : Oct 16-23, 2023





Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118825
Date Received :Oct 24, 2023
Date Reported :Oct 31, 2023
Report Number :2802725-1

Page 1 of 2

Sample Number 23118825-15 to 21
Parameter Wind Speed / Wind Direction
Location จันทนากร (A3) (GPS 47P 0744066, 1420470)
Sampling Date Oct 16 - Oct 23, 2023
Sampling by Jakarin Manwicha

Time		Oct 16 - Oct 17, 2023		Oct 17 - Oct 18, 2023		Oct 18 - Oct 19, 2023		Oct 19 - Oct 20, 2023		Oct 20 - Oct 21, 2023		Oct 21 - Oct 22, 2023		Oct 22 - Oct 23, 2023								
		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)							
	11:00 AM - 12:00 PM	1.3	55.0	NE	0.0	-	1.6	106.0	ESE	2.5	2.0	N	2.5	100.0	E	0.0	-	2.6	36.0	NE		
	12:00 PM - 01:00 PM	1.4	23.0	NNE	0.0	-	0.0	-	2.4	359.0	N	0.6	86.0	E	1.1	107.0	ESE	1.1	313.0	NW		
	01:00 PM - 02:00 PM	1.5	323.0	NW	1.5	350.0	N	0.6	265.0	W	2.6	48.0	NE	1.7	86.0	E	2.6	191.0	S	0.9	271.0	W
	02:00 PM - 03:00 PM	0.4	183.0	S	1.3	318.0	NW	1.1	10.0	N	0.4	54.0	NE	1.3	43.0	NE	2.2	15.0	NNE	0.6	254.0	WSW
	03:00 PM - 04:00 PM	1.6	105.0	ESE	0.7	79.0	E	0.3	39.0	NE	1.3	54.0	NE	1.7	306.0	NW	3.0	338.0	NNW	1.6	352.0	N
	04:00 PM - 05:00 PM	1.8	217.0	SW	1.9	22.0	NNE	1.0	32.0	NNE	1.2	322.0	NW	1.7	110.0	ESE	2.4	106.0	ESE	1.6	53.0	NE
	05:00 PM - 06:00 PM	0.5	98.0	E	3.9	32.0	NNE	1.2	332.0	NNW	0.2	-	-	1.7	354.0	N	0.6	110.0	ESE	0.7	304.0	NW
	06:00 PM - 07:00 PM	0.9	359.0	N	1.4	63.0	ENE	0.0	-	3.0	350.0	N	2.3	269.0	W	0.3	94.0	E	0.5	268.0	W	
	07:00 PM - 08:00 PM	1.5	34.0	NE	0.4	291.0	WNW	1.3	319.0	NW	2.3	331.0	NNW	1.7	268.0	W	0.0	-	0.0	-	-	-
	08:00 PM - 09:00 PM	1.2	34.0	NE	0.1	-	1.1	274.0	W	2.1	331.0	NNW	1.3	274.0	W	2.2	92.0	E	0.9	281.0	W	
	09:00 PM - 10:00 PM	0.5	35.0	NE	0.4	311.0	NW	0.0	-	-	1.5	332.0	NNW	0.0	-	0.7	96.0	E	0.8	279.0	W	
	10:00 PM - 11:00 PM	0.7	33.0	NNE	0.1	-	1.6	265.0	W	1.1	333.0	NNW	0.0	-	0.8	94.0	E	1.9	281.0	W		
	11:00 PM - 12:00 AM	0.0	-	-	0.2	-	1.8	265.0	W	0.8	332.0	NNW	0.0	-	1.7	94.0	E	2.1	279.0	W		
	12:00 AM - 01:00 AM	0.0	-	-	0.0	-	1.3	265.0	W	0.6	332.0	NNW	0.0	-	1.3	96.0	E	0.7	280.0	W		
	01:00 AM - 02:00 AM	0.0	-	-	0.2	-	0.0	-	0.0	-	1.2	333.0	NNW	0.0	-	0.7	93.0	E	0.7	279.0	W	
	02:00 AM - 03:00 AM	0.0	-	-	0.6	312.0	NW	0.0	-	0.5	332.0	NNW	0.0	-	1.5	95.0	E	0.0	-	-	-	
	03:00 AM - 04:00 AM	0.0	-	-	0.0	-	0.0	-	0.0	-	0.3	333.0	NNW	0.0	-	1.1	94.0	E	0.0	-	-	
	04:00 AM - 05:00 AM	0.0	-	-	0.0	-	1.2	356.0	N	2.4	332.0	NNW	0.0	-	1.9	92.0	E	2.4	280.0	W		
	05:00 AM - 06:00 AM	0.0	-	-	0.0	-	0.0	-	0.0	-	1.9	333.0	NNW	0.0	-	1.6	96.0	E	0.0	-	-	
	06:00 AM - 07:00 AM	0.0	-	-	0.0	-	0.0	-	0.0	-	1.9	284.0	WNW	0.0	-	0.8	94.0	E	0.0	-	-	
	07:00 AM - 08:00 AM	0.0	-	-	0.6	312.0	NW	0.0	-	2.3	294.0	WNW	0.0	-	0.8	95.0	E	0.0	-	-	-	
	08:00 AM - 09:00 AM	0.0	-	-	1.6	312.0	NW	0.0	-	2.7	23.0	NNE	0.0	-	1.5	20.0	NNE	0.0	-	-	-	
	09:00 AM - 10:00 AM	0.0	-	-	1.7	108.0	ESE	1.0	287.0	WNW	1.6	52.0	NE	0.0	-	0.8	309.0	NW	0.8	93.0	E	
	10:00 AM - 11:00 AM	0.0	-	-	1.4	69.0	ENE	2.0	269.0	W	2.8	66.0	ENE	0.0	-	1.7	108.0	ESE	0.6	328.0	NNW	

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by

Sarayuth Jitranont
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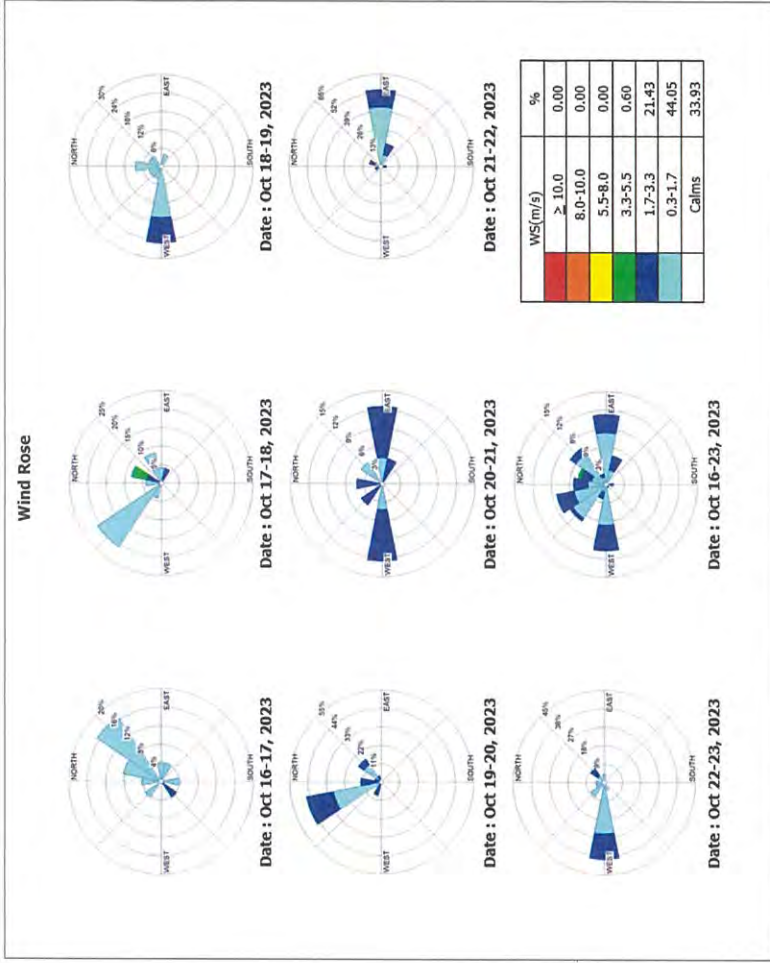
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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118825
Date Received :Oct 24, 2023
Date Reported :Oct 31, 2023
Report Number :2802725-1

Page 2 of 2



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Approved by

Sarayuth Jitranont
Assistant General Manager

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Rayong Thailand 21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

Lot ID: 23118825

Date Received : Oct 24, 2023

Date Reported : Oct 31, 2023

Report Number : 2802725-1

Page 1 of 2

Sample Number	23118825-22 to 28
Parameter	Wind Speed / Wind Direction
Location	จตุรัสราชัน (A4) (GPS 47P 0747515, 1419157)
Sampling Date	Oct 16 - Oct 23, 2023
Sampling by	Jakkarin Manwicha

Time	Oct 16 - Oct 17, 2023		Oct 17 - Oct 18, 2023		Oct 18 - Oct 19, 2023		Oct 19 - Oct 20, 2023		Oct 20 - Oct 21, 2023		Oct 21 - Oct 22, 2023		Oct 22 - Oct 23, 2023								
	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	3.2	299.0	WNW	3.5	62.0	ENE	2.2	154.0	SSE	0.0	-	0.3	205.0	SSW	2.2	85.0	E	0.5	247.0	WSW	
01:00 PM - 02:00 PM	1.8	64.0	ENE	0.8	4.0	N	1.2	303.0	WNW	1.0	128.0	SE	2.3	137.0	SE	3.3	46.0	NE	1.1	66.0	ENE
02:00 PM - 03:00 PM	1.7	135.0	SE	1.8	53.0	NE	3.1	332.0	NNW	1.7	139.0	SE	1.6	156.0	SSE	3.3	196.0	SSW	3.1	33.0	NNE
03:00 PM - 04:00 PM	3.0	223.0	SW	2.6	78.0	ENE	0.8	283.0	WNW	0.1	-	-	1.3	186.0	S	1.7	249.0	W	4.3	200.0	SSW
04:00 PM - 05:00 PM	2.9	238.0	WSW	3.8	48.0	NE	0.8	121.0	ESE	1.9	70.0	ENE	1.4	80.0	E	1.7	189.0	S	2.5	209.0	SSW
05:00 PM - 06:00 PM	1.5	204.0	SSW	2.5	83.0	E	1.9	97.0	E	0.8	9.0	N	0.9	274.0	W	1.4	177.0	S	5.4	359.0	N
06:00 PM - 07:00 PM	2.3	196.0	SSW	3.6	250.0	WSW	0.7	98.0	E	0.9	8.0	N	1.1	94.0	E	0.3	304.0	NW	2.3	209.0	SSW
07:00 PM - 08:00 PM	2.8	296.0	WNW	0.5	332.0	NNW	1.6	95.0	E	0.4	86.0	E	0.0	-	-	0.9	351.0	N	1.8	313.0	NW
08:00 PM - 09:00 PM	1.6	300.0	WNW	0.7	333.0	NNW	3.4	98.0	E	0.5	114.0	ESE	0.0	-	-	2.1	20.0	NNE	2.5	288.0	WNW
09:00 PM - 10:00 PM	1.2	299.0	WNW	0.6	334.0	NNW	1.0	343.0	NNW	0.5	118.0	ESE	0.9	121.0	ESE	0.9	337.0	NNW	1.9	321.0	NW
10:00 PM - 11:00 PM	1.5	297.0	WNW	0.7	333.0	NNW	0.6	359.0	N	0.0	-	-	1.5	120.0	ESE	2.3	349.0	N	3.5	329.0	NNW
11:00 PM - 12:00 AM	0.0	-	-	0.6	331.0	NNW	0.0	-	-	0.0	-	-	0.3	236.0	SW	0.7	349.0	N	1.6	328.0	NNW
12:00 AM - 01:00 AM	0.8	300.0	WNW	0.0	-	-	0.5	358.0	N	0.0	-	-	0.0	-	-	1.2	348.0	NNW	1.8	329.0	NNW
01:00 AM - 02:00 AM	1.9	299.0	WNW	0.4	332.0	NNW	0.0	-	-	0.3	115.0	ESE	0.1	-	-	1.2	296.0	WNW	1.3	325.0	NNW
02:00 AM - 03:00 AM	0.6	296.0	WNW	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.8	330.0	NNW
03:00 AM - 04:00 AM	0.6	295.0	WNW	0.6	320.0	NW	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.9	357.0	N
04:00 AM - 05:00 AM	1.7	311.0	NW	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.4	334.0	NNW	0.9	322.0	NW
05:00 AM - 06:00 AM	0.2	-	-	1.3	320.0	NW	0.0	-	-	0.7	100.0	E	0.0	-	-	0.0	-	-	0.5	323.0	NW
06:00 AM - 07:00 AM	0.6	356.0	N	0.8	324.0	NW	0.0	-	-	0.5	117.0	ESE	0.0	-	-	0.2	-	-	0.0	-	-
07:00 AM - 08:00 AM	2.2	356.0	N	0.6	323.0	NW	0.0	-	-	0.0	-	-	0.5	315.0	NW	0.0	-	-	0.0	-	-
08:00 AM - 09:00 AM	1.7	41.0	NE	0.7	354.0	N	0.3	59.0	ENE	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
09:00 AM - 10:00 AM	1.1	121.0	ESE	2.8	333.0	NNW	0.0	-	-	0.0	-	-	0.0	-	-	0.6	331.0	NNW	1.3	40.0	NE
10:00 AM - 11:00 AM	3.7	82.0	E	0.7	0.0	N	0.6	277.0	W	0.2	-	-	1.5	0.0	N	1.7	344.0	NNW	0.6	33.0	NNE
11:00 AM - 12:00 PM	2.5	136.0	SE	1.0	53.0	NE	0.8	259.0	W	0.0	-	-	1.0	356.0	N	0.6	324.0	NW	1.2	37.0	NE

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by

Sarayuht Jitranont

Assistant General Manager

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Approved by

Sarayuht Jitranont

Assistant General Manager



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Rayong Thailand 21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

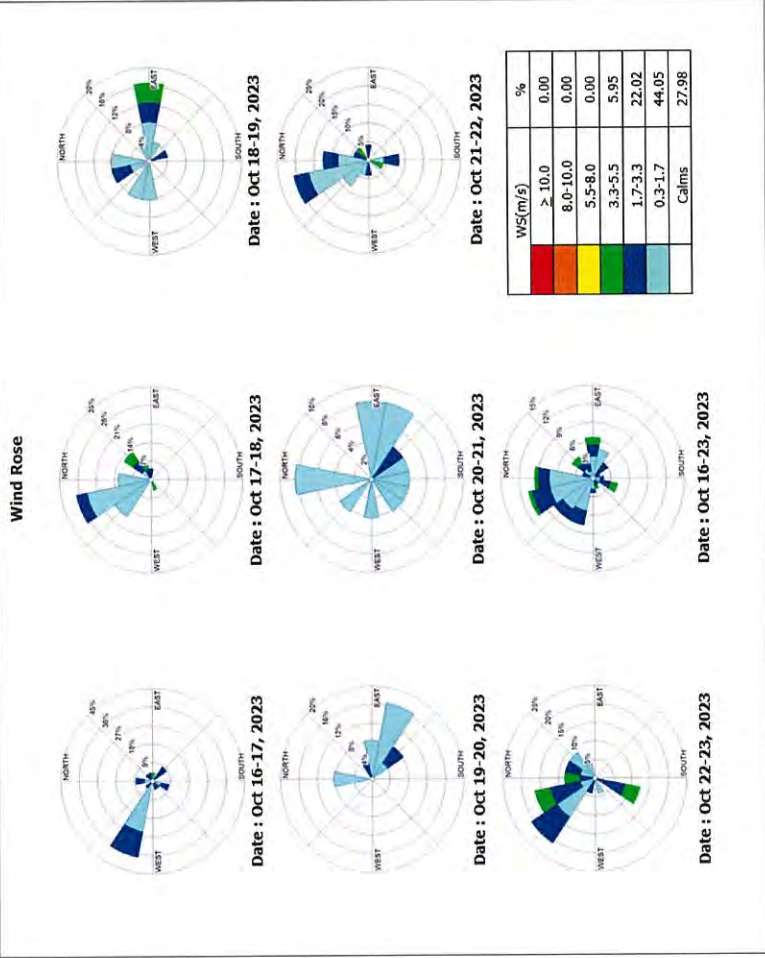
Lot ID: 23118825

Date Received : Oct 24, 2023

Date Reported : Oct 31, 2023

Report Number : 2802725-1

Page 2 of 2



ภาคผนวก ค-3

ระดับเสียงโดยทั่วไป



TESTING
No.0042

Analysis / Test Report

Client: Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118679
Date Received : Oct 24, 2023
Date Reported : Oct 27, 2023
Report Number: 2818343-1

Page 1 of 1

Sample Number	23118679-1
Parameter	Noise (Leq 24 hrs.)
Location	บ้านพักคนงาน (GPS 47P 0743667, 1419318)
Measurement Date	Oct 16 - Oct 17, 2023
Measurement by	Jakkarn Manwicha
Sound Level meter	Serial No. 376364

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	56.9	81.7	51.5
10:00 AM - 11:00 AM	57.2	82.3	51.5
11:00 AM - 12:00 PM	56.0	71.8	52.1
12:00 PM - 01:00 PM	57.1	75.6	52.7
01:00 PM - 02:00 PM	56.8	74.3	52.4
02:00 PM - 03:00 PM	58.1	76.7	52.6
03:00 PM - 04:00 PM	56.9	75.3	52.3
04:00 PM - 05:00 PM	58.0	81.2	52.0
05:00 PM - 06:00 PM	56.4	77.1	51.6
06:00 PM - 07:00 PM	54.5	76.1	51.2
07:00 PM - 08:00 PM	54.0	67.0	51.8
08:00 PM - 09:00 PM	53.3	72.8	51.6
09:00 PM - 10:00 PM	52.9	66.5	50.7
10:00 PM - 11:00 PM	52.7	64.3	50.8
11:00 PM - 12:00 AM	54.8	68.7	52.1
12:00 AM - 01:00 AM	56.2	65.2	53.8
01:00 AM - 02:00 AM	54.7	64.7	52.9
02:00 AM - 03:00 AM	52.3	57.8	50.3
03:00 AM - 04:00 AM	54.9	65.1	48.4
04:00 AM - 05:00 AM	54.1	75.4	48.0
05:00 AM - 06:00 AM	62.1	83.1	52.3
06:00 AM - 07:00 AM	56.4	79.6	51.1
07:00 AM - 08:00 AM	55.9	72.5	51.4
08:00 AM - 09:00 AM	56.5	75.7	51.6
Leq Average 24 hrs. (dB(A))	56.4		
Lmax (dB(A))	83.1		
L90 (dB(A))			51.6
Ldn (dB(A))	62.9		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2
Standard : 1. กรุงเทพมหานครและปริมณฑล ฉบับที่ 15 (พ.ศ. 2540) เกณฑ์มาตรฐานระดับเสียงในชุมชน
2. กรุงเทพมหานครและปริมณฑล เกณฑ์มาตรฐานระดับเสียงในชุมชน และระดับเสียงจากทางหลวง
รายงาน พ.ศ. 2548
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management
Thanita Kulsumwong
Scientist (4)

Approved by

Supt S.

Supot Salanteh
Section Head

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RIGHT SOLUTIONS RICHLY PARTNERS

S Report_Air Noise.pdf (2239K)

2272-621 EMAIL



TESTING
No.0042

Analysis / Test Report

Client: Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118679
Date Received : Oct 24, 2023
Date Reported : Oct 27, 2023
Report Number: 2818344-1

Page 1 of 1

Sample Number	23118679-2
Parameter	Noise (Leq 24 hrs.)
Location	บ้านพักคนงาน (GPS 47P 0743667, 1419318)
Measurement Date	Oct 17 - Oct 18, 2023
Measurement by	Jakkarn Manwicha
Sound Level meter	Serial No. 376364

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	55.9	74.4	51.5
10:00 AM - 11:00 AM	55.8	76.1	51.3
11:00 AM - 12:00 PM	57.1	75.1	52.9
12:00 PM - 01:00 PM	56.4	71.1	52.5
01:00 PM - 02:00 PM	56.4	84.1	52.2
02:00 PM - 03:00 PM	58.0	77.8	52.7
03:00 PM - 04:00 PM	58.8	85.2	52.6
04:00 PM - 05:00 PM	57.2	73.1	51.5
05:00 PM - 06:00 PM	57.1	82.7	51.3
06:00 PM - 07:00 PM	54.9	74.4	52.0
07:00 PM - 08:00 PM	54.2	73.6	52.6
08:00 PM - 09:00 PM	52.5	66.4	51.2
09:00 PM - 10:00 PM	52.9	74.8	50.3
10:00 PM - 11:00 PM	55.3	86.5	51.2
11:00 PM - 12:00 AM	51.2	74.3	49.1
12:00 AM - 01:00 AM	51.6	66.1	48.6
01:00 AM - 02:00 AM	55.2	63.7	52.0
02:00 AM - 03:00 AM	50.9	67.0	48.3
03:00 AM - 04:00 AM	52.5	64.1	48.3
04:00 AM - 05:00 AM	53.6	72.0	47.5
05:00 AM - 06:00 AM	59.7	78.8	50.9
06:00 AM - 07:00 AM	56.1	74.6	50.8
07:00 AM - 08:00 AM	56.7	84.0	51.4
08:00 AM - 09:00 AM	55.8	74.8	51.5
Leq Average 24 hrs. (dB(A))	55.8		
Lmax (dB(A))	86.5		
L90 (dB(A))			51.3
Ldn (dB(A))	61.6		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2
Standard : 1. กรุงเทพมหานครและปริมณฑล ฉบับที่ 15 (พ.ศ. 2540) เกณฑ์มาตรฐานระดับเสียงในชุมชน
2. กรุงเทพมหานครและปริมณฑล เกณฑ์มาตรฐานระดับเสียงในชุมชน และระดับเสียงจากทางหลวง
รายงาน พ.ศ. 2548
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management
Thanita Kulsumwong
Scientist (4)

Approved by

Supt S.

Supot Salanteh
Section Head

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2272-621 EMAIL

S Report_Air Noise.pdf (2239K)



TESTING
No.0042

Lot ID: 23118679

Date Received : Oct 24, 2023
Date Reported : Oct 27, 2023
Report Number: 2818345-1

Page 1 of 1



Analysis / Test Report

Client: Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :

Sample Number	23118679-3
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่โรงงานอุตสาหกรรม (GPS 47P 0743667, 1419318)
Measurement Date	Oct 18 - Oct 19, 2023
Measurement by	Jakkarn Maniwicha
Sound Level meter	Serial No. 376364

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	61.8	92.2	51.7
10:00 AM - 11:00 AM	56.6	84.1	51.3
11:00 AM - 12:00 PM	56.8	78.5	52.0
12:00 PM - 01:00 PM	56.8	73.6	52.9
01:00 PM - 02:00 PM	56.5	73.6	52.8
02:00 PM - 03:00 PM	57.7	78.4	52.6
03:00 PM - 04:00 PM	58.5	84.6	52.4
04:00 PM - 05:00 PM	56.3	74.0	52.0
05:00 PM - 06:00 PM	57.3	77.1	51.3
06:00 PM - 07:00 PM	54.9	71.0	50.8
07:00 PM - 08:00 PM	53.8	68.9	50.4
08:00 PM - 09:00 PM	52.3	72.7	49.5
09:00 PM - 10:00 PM	54.1	74.1	50.4
10:00 PM - 11:00 PM	53.0	66.3	49.9
11:00 PM - 12:00 AM	53.0	72.2	50.5
12:00 AM - 01:00 AM	53.8	68.2	51.9
01:00 AM - 02:00 AM	54.1	64.9	52.2
02:00 AM - 03:00 AM	53.8	62.5	52.0
03:00 AM - 04:00 AM	53.2	67.9	48.7
04:00 AM - 05:00 AM	55.3	76.1	48.5
05:00 AM - 06:00 AM	60.1	82.1	50.5
06:00 AM - 07:00 AM	56.1	80.5	50.1
07:00 AM - 08:00 AM	57.3	85.0	52.7
08:00 AM - 09:00 AM	56.0	70.2	52.1
Leq Average 24 hrs. (dB(A))	56.5	92.2	51.3
Lmax (dB(A))			
L90 (dB(A))			
Ldn (dB(A))	62.1		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2
Standard : 1. ปริมาณการรบกวนจากเสียงในเวลากลางคืน (พ.ร.บ. 2540) สำหรับโรงงานอุตสาหกรรม
2. ปริมาณการรบกวนจากเสียงในเวลากลางวันและกลางคืน (พ.ร.บ. 2540) สำหรับโรงงานอุตสาหกรรม
Tasana W.R. 2548
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management
Thanit Kulsunwong

Approved by
Supt S.

Scientist (4)

Supat Salameeth

Section Head

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2272-60/ ENAL

S. Rapong, Air Noise rpt (224PM)



TESTING
No.0042

Lot ID: 23118679

Date Received : Oct 24, 2023
Date Reported : Oct 27, 2023
Report Number: 2818346-1

Page 1 of 1



Analysis / Test Report

Client: Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :

Sample Number	23118679-4
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่โรงงานอุตสาหกรรม (GPS 47P 0743667, 1419318)
Measurement Date	Oct 19 - Oct 20, 2023
Measurement by	Jakkarn Maniwicha
Sound Level meter	Serial No. 376364

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	57.9	79.5	52.8
10:00 AM - 11:00 AM	58.2	82.7	52.3
11:00 AM - 12:00 PM	57.4	77.7	53.3
12:00 PM - 01:00 PM	57.1	78.9	52.7
01:00 PM - 02:00 PM	58.4	87.1	52.5
02:00 PM - 03:00 PM	59.6	83.8	53.5
03:00 PM - 04:00 PM	59.8	84.0	53.8
04:00 PM - 05:00 PM	57.6	80.7	53.2
05:00 PM - 06:00 PM	56.6	80.5	51.9
06:00 PM - 07:00 PM	54.5	71.4	51.8
07:00 PM - 08:00 PM	52.5	68.7	50.9
08:00 PM - 09:00 PM	54.4	65.1	51.9
09:00 PM - 10:00 PM	59.6	68.0	53.3
10:00 PM - 11:00 PM	63.6	71.7	60.7
11:00 PM - 12:00 AM	63.9	77.0	61.3
12:00 AM - 01:00 AM	63.4	69.6	60.9
01:00 AM - 02:00 AM	61.0	67.3	56.3
02:00 AM - 03:00 AM	55.7	64.5	50.8
03:00 AM - 04:00 AM	53.8	70.1	49.3
04:00 AM - 05:00 AM	53.7	71.3	48.8
05:00 AM - 06:00 AM	59.7	85.8	50.0
06:00 AM - 07:00 AM	56.2	82.2	52.4
07:00 AM - 08:00 AM	55.3	69.1	52.4
08:00 AM - 09:00 AM	56.1	76.3	52.3
Leq Average 24 hrs. (dB(A))	58.9	87.1	52.4
Lmax (dB(A))			
L90 (dB(A))			
Ldn (dB(A))	66.7	115	
Standard (dB(A))	70		

Reference Method : ISO1996-1 and 1996-2
Standard : 1. ปริมาณการรบกวนจากเสียงในเวลากลางคืน (พ.ร.บ. 2540) สำหรับโรงงานอุตสาหกรรม
2. ปริมาณการรบกวนจากเสียงในเวลากลางวันและกลางคืน (พ.ร.บ. 2540) สำหรับโรงงานอุตสาหกรรม
Tasana W.R. 2548
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management
Thanit Kulsunwong

Approved by
Supt S.

Scientist (4)

Supat Salameeth

Section Head

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2272-60/ ENAL

S. Rapong, Air Noise rpt (224PM)



Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118679
Date Received : Oct 24, 2023
Date Reported : Oct 27, 2023
Report Number: 2818347-1

Page 1 of 1

Sample Number	23118679-5
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณถนนสุขุมวิท (GPS 47P-0743667, 1419310)
Measurement Date	Oct 20 - Oct 21, 2023
Measurement by	Jakkarin Manivicha
Sound Level meter	Serial No. 376364

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	57.6	81.7	51.9
10:00 AM - 11:00 AM	58.1	83.1	52.8
11:00 AM - 12:00 PM	56.3	75.8	53.3
12:00 PM - 01:00 PM	58.1	94.4	52.8
01:00 PM - 02:00 PM	56.6	75.8	52.8
02:00 PM - 03:00 PM	58.7	84.7	53.2
03:00 PM - 04:00 PM	58.1	83.7	52.2
04:00 PM - 05:00 PM	56.4	81.8	50.4
05:00 PM - 06:00 PM	55.8	77.5	50.8
06:00 PM - 07:00 PM	56.9	72.2	51.7
07:00 PM - 08:00 PM	53.2	67.8	51.7
08:00 PM - 09:00 PM	53.6	68.7	51.5
09:00 PM - 10:00 PM	53.7	70.0	51.2
10:00 PM - 11:00 PM	54.8	68.8	49.8
11:00 PM - 12:00 AM	57.3	66.8	57.4
12:00 AM - 01:00 AM	61.0	66.3	57.4
01:00 AM - 02:00 AM	60.0	66.1	56.6
02:00 AM - 03:00 AM	56.0	71.9	51.6
03:00 AM - 04:00 AM	64.6	89.7	50.3
04:00 AM - 05:00 AM	51.2	70.7	48.3
05:00 AM - 06:00 AM	53.1	73.3	48.1
06:00 AM - 07:00 AM	52.8	78.3	48.0
07:00 AM - 08:00 AM	49.6	70.8	46.1
08:00 AM - 09:00 AM	49.4	69.3	45.3

Leq Average 24 hrs. (dB(A))	57.4
Lmax (dB(A))	94.4
L90 (dB(A))	51.5
L01 (dB(A))	
Standard (dB(A))	70
Reference Method : ISO1996-1 and 1996-2	
Standard : 1. ใช้มาตรฐานการวัดเสียงตามเกณฑ์ มาตรฐาน 15 (พ.ศ. 2540) สำหรับการวัดเสียงรบกวนในชุมชน 2. ใช้เกณฑ์การประเมินเสียงรบกวนตามมาตรฐานการวัดเสียงรบกวนในชุมชนตามข้อกำหนดของกรมส่งเสริมการค้าระหว่างประเทศ	
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.	

Supt S.

Technical Management : Tharitat, Scientist (4)
Approved by : Supt S.
Supot Salameh
Section Head

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Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23118679
Date Received : Oct 24, 2023
Date Reported : Oct 27, 2023
Report Number: 2818348-1

Page 1 of 1

Sample Number	23118679-6
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณถนนสุขุมวิท (GPS 47P-0743667, 1419318)
Measurement Date	Oct 21 - Oct 22, 2023
Measurement by	Jakkarin Manivicha
Sound Level meter	Serial No. 376364

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	49.5	66.9	45.4
10:00 AM - 11:00 AM	52.7	68.9	48.7
11:00 AM - 12:00 PM	54.6	74.3	51.7
12:00 PM - 01:00 PM	54.0	69.6	51.8
01:00 PM - 02:00 PM	55.6	73.3	52.4
02:00 PM - 03:00 PM	56.1	79.8	53.1
03:00 PM - 04:00 PM	56.1	70.4	53.3
04:00 PM - 05:00 PM	55.9	67.2	52.7
05:00 PM - 06:00 PM	55.4	81.6	53.2
06:00 PM - 07:00 PM	54.9	71.1	53.2
07:00 PM - 08:00 PM	58.3	70.0	53.8
08:00 PM - 09:00 PM	61.4	75.0	57.5
09:00 PM - 10:00 PM	63.0	67.6	61.3
10:00 PM - 11:00 PM	62.9	78.2	61.3
11:00 PM - 12:00 AM	61.2	65.8	59.2
12:00 AM - 01:00 AM	62.5	67.4	60.0
01:00 AM - 02:00 AM	62.7	67.4	60.8
02:00 AM - 03:00 AM	61.6	66.9	57.2
03:00 AM - 04:00 AM	56.0	75.3	51.5
04:00 AM - 05:00 AM	53.0	70.3	50.6
05:00 AM - 06:00 AM	57.7	78.7	51.5
06:00 AM - 07:00 AM	52.3	68.8	48.4
07:00 AM - 08:00 AM	49.8	65.1	47.2
08:00 AM - 09:00 AM	51.0	65.1	47.8

Leq Average 24 hrs. (dB(A))	58.5
Lmax (dB(A))	81.6
L90 (dB(A))	52.7
L01 (dB(A))	
Standard (dB(A))	70
Reference Method : ISO1996-1 and 1996-2	
Standard : 1. ใช้มาตรฐานการวัดเสียงตามเกณฑ์ มาตรฐาน 15 (พ.ศ. 2540) สำหรับการวัดเสียงรบกวนในชุมชน 2. ใช้เกณฑ์การประเมินเสียงรบกวนตามมาตรฐานการวัดเสียงรบกวนในชุมชนตามข้อกำหนดของกรมส่งเสริมการค้าระหว่างประเทศ	
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.	

Supt S.

Technical Management : Tharitat, Scientist (4)
Approved by : Supt S.
Supot Salameh
Section Head

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ALS LABORATORY GROUP (THAILAND) CO., LTD. An ALS Limited Company



Analysis / Test Report



Client: Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand 21120

P/O : 4510433115

Project Name : Environment : EIA

Project Location :

TESTING

No.0042

Lot ID: 23118679

Date Received : Oct 24, 2023

Date Reported : Oct 27, 2023

Report Number: 2818349-1

Page 1 of 1

Sample Number	23118679-7
Parameter	Noise (Leq 24 hrs.)
Location	ริมฟุตบาทด้านหน้าอาคาร (GPS 47P 0743667, 1419318)
Measurement Date	Oct 22 - Oct 23, 2023
Measurement by	Jakkarn Manwicha
Sound Level meter	Serial No. 376364

Tint	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	54.9	81.7	49.0
10:00 AM - 11:00 AM	53.4	70.5	50.5
11:00 AM - 12:00 PM	53.0	72.9	51.0
12:00 PM - 01:00 PM	53.5	72.7	50.9
01:00 PM - 02:00 PM	60.0	90.4	50.9
02:00 PM - 03:00 PM	53.8	67.0	51.1
03:00 PM - 04:00 PM	57.3	82.9	50.2
04:00 PM - 05:00 PM	55.9	71.0	49.7
05:00 PM - 06:00 PM	60.7	70.7	52.7
06:00 PM - 07:00 PM	65.1	72.6	60.7
07:00 PM - 08:00 PM	66.4	71.3	63.8
08:00 PM - 09:00 PM	65.7	71.4	62.4
09:00 PM - 10:00 PM	63.5	71.3	58.8
10:00 PM - 11:00 PM	61.2	68.7	53.6
11:00 PM - 12:00 AM	58.2	70.4	51.1
12:00 AM - 01:00 AM	56.0	65.3	50.1
01:00 AM - 02:00 AM	54.6	69.4	49.9
02:00 AM - 03:00 AM	53.2	72.0	48.1
03:00 AM - 04:00 AM	56.2	72.0	49.0
04:00 AM - 05:00 AM	59.9	79.3	51.2
05:00 AM - 06:00 AM	55.3	73.7	50.5
06:00 AM - 07:00 AM	58.0	70.2	50.9
07:00 AM - 08:00 AM	56.2	71.3	50.0
Leq Average 24 hrs. (dB(A))	59.9	90.4	50.9
Lmax (dB(A))			
L90 (dB(A))			
Ldn (dB(A))	65.5		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2
Standard : 1. กรุงเทพมหานครและปริมณฑล 15 (พ.ศ. 2560) สำหรับชุมชนและพื้นที่อยู่อาศัย
2. กรุงเทพมหานครและปริมณฑล 15 (พ.ศ. 2560) สำหรับพื้นที่อุตสาหกรรมและพื้นที่พาณิชยกรรม

วันที่ ท.ศ. 2548

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

Technical Management

Thairitak.

Approved by

Supt S

Thaniia Kulsriwong

Supot Sallamleh

Scientist (4)

Section Head

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S. Vajraporn, Air Noise rpt (2.25PM)

ภาคผนวก ค-4

คุณภาพน้ำทิ้ง



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 2370732
Date Received : Jul 14, 2023
Date Reported : Jul 21, 2023
Report Number : 2725374-1

Page 1 of 2

Sample Number	2370732-2						
Sampled Date	Jul 14, 2023 4:00 PM						
Sample Description	Wastewater						
Location	Effluent (Holding pond 5,000 m3)						
Date Analysis Commenced	Jul 14, 2023						
Condition of Sample	Contained in one BOD bottle, one amber glass bottle and four 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	2.8	≤20	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	<25	≤120	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	17	≤300	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	15	≤300	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	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C *		-	-	7.1	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-CI (F)	Rayong
Temperature *	Degree C	-	-	34.2	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	900	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong

Technical Management

N. Banphit

Narumon Banchoangkit
Supervisor

โทรศัพท์ 3-323-9-9445

Approved by

D. Changchon

Dej Changchon
Senior Manager

โทรศัพท์ 3-323-9-9442

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 2370732
Date Received : Jul 14, 2023
Date Reported : Jul 21, 2023
Report Number : 2725374-1

Page 2 of 2

Sample Number	2370732-2						
Sampled Date	Jul 14, 2023 4:00 PM						
Sample Description	Wastewater						
Location	Effluent (Holding pond 5,000 m3)						
Date Analysis Commenced	Jul 14, 2023						
Condition of Sample	Contained in one BOD bottle, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	18	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

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

Sampling By : Narumon thammassaro โทรศัพท์ 3-323-9-9477, Panupong Manit โทรศัพท์ 3-204-9-8600

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

Technical Management

N. Banphit

Narumon Banchoangkit
Supervisor

โทรศัพท์ 3-323-9-9445

Approved by

D. Changchon

Dej Changchon
Senior Manager

โทรศัพท์ 3-323-9-9442

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :
TESTING No.0009
Lot ID: 2370732
Date Received : Jul 14, 2023
Date Reported : Jul 21, 2023
Report Number : 2725374-2

Page 1 of 1

Sample Number	2370732-2
Sampled Date	Jul 14, 2023 4:00 PM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Jul 17, 2023
Condition of Sample	Contained in one BOD bottle, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.15	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	2.85	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

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

Sampling By : Narurat thammamaso รหัสประจำตัว 7-204-3-9477 , Panupong Manit รหัสประจำตัว 7-204-3-8600

Remark :

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- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chanath L.

Chanatagarn Imchom
Section Head

Approved by

Kanokkom Anek

Kanokkom Anek
Senior Manager

รหัสประจำตัว 7-204-3-6111

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :
TESTING No.0009
Lot ID: 2370732
Date Received : Jul 14, 2023
Date Reported : Jul 21, 2023
Report Number : 2725374-3

Page 1 of 1

Sample Number	2370732-2
Sampled Date	Jul 14, 2023 4:00 PM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Jul 15, 2023
Condition of Sample	Contained in one BOD bottle, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	2.12	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	microhm/cm	-	0.5	1253	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	6.1	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Rayong

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

Sampling By : Narurat thammamaso , Panupong Manit

Remark :

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Approved by

Chanath L.

Chanatagarn Imchom
Section Head

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 2379072
Date Received : Aug 15, 2023
Date Reported : Aug 22, 2023
Report Number : 2752471-1

Page 1 of 2

Sample Number	2379072-2
Sampled Date	Aug 15, 2023 9:28 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Aug 15, 2023
Condition of Sample	Contained in one amber glass bottle, one BOD bottle and four 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	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4300 - O G	Rayong
COD	mg/L	1.5	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADME	-	5	8	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADME	-	5	7	≤300	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	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C *	-	-	-	7.9	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Rayong
Temperature *	Degree C	-	-	34.8	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	972	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong

Technical Management : Narumon Banchoangkit Supervisor
N. Banchoangkit
wudnuan@ 1-323-a-9445
Approved by : Dej Changchon Senior Manager
wudnuan@ 1-323-a-9442

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 2379072
Date Received : Aug 15, 2023
Date Reported : Aug 22, 2023
Report Number : 2752471-1

Page 2 of 2

Sample Number	2379072-2
Sampled Date	Aug 15, 2023 9:28 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Aug 15, 2023
Condition of Sample	Contained in one amber glass bottle, one BOD bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).
Sampling BY : Suravit Narapong wudnuan@ 1-323-a-0011, Panupong Manit wudnuan@ 1-204-a-8600

Remark :
- LOD : Limit of Detection
- LOQ : Lower than LOQ (Unit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management : Narumon Banchoangkit Supervisor
N. Banchoangkit
wudnuan@ 1-323-a-9445
Approved by : Dej Changchon Senior Manager
wudnuan@ 1-323-a-9442

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 2379072
Date Received : Aug 15, 2023
Date Reported : Aug 22, 2023
Report Number: 2752471-2

Page 1 of 1

Sample Number	2379072-2
Sampled Date	Aug 15, 2023 9:28 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Aug 16, 2023
Condition of Sample	Contained in one amber glass bottle, one BOD bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.11	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.26	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

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

Sampling By : สุรวดี นารอง นิสิตกุล ๓-323-๔-0011, Panupong Manit นิสิตกุล ๓-204-๔-8600

Remark :

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

Technical Management

Savitree N.

Swiree Nongsangman
Manager
นิตินุมา ๓-204-๔-4709

Approved by

Kanokkam Anek

Senior Manager
นิตินุมา ๓-204-๔-6111

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 2379072
Date Received : Aug 15, 2023
Date Reported : Aug 22, 2023
Report Number: 2752471-3

Page 1 of 1

Sample Number	2379072-2
Sampled Date	Aug 15, 2023 9:28 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Aug 16, 2023
Condition of Sample	Contained in one amber glass bottle, one BOD bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.18	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	microhm/cm	-	0.5	1233	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	4.7	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Rayong

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

Sampling By : สุรวดี นารอง นิสิตกุล ๓-323-๔-0011, Panupong Manit นิสิตกุล ๓-204-๔-8600

Remark :

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

Approved by

Savitree N.

Swiree Nongsangman
Manager
นิตินุมา ๓-204-๔-4709

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0042
Lot ID: 2393536
Date Received : Sep 14, 2023
Date Reported : Sep 21, 2023
Report Number : 2784603-1

Page 1 of 2

Sample Number		2393536-2					
Sample Date	Sep 14, 2023 2:35 PM						
Sample Description	Wastewater						
Location	Effluent (Holding pond 5,000 m3)						
Date Analysis Commenced		Sep 14, 2023					
Condition of Sample		Contained in one BOD bottle, one amber glass bottle and four 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	4.3	≤20	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	30	≤120	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	15	≤300	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	14	≤300	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	≤5	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
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Rayong
Temperature *	Degree C	-	-	33.4	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 Degree C	mg/L	-	5	912	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong

Technical Management

N. Banphit
Narumon Banchoangkit
Supervisor
wtulnuawaf 7-323-a-9445

Approved by

D. Chuan
Dej Changchon
Senior Manager
wtulnuawaf 7-323-a-9442

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NIGHT SOLUTIONS PUGH PARTIES

2772-31

S. Veeeta_AL_Grpt (1.03PH)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0042
Lot ID: 2393536
Date Received : Sep 14, 2023
Date Reported : Sep 21, 2023
Report Number : 2784603-1

Page 2 of 2

Sample Number	2393536-2						
Sampled Date	Sep 14, 2023 2:35 PM						
Sample Description	Wastewater						
Location	Effluent (Holding pond 5,000 m3)						
Date Analysis Commenced	Sep 14, 2023						
Condition of Sample	Contained in one 800 bottle, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	15	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

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

Sampling By : Narunat thammusaro wtulnuawaf 7-323-a-9477, Thanassun Namakunna wtulnuawaf 7-204-a-8592

- Remark :
- LOD : Limit of Detection
 - LOQ : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
 - "x" : Analyte(s) marked "x" are not included in scope of Accreditation ISO/IEC 17025.
 - The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

N. Banphit
Narumon Banchoangkit
Supervisor
wtulnuawaf 7-323-a-9445

Approved by

D. Chuan
Dej Changchon
Senior Manager
wtulnuawaf 7-323-a-9442

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NIGHT SOLUTIONS PUGH PARTIES

2772-31

S. Veeeta_AL_Grpt (1.03PH)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 23935336
Date Received : Sep 14, 2023
Date Reported : Sep 21, 2023
Report Number : 2784603-2

Page 1 of 1

Sample Number	2393536-2
Sampled Date	Sep 14, 2023 2:35 PM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m ³)
Date Analysis Commenced	Sep 15, 2023
Condition of Sample	Contained in one BOD bottle, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0083	0.0005	0.27	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.35	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

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

Sampling By : Narurat thammassaro มัณฑิมาสาร นัฐนารัตน์, Thanassoun Namakunna มัณฑิมาสาร นัฐนารัตน์

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

Technical Management

Savitree N.
Savitree Nongsangiam
Manager

Approved by

Kanokorn Anek
Kanokorn Anek
Senior Manager

โทรศัพท์ 02-04-4709

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RIGHT SOLUTIONS RIGHT PARTNERS

277231

S. Waporn, J.A. Gil, et al. (2009)

Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 23935336
Date Received : Sep 14, 2023
Date Reported : Sep 21, 2023
Report Number : 2784603-3

Page 1 of 1

Sample Number	2393536-2
Sampled Date	Sep 14, 2023 2:35 PM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m ³)
Date Analysis Commenced	Sep 15, 2023
Condition of Sample	Contained in one BOD bottle, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.15	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	micromhos/cm	-	0.5	1248	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	6.2	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Rayong

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

Sampling By : Narurat thammassaro มัณฑิมาสาร นัฐนารัตน์, Thanassoun Namakunna มัณฑิมาสาร นัฐนารัตน์

Remark :

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- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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Approved by

Savitree N.
Savitree Nongsangiam
Manager

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277231

S. Waporn, J.A. Gil, et al. (2009)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0042
Lot ID: 23108489
Date Received : Oct 17, 2023
Date Reported : Oct 25, 2023
Report Number : 2815916-1

Page 1 of 2

Sample Number		23108489-2					
Sampled Date		Oct 17, 2023 9:54 AM					
Sample Description		Wastewater					
Location		Effluent (Holding pond 5,000 m3)					
Date Analysis Commenced		Oct 17, 2023					
Condition of Sample		Contained in one amber glass bottle, one BOD bottle and four 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	4.1	≤20	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	28	≤120	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	11	≤300	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	11	≤300	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	≤5	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
Residual Free Chlorine *	mg/L	-	0.1	0.2	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-CI (F)	Rayong
Temperature *	Degree C	-	-	30.2	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	920	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong

Technical Management

N. Banphit
Narumon Banchoangkit
Supervisor

Approved by

D. Chongchon
Dej Chongchon
Senior Manager

วท004289-2-323-9-9445

วท004289-2-323-9-9442

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0042
Lot ID: 23108489
Date Received : Oct 17, 2023
Date Reported : Oct 25, 2023
Report Number : 2815916-1

Page 2 of 2

Sample Number	23108489-2						
Sampled Date	Oct 17, 2023 9:54 AM						
Sample Description	Wastewater						
Location	Effluent (Holding pond 5,000 m3)						
Date Analysis Commenced	Oct 17, 2023						
Condition of Sample	Contained in one amber glass bottle, one BOD bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	23	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

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

Sampling By : Surawit Narapong วท004289-2-323-9-0011, Pattarapol Sawanajitlam วท004289-2-323-9-0002

Remark :

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Technical Management

N. Banphit
Narumon Banchoangkit
Supervisor

Approved by

D. Chongchon
Dej Chongchon
Senior Manager

วท004289-2-323-9-9445

วท004289-2-323-9-9442

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 23108489
Date Received : Oct 17, 2023
Date Reported : Oct 25, 2023
Report Number : 2815916-2

Page 1 of 1

Sample Number	23108489-2
Sampled Date	Oct 17, 2023 9:54 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m ³)
Date Analysis Commenced	Oct 18, 2023
Condition of Sample	Contained in one amber glass bottle, one BOD bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.18	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	1.52	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

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

Remark :

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

Technical Management

Savitree N.
Sawitree Nongsingam
Manager

Approved by

Kanokorn Anek
Kanokorn Anek
Senior Manager

โทรศัพท์ 0-204-4-6111

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2372 31

S. Jongsomjit, AL, GL, and I (6.13PM)

Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 23108489
Date Received : Oct 17, 2023
Date Reported : Oct 25, 2023
Report Number : 2815916-3

Page 1 of 1

Sample Number	23108489-2
Sampled Date	Oct 17, 2023 9:54 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m ³)
Date Analysis Commenced	Oct 18, 2023
Condition of Sample	Contained in one amber glass bottle, one BOD bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.73	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	micromhos/cm	-	0.5	1214	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	5.0	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Rayong

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

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOQ (Limit of Reporting)
- Analyte(s) marked * : Ignore not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Savitree N.
Sawitree Nongsingam
Manager

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2372 31

S. Jongsomjit, AL, GL, and I (6.13PM)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 23120921
Date Received : Nov 14, 2023
Date Reported : Nov 20, 2023
Report Number : 2841518-1

Page 1 of 2

Sample Number	23120921-2
Sampled Date	Nov 13, 2023 9:45 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Nov 14, 2023
Condition of Sample	Contained in one amber glass bottle, one BOD bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	<2.0	≤20	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	<25	≤120	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	7	≤300	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	6	≤300	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	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C *	-	-	-	7.6	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-C1 (F)	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-C1 (F)	Rayong
Temperature *	Degree C	-	-	33.6	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	992	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong

Technical Management
N. Banthit
Narumon Banchongkit
Supervisor
โทรศัพท์ ๐-๓๒๓-๙๙๔๕

Approved by
Dej Changchon
Senior Manager
โทรศัพท์ ๐-๓๒๓-๙๙๔๕

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ALS LABORATORY GROUP (THAILAND) CO., LTD. An ALS Limited Company

Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 23120921
Date Received : Nov 14, 2023
Date Reported : Nov 20, 2023
Report Number : 2841518-1

Page 2 of 2

Sample Number	23120921-2
Sampled Date	Nov 13, 2023 9:45 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Nov 14, 2023
Condition of Sample	Contained in one amber glass bottle, one BOD bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	13	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 02, 8.E.2560 (2017).

Sampling By : Surawit Narapong รหัสประจำตัว ๓-๓๒๓-๙-๐๐๑๑, Thanasoun Namakunna รหัสประจำตัว ๓-๓๒๓-๙-๐๕๙๒

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

Technical Management
N. Banthit
Narumon Banchongkit
Supervisor
โทรศัพท์ ๐-๓๒๓-๙๙๔๕

Approved by
Dej Changchon
Senior Manager
โทรศัพท์ ๐-๓๒๓-๙๙๔๕

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :
TESTING
No.0009
Lot ID: 23120921
Date Received : Nov 14, 2023
Date Reported : Nov 21, 2023
Report Number : 2841518-2

Page 1 of 1

Sample Number	23120921-2
Sampled Date	Nov 13, 2023 9:45 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Nov 15, 2023
Condition of Sample	Contained in one amber glass bottle, one BOD bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.12	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.74	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

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

Sampling By : Surawit Narapong รหัสประจำตัว 7-323-า-0011, Thanasoun Namakunna รหัสประจำตัว 7-204-า-8592

Remark :

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Technical Management

Chanatt L.

Chanatagarn Jinchon
Section Head

รหัสประจำตัว 7-204-า-4710

Approved by

Kank Anuk

Kanokorn Anuk
Senior Manager

รหัสประจำตัว 7-204-า-6111

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2372-31

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :
TESTING
No.0009
Lot ID: 23120921
Date Received : Nov 14, 2023
Date Reported : Nov 21, 2023
Report Number : 2841518-3

Page 1 of 1

Sample Number	23120921-2
Sampled Date	Nov 13, 2023 9:45 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Nov 15, 2023
Condition of Sample	Contained in one amber glass bottle, one BOD bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.86	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	micromhos/cm	-	0.5	1292	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	3.9	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Rayong

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

Sampling By : Surawit Narapong , Thanasoun Namakunna

Remark :

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Approved by

Chanatt L.

Chanatagarn Jinchon
Section Head

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0042
Lot ID: 23130742
Date Received : Dec 14, 2023
Date Reported : Dec 21, 2023
Report Number : 2870007-1

Page 1 of 2

Sample Number		23130742-2					
Sampled Date		Dec 14, 2023 2:20 PM					
Sample Description		Wastewater					
Location		Effluent (Holding pond 5,000 m3)					
Date Analysis Commenced		Dec 14, 2023					
Condition of Sample		Contained in one BOD bottle, one amber glass bottle, two glass vials and four 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	<2.0	≤20	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	<25	≤120	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	8	≤300	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	7	≤300	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	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C *	-	-	-	7.3	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (9)	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Rayong
Temperature *	Degree C	-	-	33.3	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1220	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong

Technical Management
N. Banphit
Narumon Banchongkit
Supervisor
โทรศัพท์ 3-323-9445

Approved by
D. Chongchon
Dej Chongchon
Senior Manager
โทรศัพท์ 3-323-9442

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0042
Lot ID: 23130742
Date Received : Dec 14, 2023
Date Reported : Dec 21, 2023
Report Number : 2870007-1

Page 2 of 2

Sample Number	23130742-2						
Sampled Date	Dec 14, 2023 2:20 PM						
Sample Description	Wastewater						
Location	Effluent (Holding pond 5,000 m3)						
Date Analysis Commenced	Dec 14, 2023						
Condition of Sample	Contained in one BOD bottle, one amber glass bottle, two glass vials and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	9	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

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

Sampling By : Sunseon Khuyokseui วัสดุภัณฑ์ 3-323-94005 , Thanassoon Namakuma วัสดุภัณฑ์ 3-204-8592

- Remark :
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Technical Management
N. Banphit
Narumon Banchongkit
Supervisor
โทรศัพท์ 3-323-9445

Approved by
D. Chongchon
Dej Chongchon
Senior Manager
โทรศัพท์ 3-323-9442

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 23130742
Date Received : Dec 14, 2023
Date Reported : Dec 21, 2023
Report Number : 2870007-2

Page 1 of 1

Sample Number	23130742-2				
Sampled Date	Dec 14, 2023 2:20 PM				
Sample Description	Wastewater				
Location	Effluent (Holding pond 5,000 m3)				
Date Analysis Commenced	Dec 15, 2023				
Condition of Sample	Contained in one BOD bottle, one amber glass bottle, two glass vials and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)				

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.11	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.56	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

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

Sampling By : Sanseon Khuyoksuai รหัสพนักงาน 7-204-4-8592 , Thanasoun Namakunna รหัสพนักงาน 7-204-4-8592

Remark :

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Technical Management

Savitree N.

Swiree Naisangiam
Manager

รหัสพนักงาน 7-204-4-4709

Approved by

Loek Auk.

Kanokkom Anek
Senior Manager

รหัสพนักงาน 7-204-4-6111

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S (Japorn)_AB_GL-INT (1.5/2PH)

Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510426489
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 23130742
Date Received : Dec 14, 2023
Date Reported : Dec 21, 2023
Report Number : 2870007-3

Page 1 of 1

Sample Number	23130742-2				
Sampled Date	Dec 14, 2023 2:20 PM				
Sample Description	Wastewater				
Location	Effluent (Holding pond 5,000 m3)				
Date Analysis Commenced	Dec 15, 2023				
Condition of Sample	Contained in one BOD bottle, one amber glass bottle, two glass vials and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)				

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.70	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	microhm/cm	-	0.5	1603	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	9.9	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Rayong

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

Sampling By : Sanseon Khuyoksuai , Thanasoun Namakunna

Remark :

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Approved by

Savitree N.

Swiree Naisangiam
Manager

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S (Japorn)_AB_GL-INT (1.5/2PH)

ภาคผนวก ค-5

คุณภาพดิน



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23122592
Date Received : Nov 17, 2023
Date Reported : Nov 25, 2023
Report Number : 2812713-1

Page 1 of 12

Sample Number 23122592-1
Sampled Date Nov 17, 2023 10:30 AM
Sample Description Soil
Location SI หมู่บ้าน 30 คุ้งหว้า 1
Date Analysis Commenced Nov 20, 2023
Condition of Sample Packed in one plastic bag and one glass bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Metals Testing						
Copper	mg/kg	-	1.00	46.3	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Iron	mg/kg	-	1.00	9625	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Zinc	mg/kg	-	1.00	89.0	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Physical Parameters						
Moisture	%	-	0.1	8.8	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 G	Bangkok

Note : Analysis Results expressed on dry basis.

Sampling By : Samart Khumpliee

Remark :

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

Approved by
Swimon C.
Swimon Chaiuangwut
Scientist (3)

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2312-02

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23122592
Date Received : Nov 17, 2023
Date Reported : Nov 25, 2023
Report Number : 2812713-1

Page 3 of 12

Sample Number 23122592-3
Sampled Date Nov 17, 2023 11:00 AM
Sample Description Soil
Location SI หมู่บ้าน 30 คุ้งหว้า 1
Date Analysis Commenced Nov 20, 2023
Condition of Sample Packed in one plastic bag and one glass bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Metals Testing						
Copper	mg/kg	-	1.00	65.3	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Iron	mg/kg	-	1.00	8771	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Zinc	mg/kg	-	1.00	150	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Physical Parameters						
Moisture	%	-	0.1	11.8	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 G	Bangkok

Note : Analysis Results expressed on dry basis.

Sampling By : Samart Khumpliee

Remark :

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

Approved by
Swimon C.
Swimon Chaiuangwut
Scientist (3)

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23122592
Date Received : Nov 17, 2023
Date Reported : Nov 25, 2023
Report Number : 2812713-1

Page 5 of 12

Sample Number : 23122592-5
Sampled Date : Nov 17, 2023 9:55 AM
Sample Description : Soil
Location : S2 วนอุทยานแห่งชาติ 1
Date Analysis Commenced : Nov 20, 2023
Condition of Sample : Packed in one plastic bag and one glass bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOB)	Result	Method	Testing Location
Metals Testing						
Copper	mg/kg	-	1.00	22.4	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Iron	mg/kg	-	1.00	8363	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Zinc	mg/kg	-	1.00	67.0	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Physical Parameters						
Moisture	%	-	0.1	12.0	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 G	Bangkok

Note : Analysis Results expressed on dry basis.

Sampling By : Samart Khumplilee

Remark :
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Approved by

Suwimon Chaiwangwut
Scientist (3)

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2372.42

S:\Report\AL_11024_01 (13-5400)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23122592
Date Received : Nov 17, 2023
Date Reported : Nov 25, 2023
Report Number : 2812713-1

Page 7 of 12

Sample Number : 23122592-7
Sampled Date : Nov 17, 2023 10:20 AM
Sample Description : Soil
Location : S2 วนอุทยานแห่งชาติ 1
Date Analysis Commenced : Nov 20, 2023
Condition of Sample : Packed in one plastic bag and one glass bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOB)	Result	Method	Testing Location
Metals Testing						
Copper	mg/kg	-	1.00	10.2	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Iron	mg/kg	-	1.00	8777	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Zinc	mg/kg	-	1.00	21.8	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Physical Parameters						
Moisture	%	-	0.1	8.6	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 G	Bangkok

Note : Analysis Results expressed on dry basis.

Sampling By : Samart Khumplilee

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOB (Limit of Reporting)

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. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced or used in full.

Approved by

Suwimon Chaiwangwut
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2372.42

S:\Report\AL_11024_01 (13-5400)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23122592
Date Received : Nov 17, 2023
Date Reported : Nov 25, 2023
Report Number : 2812713-1

Page 11 of 12

Sample Number 23122592-11
Sampled Date Nov 17, 2023 9:45 AM
Sample Description Soil
Location 53 หมู่บ้าน 30 หมู่บ้าน บ้านใหม่ 1
Date Analysis Commenced Nov 20, 2023
Condition of Sample Packed in one plastic bag and one glass bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Metals Testing						
Copper	mg/kg	-	1.00	107	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Iron	mg/kg	-	1.00	8661	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Zinc	mg/kg	-	1.00	144	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Physical Parameters						
Moisture	%	-	0.1	7.2	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 G	Bangkok

Note : Analysis Results expressed on dry basis.

Sampling By : Smart Khumplies

Remark :

- LOD : Limit of Detection
- "L" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Approved by
Swimon C.
Swimon Chinnagwut
Scientist (3)

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2372-62 S:\Report\AL_Indo_JK (8-5449)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 23143366
Date Received : Dec 16, 2023
Date Reported : Dec 25, 2023
Report Number : 2862193-1

Page 1 of 2

Sample Number 23143366-1
Sampled Date Dec 15, 2023 9:45 AM
Sample Description Soil
Location 53 หมู่บ้าน 4 บ้านใหม่ 1
Date Analysis Commenced Dec 16, 2023
Condition of Sample Packed in one plastic bag and one glass bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Metals Testing						
Copper	mg/kg	-	1.00	20.6	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Iron	mg/kg	-	1.00	15945	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Zinc	mg/kg	-	1.00	44.0	United States Environmental Protection Agency, EPA Method 3050B and 6010D	Bangkok
Physical Parameters						
Moisture	%	-	0.1	8.3	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 G	Bangkok

Note : Analysis Results expressed on dry basis.

Sampling By : Thanassou Namakunna

Remark :

- LOD : Limit of Detection
- "L" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Approved by
Sinluk P.
Sinluk Puengpang
Section Head

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ภาคผนวก ค-6

ระดับความร้อนในสถานที่ทำงาน



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510463439
Project Name : Environment : EIA
Project Location :
Lot ID: 23105562
Date Received : Sep 15, 2023
Date Reported : Sep 21, 2023
Report Number: 2770342-1

Page 1 of 6

Sample Number	23105562-1
Parameter	Heat Stress (Sampling Time :09:00 AM - 11:00 AM)
Measurement Date	Sep 15, 2023
Measurement by	Natakarn Vonginyoo
Location	บริเวณ 1 จุด (ด้านหน้าโรงงาน : - อุณหภูมิ : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่กลางแจ้ง (H1) (Boiler# R-Toch)	120	32.2	29.8	37.8	37.7
Average (WBGT)		32.2			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

Supdt S.

Supot Salameh
Section Head

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

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2776-62

S: 090902, Air Heat (T) (6-47700)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510463439
Project Name : Environment : EIA
Project Location :
Lot ID: 23105562
Date Received : Sep 15, 2023
Date Reported : Sep 21, 2023
Report Number: 2770342-1

Page 2 of 6

Sample Number	23105562-2
Parameter	Heat Stress (Sampling Time :09:00 AM - 11:00 AM)
Measurement Date	Sep 15, 2023
Measurement by	Natakarn Vonginyoo
Location	บริเวณ 1 จุด (ด้านหลังโรงงาน : - อุณหภูมิ : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่กลางแจ้ง (H2) (อาคาร)	120	27.8	25.8	32.3	32.3
Average (WBGT)		27.8			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Supdt S.

Supot Salameh
Section Head

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

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S: 090902, Air Heat (T) (6-47700)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
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21120
P/O : 4510463439
Project Name : Environment : EIA
Project Location :
Lot ID: 23105562
Date Received : Sep 15, 2023
Date Reported : Sep 21, 2023
Report Number: 2770342-1

Page 3 of 6

Sample Number	23105562-3						
Parameter	Heat Stress (Sampling Time :09.00 AM - 11.00 AM)						
Measurement Date	Sep 15, 2023						
Measurement by	Natakam Vonginyoo						
Location	บริเวณ 1 หลัง (ท่าขนถ่าย ถังน้ำมัน : - มุม : -)						
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)		
บริเวณท่าขนถ่าย (H3) (M32 (ทุ่น	120	26.5	24.4	31.3	31.2		
รือ)/RTD)							
Average (WBGT)		26.5					
Guideline WBGT (°C)		34.0					

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

Supt S.

Suput Salanthet
Section Head

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

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S. Vongvorn, Jr. Head of (E & P) PG



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
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21120
P/O : 4510463439
Project Name : Environment : EIA
Project Location :
Lot ID: 23105562
Date Received : Sep 15, 2023
Date Reported : Sep 21, 2023
Report Number: 2770342-1

Page 4 of 6

Sample Number	23105562-4						
Parameter	Heat Stress (Sampling Time :09.00 AM - 11.00 AM)						
Measurement Date	Sep 15, 2023						
Measurement by	Natakam Vonginyoo						
Location	บริเวณ 1 หลัง (ท่าขนถ่าย ถังน้ำมัน : - มุม : -)						
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)		
บริเวณท่าขนถ่าย (H4) (Wet	120	26.2	24.1	31.2	31.1		
Drawing#/SCD1)							
Average (WBGT)		26.2					
Guideline WBGT (°C)		34.0					

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

Supt S.

Suput Salanthet
Section Head

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510463439
Project Name : Environment : EIA
Project Location :
Lot ID: 23105562
Date Received : Sep 15, 2023
Date Reported : Sep 21, 2023
Report Number: 2770342-1

Page 5 of 6

Sample Number	23105562-5				
Parameter	Heat Stress (Sampling Time : 09.00 AM - 11.00 AM)				
Measurement Date	Sep 15, 2023				
Measurement by	Natakam Vongmyoo				
Location	ปฏิบัติงาน 1 ชั้น (ด้านอาคารปฏิบัติงาน : - นอก : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณงาน 1 ชั้น (ด้านอาคารปฏิบัติงาน (H5) (Wet Drawing # RCD2)	120	26.5	24.5	31.3	31.2
Average (WBGT)		26.5			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

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Assistant Manager

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21120
P/O : 4510463439
Project Name : Environment : EIA
Project Location :
Lot ID: 23105562
Date Received : Sep 15, 2023
Date Reported : Sep 21, 2023
Report Number: 2770342-1

Page 6 of 6

Sample Number	23105562-6				
Parameter	Heat Stress (Sampling Time : 09.00 AM - 11.00 AM)				
Measurement Date	Sep 15, 2023				
Measurement by	Natakam Vongmyoo				
Location	บริเวณงาน 1 ชั้น (ด้านหลังสำนักงาน : - นอก : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณงาน 1 ชั้น (ด้านหลังสำนักงานเดิม (H6) (Wet Drawing # JRC03)	120	26.4	24.3	31.4	31.3
Average (WBGT)		26.4			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

Supot Salameh
Section Head

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Wichan Choonharat
Assistant Manager

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand

21120

P/O : 4510463439

Project Name : Environment : EIA

Project Location :

Lot ID: 23142510

Date Received : Dec 22, 2023

Date Reported : Dec 27, 2023

Report Number: 2860311-1

Page 1 of 6

Sample Number	23142510-1
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Dec 20, 2023
Measurement by	Chanon Booncheun
Location	บริเวณ 1 หลัง (ด้านหลังประตูรถจักรยาน : - มุม : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ 1 หลัง (ด้านหลังประตูรถจักรยาน) (Boiler #R-tech)	120	32.4	29.2	39.9	39.6
Average (WBGT)		32.4			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

Supt S.

Supot Salmitich
Section Head

Approved by

Wichan Chonharat

Wichan Chonharat
Assistant Manager



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand

21120

P/O : 4510463439

Project Name : Environment : EIA

Project Location :

Lot ID: 23142510

Date Received : Dec 22, 2023

Date Reported : Dec 27, 2023

Report Number: 2860311-1

Page 2 of 6

Sample Number	23142510-2
Parameter	Heat Stress (Sampling Time : 09.00 AM - 11.00 AM)
Measurement Date	Dec 19, 2023
Measurement by	Chanon Booncheun
Location	บริเวณ 1 หลัง (ด้านหลังประตูรถจักรยาน : - มุม : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ 1 หลัง (ด้านหลังประตูรถจักรยาน) (Boiler #RTO)	120	26.4	23.5	33.1	33.0
Average (WBGT)		26.4			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

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Supot Salmitich
Section Head

Approved by

Wichan Chonharat

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Assistant Manager



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Lok-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510463439
Project Name : Environment : EIA
Project Location :

Lot ID: 23142510
Date Received : Dec 22, 2023
Date Reported : Dec 27, 2023
Report Number: 2860311-1

Page 3 of 6

Sample Number	23142510-3				
Parameter	Heat Stress (Sampling Time : 09:00 AM - 11:00 AM)				
Measurement Date	Dec 19, 2023				
Measurement by	Chanon Booncheun				
Location	บริเวณ 1 หลัง (ด้านหลังอาคาร : - ภายใน : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ 1 หลัง (ด้านหลังอาคาร : - ภายใน : -)	120	26.8	24.1	33.2	33.1
ค่าเฉลี่ย (Average WBGT)	26.8				
ค่ามาตรฐาน (Guideline WBGT (°C))	34.0				

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

Supt S.

Supot Salmitheh
Section Head

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Lok-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510463439
Project Name : Environment : EIA
Project Location :

Lot ID: 23142510
Date Received : Dec 22, 2023
Date Reported : Dec 27, 2023
Report Number: 2860311-1

Page 4 of 6

Sample Number	23142510-4					
Parameter	Heat Stress (Sampling Time : 09:00 AM - 11:00 AM)					
Measurement Date	Dec 19, 2023					
Measurement by	Chanon Booncheun					
Location	บริเวณงาน 1 หลัง (ด้านหลังอาคาร : - ภายใน : -)					
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)	
	120	25.6	23.3	30.8	30.8	
Drawing # / RCD1						
Average (WBGT)	25.6					
Guideline WBGT (°C)	34.0					

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

Supt S.

Supot Salmitheh
Section Head

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand

21120

P/O : 4510463439

Project Name : Environment : EIA

Project Location :

Lot ID: 23142510

Date Received : Dec 22, 2023

Date Reported : Dec 27, 2023

Report Number: 2860311-1

Page 5 of 6

Sample Number	23142510-5	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Parameter	Heat Stress (Sampling Time : 09.00 AM - 11.00 AM)					
Measurement Date	Dec 19, 2023					
Measurement by	Charon Booncheun					
Location	บริเวณงาน 1 หลัง (ด้านหลังอาคาร) : - มุม : -)					
Location						
Drawing #/RCD2)						
Average (WBGT)						
Guideline WBGT (°C)						

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

Supt S.

Supot Salamech
Section Head

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand

21120

P/O : 4510463439

Project Name : Environment : EIA

Project Location :

Lot ID: 23142510

Date Received : Dec 22, 2023

Date Reported : Dec 27, 2023

Report Number: 2860311-1

Page 6 of 6

Sample Number	23142510-6	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Parameter	Heat Stress (Sampling Time : 09.00 AM - 11.00 AM)					
Measurement Date	Dec 19, 2023					
Measurement by	Charon Booncheun					
Location	บริเวณงาน 1 หลัง (ด้านหลังอาคาร) : - มุม : -)					
Location						
Drawing #/RCD3)						
Average (WBGT)						
Guideline WBGT (°C)						

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

Supt S.

Supot Salamech
Section Head

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

ภาคผนวก ค-7

คุณภาพอากาศในสถานประกอบการ



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23105557
Date Received : Sep 15, 2023
Date Reported : Sep 23, 2023
Report Number : 2770329-1

Page 1 of 4

Sample Number	23105557-1								
Sampled Date	Sep 15, 2023								
Sample Description	Air Quality								
Location	หมู่ที่ 3 บ้านนาดี								
Date Analysis Commenced	Sep 19, 2023								
Condition of Sample	Drawn into two filter papers placed in plastic cassette								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	28.0 °C								
Analyte	Unit	Sampled Date/Time	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Respirable Dust	mg/m3	09:00 AM - 05:00 PM	-	0.15	<0.15	5	Based on NIOSH (1998), 0600	OSHA	Rayong
Total Dust	mg/m3	09:00 AM - 05:00 PM	-	0.15	0.21	15	Based on NIOSH (1994), 0500	OSHA	Rayong
Guideline : OSHA : Occupational Safety and Health Administration Sampled By : Natthapon Jitwarewong									
Remark : - LOD : Limit of Detection - "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)									

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Orawan Rakying
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Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23105557
Date Received : Sep 15, 2023
Date Reported : Sep 23, 2023
Report Number : 2770329-1

Page 2 of 4

Sample Number	23105557-2								
Sampled Date	Sep 15, 2023								
Sample Description	Air Quality								
Location	หมู่ที่ 3 บ้านนาดี ตำบลนาดี อำเภอเมืองระยอง จังหวัดระยอง								
Date Analysis Commenced	Sep 19, 2023								
Condition of Sample	Drawn into two filter papers placed in plastic cassette								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	28.0 °C								
Analyte		Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing									
Respirable Dust		09:00 AM - 05:00 PM	mg/m3	-	0.15	<0.15	5	Based on NIOSH (1998), 0600	OSHA Rayong
Total Dust		09:00 AM - 05:00 PM	mg/m3	-	0.15	0.17	15	Based on NIOSH (1994), 0500	OSHA Rayong
Guideline : OSHA : Occupational Safety and Health Administration Sampled By : Natthapon Jitwarewong									
Remark : - LOD : Limit of Detection - "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)									

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21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23105557
Date Received : Sep 15, 2023
Date Reported : Sep 23, 2023
Report Number : 2770329-1

Page 3 of 4

Sample Number	23105557-3							
Sampled Date	Sep 15, 2023							
Sample Description	Air Quality							
Location	ห้วยไผ่ (F1)							
Date Analysis Commenced	Sep 19, 2023							
Condition of Sample	Drawn into one sorbent tube, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	28.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid	09:00 AM - 05:00 PM	mg/m ³	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL Bangkok
Sulfuric acid	09:00 AM - 05:00 PM	mg/m ³	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL Bangkok

Guideline :
MOL : Announcement of the Department of Labour Protection and Welfare on Threshold Limit Values of Hazardous Chemical Substances Dated August 3, B.E. 2560 (2017)
Sampled By : Natthapon Jitngwarawong

Remark :
- LOD : Limit of Detection
- "C" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Orawan R.

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23105557
Date Received : Sep 15, 2023
Date Reported : Sep 23, 2023
Report Number : 2770329-1

Page 4 of 4

Sample Number	23105557-4							
Sampled Date	Sep 15, 2023							
Sample Description	Air Quality							
Location	ห้วยไผ่ (F2)							
Date Analysis Commenced	Sep 19, 2023							
Condition of Sample	Drawn into one sorbent tube, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	28.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid	09:00 AM - 05:00 PM	mg/m ³	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL Bangkok
Sulfuric acid	09:00 AM - 05:00 PM	mg/m ³	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL Bangkok

Guideline :
MOL : Announcement of the Department of Labour Protection and Welfare on Threshold Limit Values of Hazardous Chemical Substances Dated August 3, B.E. 2560 (2017)
Sampled By : Natthapon Jitngwarawong

Remark :
- LOD : Limit of Detection
- "C" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23130472
Date Received : Dec 21, 2023
Date Reported : Dec 28, 2023
Report Number : 2830208-1

Page 1 of 4

Sample Number	23130472-1								
Sampled Date	Dec 19, 2023								
Sample Description	Air Quality								
Location	ขุขันธ์เขื่อน D1								
Date Analysis Commenced	Dec 22, 2023								
Condition of Sample	Drawn into two filter papers placed in plastic cassette								
Barometric Pressure	758 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
	Respirable Dust	09:00 AM - 05:00 PM	mg/m3	-	0.15	0.29	5	Based on NIOSH (1998), OSHA 0600	Rayong
Total Dust		09:00 AM - 05:00 PM	mg/m3	-	0.15	0.42	15	Based on NIOSH (1994), OSHA 0500	Rayong

Guideline :
OSHA : Occupational Safety and Health Administration
Sampled By : Mongkon Phalathip
Remark :
· LOD : Limit of Detection
· "c" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Approved by
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Saranya Chaleamthamrong
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2313-43



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23130472
Date Received : Dec 21, 2023
Date Reported : Dec 28, 2023
Report Number : 2830208-1

Page 2 of 4

Sample Number	23130472-2								
Sample Date	Dec 19, 2023								
Sample Description	Air Quality								
Location	ขุขันธ์เขื่อน D2								
Date Analysis Commenced	Dec 22, 2023								
Condition of Sample	Drawn into two filter papers placed in plastic cassette								
Barometric Pressure	758 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Respirable Dust	09:00 AM - 05:00 PM	mg/m3	-	0.15	<0.15	5	Based on NIOSH (1998), OSHA 0600		Rayong
Total Dust	09:00 AM - 05:00 PM	mg/m3	-	0.15	<0.15	15	Based on NIOSH (1994), OSHA 0500		Rayong

Guideline :
OSHA : Occupational Safety and Health Administration
Sampled By : Mongkon Phalathip
Remark :
· LOD : Limit of Detection
· "c" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Saranya Chaleamthamrong
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RIGHT SOLUTIONS

2313-43



Analysis / Test Report

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21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23130472
Date Received : Dec 21, 2023
Date Reported : Dec 28, 2023
Report Number : 2830208-1

Page 3 of 4

Sample Number	23130472-3									
Sampled Date	Dec 20, 2023									
Sample Description	Air Quality									
Location	ฟาร์ม (F1)									
Date Analysis Commenced	Dec 26, 2023									
Condition of Sample	Drawn into one sorbent tube, refrigerated									
Barometric Pressure	758 mmHg									
Atmospheric Temperature	31.0 °C									
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location	
Air Testing										
Phosphoric acid	09:00 AM - 05:00 PM	mg/m3	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL	Bangkok	
Sulfuric acid	09:00 AM - 05:00 PM	mg/m3	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL	Bangkok	

Guideline :
MOL : Announcement of the Department of Labour Protection and Welfare on Threshold Limit Values of Hazardous Chemical Substances Dated August 3, B.E. 2560 (2017)
Sampled By : Mongkon Phialathip

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Savanya C.

Approved by
Savanya Chalemtamrong
Scientist (4)

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Client : Michelin Siam Co., Ltd.
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21120
P/O : 4510433115
Project Name : Environment : EIA
Project Location :
Lot ID: 23130472
Date Received : Dec 21, 2023
Date Reported : Dec 28, 2023
Report Number : 2830208-1

Page 4 of 4

Sample Number	23130472-4									
Sampled Date	Dec 20, 2023									
Sample Description	Air Quality									
Location	ฟาร์ม (F2)									
Date Analysis Commenced	Dec 26, 2023									
Condition of Sample	Drawn into one sorbent tube, refrigerated									
Barometric Pressure	758 mmHg									
Atmospheric Temperature	31.0 °C									
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location	
Air Testing										
Phosphoric acid	09:00 AM - 05:00 PM	mg/m3	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL	Bangkok	
Sulfuric acid	09:00 AM - 05:00 PM	mg/m3	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL	Bangkok	

Guideline :
MOL : Announcement of the Department of Labour Protection and Welfare on Threshold Limit Values of Hazardous Chemical Substances Dated August 3, B.E. 2560 (2017)
Sampled By : Mongkon Phialathip

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Savanya C.

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ภาคผนวก ค-8

ระดับเสียงในสถานที่ทำงาน



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120

P/O : 4510463439

Project Name : Environment : EIA

Project Location :

Lot ID: 23105561

Date Received : Sep 15, 2023

Date Reported : Sep 21, 2023

Report Number: 2784153-1

Page 1 of 1

Sample Number	23105561-1
Parameter	Noise (Leq 8 hrs.)
Location	บริเวณเครื่องจักรภายในงาน (N1) (Heat treatment & Brass Coating/ RTO)
Measurement Date	Sep 15, 2023
Measurement by	Sawali Tonpho

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	82.1	84.7	74.8
10:00 AM - 11:00 AM	81.7	86.2	75.3
11:00 AM - 12:00 PM	81.9	88.7	78.7
12:00 PM - 01:00 PM	82.5	84.8	78.3
01:00 PM - 02:00 PM	82.3	88.4	79.7
02:00 PM - 03:00 PM	82.4	85.7	81.9
03:00 PM - 04:00 PM	81.8	85.1	81.3
04:00 PM - 05:00 PM	82.0	84.3	77.8

Leq Average 8 hrs. (dB(A))	82.1
Lmax (dB(A))	88.7
Standard (dB(A))	90
Reference Method : ISO1996-1 and 1996-2	
Standard : ปริมาณการปล่อยเสียงจากโรงงานอุตสาหกรรม	
Turntable on the ground in the area of the factory	

Suppt S.

Approved by

Thanitak.

Thantia Kulsurwong
Scientist (4)

Supot Salameh
Section Head

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2272-627 BHAI

S Wepertha_Air Noise rpt (8 1344)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120

P/O : 4510463439

Project Name : Environment : EIA

Project Location :

Lot ID: 23105561

Date Received : Sep 15, 2023

Date Reported : Sep 21, 2023

Report Number: 2784154-1

Page 1 of 1

Sample Number	23105561-2
Parameter	Noise (Leq 8 hrs.)
Location	บริเวณเครื่องจักรภายในงาน (N2) (Wet Drawing (Cadrol) RCD3)
Measurement Date	Sep 15, 2023
Measurement by	Sawali Tonpho

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:50 AM - 09:50 AM	84.1	88.4	82.5
09:50 AM - 10:50 AM	84.2	92.9	82.2
10:50 AM - 11:50 AM	84.3	85.2	84.1
11:50 AM - 12:50 PM	83.6	89.9	83.4
12:50 PM - 01:50 PM	83.9	87.7	82.7
01:50 PM - 02:50 PM	83.8	89.1	83.0
02:50 PM - 03:50 PM	84.1	85.0	83.9
03:50 PM - 04:50 PM	84.1	89.4	83.3

Leq Average 8 hrs. (dB(A))	84.0
Lmax (dB(A))	92.9
Standard (dB(A))	90
Reference Method : ISO1996-1 and 1996-2	
Standard : ปริมาณการปล่อยเสียงจากโรงงานอุตสาหกรรม	
Turntable on the ground in the area of the factory	

Thanitak.

Approved by

Suppt S.

Supot Salameh
Section Head

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2272-627 BHAI

S Wepertha_Air Noise rpt (8 1444)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510463439
Project Name : Environment : EIA
Project Location :
Lot ID: 23142509
Date Received : Dec 22, 2023
Date Reported : Dec 26, 2023
Report Number: 2872586-1

Page 1 of 1

Sample Number	23142509-1
Parameter	Noise (Leq 8 hrs)
Location	บริเวณพื้นที่ก่อสร้างถนนวงแหวน (N1) (Heat treatment & Gross Coating #/RTO)
Measurement Date	Dec 19, 2023
Measurement by	Noranon Talhongkham
Time	Leq (dB(A)) Lmax (dB(A)) L90 (dB(A))
09:00 AM - 10:00 AM	75.7 86.1 73.6
10:00 AM - 11:00 AM	77.1 83.7 76.1
11:00 AM - 12:00 PM	75.7 87.8 74.4
12:00 PM - 01:00 PM	75.9 94.0 74.8
01:00 PM - 02:00 PM	82.4 74.2 74.2
02:00 PM - 03:00 PM	76.3 88.4 75.0
03:00 PM - 04:00 PM	76.6 83.2 75.6
04:00 PM - 05:00 PM	76.7 87.1 74.6
Leq Average 8 hrs. (dB(A))	76.3
Lmax (dB(A))	94.0
Standard (dB(A))	90
Reference Method : ISO1996-1 and 1996-2	
Standard : มาตรฐานการวัดผลกระทบจากเสียง การกำหนดค่ามาตรฐานเสียง	
ตามข้อกำหนดการประเมินผลกระทบสิ่งแวดล้อมจากโรงงาน พ.ร.บ.อศร	

Technical Management

Tharitat.

Tharita Kulsurwong
Scientist (4)

Approved by

Supt S.

Supt Salameh
Section Head

ADDRESS 616/10 Moo 5 T. Maenam Khu A. Plakdang Rayong 21140 Thailand PHONE +66 0 3304 8555 FAX +66 0 3304 8556
ALS LABORATORY GROUP (THAILAND) CO., LTD. An ALS Limited Company

www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER

2272-621 EMAIL

S Upport_Air Noise rpt (8-44AM)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510463439
Project Name : Environment : EIA
Project Location :
Lot ID: 23142509
Date Received : Dec 22, 2023
Date Reported : Dec 26, 2023
Report Number: 2872987-1

Page 1 of 1

Sample Number	23142509-2
Parameter	Noise (Leq 8 hrs)
Location	บริเวณพื้นที่ก่อสร้างถนนวงแหวน (H2) (Wet Drawing (Cadro) /RCD3)
Measurement Date	Dec 19, 2023
Measurement by	Noranon Talhongkham
Time	Leq (dB(A)) Lmax (dB(A)) L90 (dB(A))
09:00 AM - 10:00 AM	82.9 87.4 82.2
10:00 AM - 11:00 AM	82.7 85.8 81.6
11:00 AM - 12:00 PM	81.8 84.3 81.3
12:00 PM - 01:00 PM	81.6 93.0 80.2
01:00 PM - 02:00 PM	83.5 88.7 82.5
02:00 PM - 03:00 PM	82.6 94.0 81.2
03:00 PM - 04:00 PM	83.2 88.4 82.2
04:00 PM - 05:00 PM	82.8 85.3 82.3
Leq Average 8 hrs. (dB(A))	82.7
Lmax (dB(A))	94.0
Standard (dB(A))	90
Reference Method : ISO1996-1 and 1996-2	
Standard : มาตรฐานการวัดผลกระทบจากเสียง การกำหนดค่ามาตรฐานเสียง	
ตามข้อกำหนดการประเมินผลกระทบสิ่งแวดล้อมจากโรงงาน พ.ร.บ.อศร	

Technical Management

Tharitat.

Tharita Kulsurwong
Scientist (4)

Approved by

Supt S.

Supt Salameh
Section Head

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S Upport_Air Noise rpt (8-44AM)

ภาคผนวก ง

ใบรับรองการสอบเทียบเครื่องมือ



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Stack	Oxides of Nitrogen	Console Control Unit	BKK_FS0556	13-Jul-23	13-Jan-24	6
Stack	Oxides of Nitrogen	Flue gas Analyzer	RYG_FS0565	28-Dec-22	28-Dec-23	12
Stack	Oxides of Nitrogen	Vacuum Gauge	RYG_FS0333	30-Mar-23	30-Sep-24	18
Stack	Oxides of Nitrogen	SPECTROPHOTOMETER	RYG_EN0037	18-Sep-23	18-Mar-25	18
Stack	Phosphoric acid	Console Control Unit	BKK_FS0556	13-Jul-23	13-Jan-24	6
Stack	Phosphoric acid	Flue gas Analyzer	RYG_FS0565	28-Dec-22	28-Dec-23	12
Stack	Phosphoric acid	Dry Gas	BKK_FS0563	13-Jul-23	13-Jan-24	6
Stack	Phosphoric acid	Ion Chromatography	BKK_EN0069	12-Jan-23	12-Jan-24	12
Stack	Sulfuric Acid	Console Control Unit	BKK_FS0556	13-Jul-23	13-Jan-24	6
Stack	Sulfuric Acid	Flue gas Analyzer	RYG_FS0565	28-Dec-22	28-Dec-23	12
Stack	Total Suspended Particulate	Console Control Unit	BKK_FS0556	13-Jul-23	13-Jan-24	6
Stack	Total Suspended Particulate	Flue gas Analyzer	RYG_FS0565	28-Dec-22	28-Dec-23	12
Stack	Total Suspended Particulate	Digital Balance	RYG_EN0003	1-Mar-23	1-Mar-24	12
Ambient	Total Suspended Particulate	High Volume	RYG_FS0663	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0174	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0181	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0662	-	-	On site Calibration
Ambient	Total Suspended Particulate	Digital Balance	RYG_EN0001	1-Mar-23	1-Mar-24	12
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0264	1-Jul-23	1-Jan-24	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0453	1-Jul-23	1-Jan-24	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0255	1-Jul-23	1-Jan-24	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0457	1-Jul-23	1-Jan-24	6
Ambient	Sulfuric Acid	Field Rotameter	BKK_FS1004	2-Oct-23	2-Jan-24	3
Ambient	Sulfuric Acid	Ion Chromatography	BKK_EN0069	12-Jan-23	12-Jan-24	12
Ambient	Phosphoric acid	Field Rotameter	BKK_FS1004	2-Oct-23	2-Jan-24	3
Ambient	Phosphoric acid	Ion Chromatography	BKK_EN0069	12-Jan-23	12-Jan-24	12
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0411	10-Feb-23	10-Aug-24	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_FS0141	5-Jan-23	5-Jul-24	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0328	18-Aug-23	18-Feb-25	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0329	18-Aug-23	18-Feb-25	18
Workplace	Total Dust	Field Rotameter	RYG_FS0198	1-Jul-23	1-Oct-23	3
Workplace	Total Dust	Field Rotameter	RYG_FS0656	2-Oct-23	2-Jan-24	3
Workplace	Total Dust	Digital Balance	RYG_EN0004	1-Mar-23	1-Mar-24	12
Workplace	Respirable Dust	Field Rotameter	RYG_FS0198	1-Jul-23	1-Oct-23	3
Workplace	Respirable Dust	Field Rotameter	RYG_FS0656	2-Oct-23	2-Jan-24	3
Workplace	Respirable Dust	Digital Balance	RYG_EN0004	1-Mar-23	1-Mar-24	12
Workplace	Phosphoric Acid	Field Rotameter	BKK_FS1042	1-Jul-23	1-Oct-23	3
Workplace	Phosphoric Acid	Field Rotameter	RYG_FS0655	2-Oct-23	2-Jan-24	3
Workplace	Phosphoric Acid	Ion Chromatography	BKK_EN0069	12-Jan-23	12-Jan-24	12
Workplace	Sulfuric Acid	Field Rotameter	BKK_FS1042	1-Jul-23	1-Oct-23	3
Workplace	Sulfuric Acid	Field Rotameter	RYG_FS0655	2-Oct-23	2-Jan-24	3
Workplace	Sulfuric Acid	Ion Chromatography	BKK_EN0069	12-Jan-23	12-Jan-24	12
Noise	Leq 8 hrs	Sound Calibrator	RYG_FS0496	17-Jan-23	17-Jan-24	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0431	25-Jan-23	25-Jan-24	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0434	25-Jan-23	25-Jan-24	12
Noise	Leq 8 hrs	Sound Calibrator	RYG_FS0496	17-Jan-23	17-Jan-24	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0432	25-Jan-23	25-Jan-24	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0433	25-Jan-23	25-Jan-24	12
Noise	Leq 24 hrs	Sound Calibrator	RYG_FS0213	26-Jan-23	26-Jan-24	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0012	16-Dec-22	16-Dec-23	12



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0218	14-Feb-23	14-Feb-24	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0236	21-Nov-22	21-Nov-23	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0356	02-Feb-23	2-Feb-24	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0357	02-Feb-23	2-Feb-24	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0358	02-Feb-23	2-Feb-24	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0359	02-Feb-23	2-Feb-24	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0357	02-Feb-23	2-Feb-24	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0358	02-Feb-23	2-Feb-24	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0359	02-Feb-23	2-Feb-24	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0360	03-Feb-23	3-Feb-24	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0520	24-Feb-23	24-Feb-24	12
Rayong Lab	pH at 25 °C	pH meter	RYG_EN0183	27-Feb-23	27-Feb-24	12
Rayong Lab	BOD	DO meter with Sensor	RYG_EN0032	24-Jul-23	24-Jan-25	18
Rayong Lab	BOD	Incubator	RYG_EN0154	29-May-23	29-Nov-24	18
Rayong Lab	COD	Spectrophotometer	RYG_EN0037	18-Sep-23	18-Mar-25	18
Rayong Lab	Total Suspended Solids	Electronic Balance	RYG_EN0002	1-Mar-23	1-Mar-24	12
Rayong Lab	Total Suspended Solids	Hot Air Oven	RYG_EN0010	20-Oct-22	20-Apr-24	18
Rayong Lab	Total Dissolved Solids 180°C	Electronic Balance	RYG_EN0002	1-Mar-23	1-Mar-24	12
Rayong Lab	Total Dissolved Solids 180°C	Hot Air Oven	RYG_EN0010	20-Oct-22	20-Apr-24	18
Rayong Lab	Oil & Grease	Electronic Balance	RYG_EN0002	1-Mar-23	1-Mar-24	12
Rayong Lab	Oil & Grease	Hot Air Oven	RYG_EN0006	20-Oct-22	20-Apr-24	18
Rayong Lab	Oil & Grease	Water Bath	RYG_EN0061	20-Oct-22	20-Apr-24	18
Rayong Lab	Conductivity	Conductivity meter	RYG_EN0029	4-Sep-23	4-Mar-25	18
Rayong Lab	Temperature	pH meter	RYG_FS0574	3-Apr-23	3-Apr-24	12
Water Lab	Iron	ICP-MS	BKK_EL0026	12-Jun-23	11-Jun-24	12
Water Lab	Iron	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Iron	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Water Lab	Copper	ICP-MS	BKK_EL0026	12-Jun-23	11-Jun-24	12
Water Lab	Copper	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Copper	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Water Lab	Zinc	ICP-MS	BKK_EL0026	12-Jun-23	11-Jun-24	12
Water Lab	Zinc	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Zinc	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Soil	Copper	ICP-OES	BKK_EL0037	2-Mar-23	1-Mar-24	12
Soil	Copper	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Soil	Copper	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Soil	Iron	ICP-OES	BKK_EL0037	2-Mar-23	1-Mar-24	12
Soil	Iron	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Soil	Iron	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Soil	Zinc	ICP-OES	BKK_EL0037	2-Mar-23	1-Mar-24	12
Soil	Zinc	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Soil	Zinc	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18



CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Calibration of Date 13-Jul-23
Next Cal. Date 13-Jan-24
Barometric Pressure (mmHg) 752
Relative Humidity (%) 55.0
Temperature (C°) 31.0

Console Control Meter Data

Calibration No. C-130723-BKK_FS0556
Dry Gas Meter ID BKK_FS0556
Serial No. 1609041
Model No. XC-572-V
Reference Dry Gas Meter ID BKK_FSM29
Serial No. 1607009
Correction Factor (V) 1.0000
Next Calibration Date 9 Dec 23

Δt (mm.H ₂ O)	Θ MmHg	Reference Dry Gas Meter Calibration						Console Control Drygas Meter						Dry Gas Meter Correction Factor Avg	Onsite Calibration Factor Avg
		Vt (Liters)			Tt (°C)	Vm (Liters)			Tm (°C)	To (°C)	Avg Tm (°C)				
		Final	Initial	Total		Final	Initial	Total							
15	11.25	150.00	0.00	150.00	31.0	150.00	147.8	293.8	147.8	146.00	30.0	30.0	30.0	1.0225	40.0324
25	0.76	150.00	0.00	150.00	31.0	147.5	300.0	447.5	300.0	147.50	30.0	30.0	30.0	1.0111	31.9981
50	0.16	150.00	0.00	150.00	32.0	145.8	598.3	745.8	598.3	147.50	32.0	32.0	32.0	1.0120	30.9546
80	5.01	150.00	0.00	150.00	32.0	999.2	742.2	147.00	742.2	147.00	33.0	33.0	33.0	1.0168	41.5259
120	4.04	150.00	0.00	150.00	33.0	1033.0	936.4	146.60	936.4	146.60	34.0	34.0	34.0	1.0146	40.8372
														Avg	40.3212

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

Avg Onsite pressure differential that exceeds to 21.24 mm of air @ 25°C and 760 mm of mercury. Installed tolerance for individual values ± 5.00 from average.

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

Calibrated by

Saksit Phaisanphut
(Mr. Saksit Phaisanphut)
Field Scientist (4)

Approved by

Nattapon Jangwongwong
(Mr. Nattapon Jangwongwong)
Field Specialist (1)

FORM NO. F-06-028 REVISION NO. 1 ISSUE DATE 22-Jul-22



Pitot Tube Calibration Data

Pitot Tube Identification Number BKK_FS0560
Lab test duct Number 258-1-13-01
Calibration Sheet No. C-130723-BKK_FS0560
Calibration Date 13 Jul 23
Standard Pitot ID BKK_FS0441
Cp Standard 0.99

Type S Pitot Tube Coefficient Data

	Type s pitot tube Leg A B	Standard pitot tube (ΔP, mm.H ₂ O)	Type s pitot tube (ΔP, mm.H ₂ O)	Cp (s)	
				Leg A	Leg B
Test 1	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 2	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 3	A	12.00	16.80	0.845	-
	B	12.00	16.80	-	0.845
			Cp	0.842	0.842

$$Cp(S) = Cp = \sqrt{\frac{\Delta P(s)}{\Delta P(s)}}$$

$$[Cp(A) - Cp(B)] \text{ must BE } \leq 0.01$$

$$\text{Average deviation(A or B)} = \frac{\sum [Cp(s) - Cp(A \text{ or } B)]}{3} \text{ must BE } \leq 0.01$$

Calibrated by

Saksit Phaisanphut
(Mr. Saksit Phaisanphut)
Field Scientist (4)

Approved by

Nattapon Jangwongwong
(Mr. Nattapon Jangwongwong)
Specialist (1)

FORM NO. F-06-028 REVISION NO. 1 ISSUE DATE 22-Jul-22

Pitot Tube Calibration Data

Pitot Tube Identification Number BKK_FS0561
Lab test duct Number 258-1-13-01
Calibration Sheet No. C-130723-BKK_FS0561
Calibration Date 13 Jul 23
Standard Pitot ID BKK_FS0441
Cp Standard 0.99

Type S Pitot Tube Coefficient Data

	Type s pitot tube Leg A B	Standard pitot tube (ΔP, mm.H ₂ O)	Type s pitot tube (ΔP, mm.H ₂ O)	Cp (s)	
				Leg A	Leg B
Test 1	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 2	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 3	A	12.00	16.80	0.845	-
	B	12.00	16.80	-	0.845
			Cp	0.842	0.842

$$Cp(S) = Cp = \sqrt{\frac{\Delta P(s)}{\Delta P(s)}}$$

$$[Cp(A) - Cp(B)] \text{ must BE } \leq 0.01$$

$$\text{Average deviation(A or B)} = \frac{\sum [Cp(s) - Cp(A \text{ or } B)]}{3} \text{ must BE } \leq 0.01$$

Calibrated by

Saksit Phaisanphut
(Mr. Saksit Phaisanphut)
Field Scientist (4)

Approved by

Nattapon Jangwongwong
(Mr. Nattapon Jangwongwong)
Specialist (1)

DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date 13 Jul 23
Calibration sheet No. C-130723-BKK_FS0557
Digital Temperature ID BKK_FS0557
Serial No. 1609041
Model XC-572-V
Ambient Temperature (°C) 29
Relative Humidity (%) 60
Reference Temperature ID BKK_FS1144
Serial No. 201000000013
Model Digicon-CC-VT-M5
Next Calibrate 14 Aug 24

Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	±3	Pass
	25	23	-2	±3	Pass
	50	48	-2	±3	Pass
	100	89	-1	±3	Pass
	150	149	-1	±3	Pass
	200	189	-2	±3	Pass
	250	248	-2	±3	Pass
Probe	300	259	-2	±3	Pass
	600	500	0	±3	Pass
	100	89	-1	±3	Pass
	120	119	-1	±3	Pass
	140	139	-1	±3	Pass
	100	100	0	±3	Pass
	120	119	-1	±3	Pass
Oven	140	139	-1	±3	Pass
	100	100	0	±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	140	0	±3	Pass
	0	0	0	±3	Pass
	10	0	-1	±3	Pass
Meter	20	18	-2	±3	Pass
	0	0	0	±3	Pass
	25	25	0	±3	Pass
AUX	50	50	0	±3	Pass
	0	0	0	±3	Pass
	25	23	-2	±3	Pass
	50	48	-2	±3	Pass

MPE (Maximum permissible error of measurement) ค่าความคลาดเคลื่อนสูงสุดที่อนุญาต

Calibrated by

Saksit Phaisanphut
(Mr. Saksit Phaisanphut)
Field Scientist (4)

Approved by

Nattapon Jangwongwong
(Mr. Nattapon Jangwongwong)
Specialist (1)

FORM NO. F-06-028 REVISION NO. 1 ISSUE DATE 22-Jul-22

FORM NO. F-06-028 REVISION NO. 2 ISSUE DATE 9-Feb-23

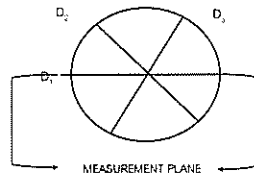


PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

Calibration Date : 13-Jul-23	Nozzle Set ID : BKK_FG0562
Calibration Sheet No : C-130723-BKK_FG0562	Vernier Caliper ID : BKK_FS1123

Nozzle ID #	Nozzle Diameter (cm.)			Hj - Lo ΔD	iD _i = D _i - D ₁ / 3
	D ₁	D ₂	D ₃		
1	0.300	0.302	0.302	0.002	0.301
2	0.480	0.475	0.480	0.005	0.478
3	0.625	0.630	0.630	0.005	0.628
4	0.755	0.750	0.755	0.005	0.753
5	0.975	0.980	0.970	0.010	0.975
6	1.082	1.081	1.080	0.002	1.081
7	1.275	1.275	1.270	0.005	1.273
8	1.610	1.610	1.610	0.000	1.610

Where
D₁, D₂, D₃ : Three different nozzle diameters at 60 degrees to each other, each measured the nearest 0.025 mm
ΔD : Maximum distance between any two diameters, must be ≤ 0.100 mm
D₁ : iD_i = D_i - D₁ / 3



Calibrated by : Saksit Phaisanphiset
(Mr. Saksit Phaisanphiset)
Field Scientist (4)
Approved by : Nattapong Jengwarewong
(Mr. Nattapong Jengwarewong)
Field Specialist (1)



Calibration Certificate
Certificate No: G 660001
Date of Issue : 03-Jan-23

Instrument description : Fuel gas Analyzer
Instrument model : Testo 340
Instrument serial no. : 63119028
ID no. or control no. : RYG_FG0565
Manufacturer : Testo SE & Co. KGaA
Probe description : -
Probe model : -
Probe serial : -
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-230001
Receiving date. : 26-Dec-22
Parameter of calibration : Gas Calibration (Oxygen 2.498, 10.04, 21.02 %vol, Carbon Monoxide 80.14, 309.9, 1003 ppm, Nitric Oxide 30.08, 150.9, 320.6 ppm, Sulphur Dioxide 50.04, 100.8, 601.1 ppm)

REVIEW BY : Manam P.
APPROVED BY : Manam P.
NEXT CAL DATE : 06/12/23

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 Nigamwongwan 47 Yaek 48, Toongsonghong, Lakki, Bangkok 10210
Calibration procedure 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. This calibration certificate documents are traceability to national standards, which realize measurement according to the International System of Units (SI).
Date of calibration : 28-Dec-22

Manam P.
Mr. Sedatavut Nueathong
Calibration Technician
Manam P.
Mrs. Nongluck Wongsettee
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 Nigamwongwan 47 Yaek 48, Toongsonghong, Lakki, Bangkok 10210 THAILAND Tel: 0-2779-8888 Calibration@entech.co.th
Tax ID : 0106530035591 www.entech.co.th



Calibration Certificate
Certificate No.: G 660001



Calibration Certificate
Certificate No.: G 660001



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	Nimt	18-Nov-26
Oxygen (O2) 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) 309.9 ppm	2803/21	Linde	22-Jun-23
Carbon monoxide (CO) 1003 ppm	2583/22	Linde	09-Aug-24
Nitric Oxide (NO) 30.08 ppm	CG-0009-22	Nimt	13-Jun-24
Nitric Oxide (NO) 150.9 ppm	2657/21	Linde	27-Jun-23
Nitric Oxide (NO) 320.6 ppm	2944/21	Linde	02-Jul-23
Sulphur Dioxide (SO2) 50.04 ppm	3205/21	Linde	25-Jul-23
Sulphur Dioxide (SO2) 100.8 ppm	3507/22	Linde	09-Nov-24
Sulphur Dioxide (SO2) 601.1 ppm	3704/21	Linde	20-Jul-23

Measured room conditions
Temperature : 23.2 °C Humidity : 56.4 %RH Pressure : 1014.8 mbar
Calibration conditions
Gas Temperature : 23 °C Flow rate : 600 ml/min Gas pressure : 1018.6 mbar

Calibration Results Before Adjustment (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O2 (%Vol)	2.498	2.47	-0.028	0.20
O2 (%Vol)	10.04	9.93	-0.11	0.40
O2 (%Vol)	21.02	21.09	0.07	0.80
CO (ppm)	80.14	81	2.86	3.0
CO (ppm)	309.9	319	9.1	6.0
CO (ppm)	1003	1038	35	12
NO (ppm)	30.08	28	-2.08	6.0
NO (ppm)	150.9	139	-11.9	8.0
NO (ppm)	320.6	299	-21.6	12
SO2 (ppm)	50.04	46	-4.04	6.0
SO2 (ppm)	100.8	96	-2.8	6.0
SO2 (ppm)	601.1	593	-8.1	13

Calibration Results After Adjustment (Table 3)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O2 (%Vol)	2.498	2.47	-0.028	0.20
O2 (%Vol)	10.04	9.93	-0.11	0.40
O2 (%Vol)	21.02	21.09	0.07	0.80
CO (ppm)	80.14	81	0.86	3.0
CO (ppm)	309.9	311	1.1	6.0
CO (ppm)	1003	1004	1	12
NO (ppm)	30.08	30	-0.08	8.0
NO (ppm)	150.9	154	3.1	6.0
NO (ppm)	320.6	322	1.4	12
SO2 (ppm)	50.04	49	-1.04	6.0
SO2 (ppm)	100.8	101	0.2	6.0
SO2 (ppm)	601.1	603	1.9	13

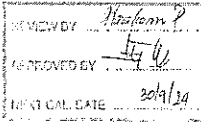
Remark : 1 cmol/mol = 1 %vol., 1 μmol/mol = 1 ppm.

End of Report

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : VACUUM GAUGE
MANUFACTURER : QUALITYWELL
MODEL / TYPE : N/A
SERIAL NO. : VG02(RYG_FS0333)
CLID. NO. : 212308696
JOB CONTROL NO. : 230329034807



CUSTOMER : ALS LABORATORY GROUP (THAILAND) CO., LTD.
164 PHATTHANAKAN 40, PHATTHANAKAN RD.,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG, BANGKOK 10250, THAILAND

DATE OF RECEIVED : 29 March 2023

DATE OF ISSUED : 31 March 2023

Report of calibration screening must not be taken in part. Except complete. Without the approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Sittipong Pimdee
Calibration Engineer



Approved By : Mongkol Yotnoontorn
Authorized Signatory
31 March 2023

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q23034807

F3-011-04/01-12

page 1 of 3



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The DUC was exercised by applying a known pressure from its zero to full scale 1 times. Then 2 series of known gauge pressure were applied. The STD reading were recorded and the means value were reported in the table below

CALIBRATION DATA

CORRECTION OF PRESSURE

DUC Test point (inHg)	STD Reading (inHg)		Correction (inHg)	
	Up	Down	Up	Down
-10.0	-9.96	-9.97	+0.04	+0.03
-20.0	-20.11	-20.12	-0.11	-0.12
-26.0	-26.18	-26.19	-0.18	-0.19
-27.0	-27.21	-27.22	-0.21	-0.22
-28.0	-28.30	-28.30	-0.30	-0.30

Uncertainty of measurement = 0.06 inHg

Transmitting fluid : Air

Note The Scope of Accredited ANAB Certificate No ACDM-2814 Version 008 Page 36 of 54

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

End of Certificate

Certificate No. Q23034807

F3-011-04/01-12

page 3 of 3



REPORT OF CALIBRATION

FOR

NOMENCLATURE : VACUUM GAUGE
MANUFACTURER : QUALITYWELL
MODEL / TYPE : N/A
SERIAL NO. : VG02(RYG_FS0333)
DATE OF CALIBRATION : 30 March 2023

ENVIRONMENT CONDITIONS :

Temperature : (23 ± 2) °C

Relative Humidity : (55 ± 10) %RH

PROCEDURE USED :

This instrument was calibrated under procedure No CLC-CPPP-05 according to DKD-R 6-1 as calibration guidelines.

The calibration was performed by direct measurement with Document Process Calibrator and Pressure Module which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Document Process Calibrator, Fluke Model 741B S/N: 8295020 with Pressure Module Model 700PD3 S/N: 89404505.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).
Certificate No. MP-0035-23, Due Date 02 February 2024.

UNCERTAINTY :

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of $k = 2$. It has been evaluated according to the "Calibration of Pressure Gauges (DKD-R 6-1)" which provides a level of confidence approximately 95%.

Certificate No. Q23034807

F3-011-04/01-12

page 2 of 3



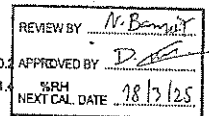
Certificate of Calibration

Equipment : SPECTROPHOTOMETER
Model : DR6000
Serial No. (or ID.): 1627645 (RYG_EN0037)
Manufacturer : HACH
Condition : In Condition

Certificate No.: C06230441
Issued Date: 19 September 2023
Job No.: WO-00005382
Page: 1 of 3

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

Environment Condition: Temperature 23.0 °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 Rungruang

Calibration Date: 18 September 2023

The Method used: In house method, CAL-WI-24, base on ASTM E 275-06 and ASTM E 387-04

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

The standard for Wavelength Certificate No. 111583 and 111504
The standard for Photometric Certificate No. 9114984 and 111508
The standard for Stray light Certificate No. 111506 and 111505
The standard for Spectral resolution Certificate No. 111587

(Mr. Nattapat Rungruang)

Person in charge

(Mr. Nitinun Srihawan)

Authorized signatory

This certificate is based on 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.

UKSH Technology Limited
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2533 Sukhumvit Road, Bangkok, Thailand 10250
Phone: +66 2029 7000 Email: info@uksh.com Website: www.uksh.com/thailand

Delivering Growth - in Asia and Beyond.

CAL-FM-C06-16: 12 Sep 2022



Certificate No.: C06230441 Page 2 of 3

Calibration Results:
Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 2 nm and UUC at 2 nm				
Standard Wavelength	Unit Under Calibration	Correction	Uncertainty	
418.61	418.3	0.31	0.13	
536.66	536.6	0.06	0.13	
637.96	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
	1.0296	1.029	0.0006	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
	0.2481	0.245	0.0011	0.0045
	0.4652	0.466	-0.0006	0.0045
	0.9468	0.946	0.0006	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

บริษัท ดีเคเอส อีซี จำกัด
DKSH Technology Limited
2533 สุขุมวิท 101/1 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
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CAL-FM-C06-15: 12 Sep 2022



Certificate No.: C06230441 Page 3 of 3

Calibration Results:
Without Adjustment

Photometric Accuracy (Absorbance)				
Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0080
	0.7355	0.737	-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)
		280.02 +/- 0.11 nm	1.3	1.886
		391.44 +/- 0.11 nm	1.3	1.886
Spectral Resolution *				
Nominal Concentration 0.02 % w/v		Peak	Trough	Ratio
Standard Wavelength (nm)		268.66	266.69	1.38
UUC: Wavelength (nm)		268.2	266.1	2.00
Std Absorbance (A)		0.4566	0.2760	
Absorbance (A)		0.413	0.300	

* Calibration Marked "Not TISI Accredited" in this Certificate have been included for completeness.

The End of Certificate

บริษัท ดีเคเอส อีซี จำกัด
DKSH Technology Limited
2533 สุขุมวิท 101/1 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
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CAL-FM-C06-15: 12 Sep 2022



ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: WO-00005382

ชนิดเครื่องวัด: SPECTROPHOTOMETER รุ่น: DR6000

หมายเลขเครื่องวัด: 1627845

ตรวจสอบ (วัน)		รายการตรวจเช็ค	ตรวจสอบ (สัปดาห์)		หมายเหตุ
18 Sep 2023			18 Sep 2023		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
General					
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3. สวิตช์ ปิด – เปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Spectrophotometer					
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6. แบตเตอรี่ไฟฟ้า (Battery Backup) >= 2.5 VDC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	7. ส่วนควบคุมความยาวคลื่น (Wavelength Control)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	*
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	9.2 Hours
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	741.5 Hours
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	11. ช่องวัดหลายตัวอย่าง (Carousel Module)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
pH Meter and Conductivity Meter					
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	12. บัลโบว (Electrode and Connection Cable)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	15. ขาตั้งบัลโบว (Stand)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Turbidimeter					
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	16. ค่าความขุ่นที่ว่าง (No Sample)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	17. ระดับการล้างตัวอย่าง (>= 2.5 ไม่นาน 3.0)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Automatic Dilutor					
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	18. สลัก Piston Burettes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	19. Function Rinsing and Dosing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	20. ระบบท่อจ่ายน้ำและอุปกรณ์ประกอบ	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

เส้นเชื่อมช่องหมายเลข: *656.1nm=655.1nm
*486.0nm=485.5nm

Mr.Nattapat Rungruang
Service Engineer

บริษัท ดีเคเอส อีซี จำกัด
DKSH Technology Limited
2533 สุขุมวิท 101/1 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
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CAL-FM-R31-03: 20 Jul 2022



DRY GAS METER CALIBRATION TEST REPORT

Calibration of Date	13 Jul 23	Barometric Pressure (mm Hg)	751
Next Calibration Date	13-Jan-24	Relative Humidity (%)	60.0
		Temperature (C)	29.0
Dry Gas Meter Data		Reference Dry Gas Meter Data	
Calibration sheet No.	C-DDMMYY-BKK_FS0563	Reference Dry Gas Meter ID	BKK_FS0629
Dry Gas Meter ID	BKK_FS0563	Serial No.	1607009
Serial No.	1606011	Correction Factor (Y)	1.0000
Model No.	XC-62-CV	Next Calibration Date	9 Dec 23

Reference Dry Gas Meter Calibration				Dry Gas Meter						Dry Gas Meter Correction Factor (Y)
Vr (Liters)			Tr (C)	Vm (Liters)			Ti (C)	To (C)	Avg Tm (C)	
Final	Initial	Total		Final	Initial	Total				
30.00	0.00	30.00	30.0	30.44	0.00	30.44	30.0	30.0	30.0	0.9855
30.00	0.00	30.00	31.0	30.50	0.00	30.50	30.0	30.0	27.0	0.9707
60.00	0.00	60.00	32.0	60.22	0.00	60.22	31.0	31.0	27.0	0.9800
60.00	0.00	60.00	33.0	60.22	0.00	60.22	32.0	32.0	27.0	0.9768
90.00	0.00	90.00	34.0	90.55	0.00	90.55	35.0	35.0	27.0	0.9713
90.00	0.00	90.00	35.0	90.55	0.00	90.55	36.0	36.0	27.0	0.9681
Avg										0.9754

Y = Ratio of reading of reference dry gas meter to dry gas meter. Tolerance for individual ± 0.05 from average

Calibrate by

Mr. (Jittakorn) Sruasa
Field Scientist (2)

Approved by

Mr. (Nattapat) Jengruang
Field Specialist (1)

FORM HQ F-06-023 REVISION HQ 1 ISSUE DATE 30-6-22



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date	13 Jul 23	Ambient Temperature (°C)	29		
Calibration sheet No.	C-130123-BKK_FS0503	Relative Humidity (%)	60		
Digital Temperature ID	BKK_FS0503	Reference Temperature ID	BKK_FS1144		
Serial No.	1006011	Serial No.	20100000013		
Model	XC-02-CV	Model	Digicon-CC-VT-4MS		
Next Calibrate		14 Aug 24			
Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stick	0	0	0	±0	Pass
	25	25	0	±0	Pass
	50	50	0	±0	Pass
	100	100	0	±0	Pass
	150	150	0	±0	Pass
	200	200	0	±0	Pass
	250	250	0	±0	Pass
	300	300	0	±0	Pass
	500	500	0	±0	Pass
	1000	1000	0	±0	Pass
Probe	120	120	0	±0	Pass
	140	140	0	±0	Pass
	160	160	0	±0	Pass
Oven	100	-	-	±0	-
	120	-	-	±0	-
	140	-	-	±0	-
Furnace	100	100	0	±0	Pass
	120	120	0	±0	Pass
	140	140	0	±0	Pass
Exit	0	0	0	±0	Pass
	10	10	0	±0	Pass
	20	20	0	±0	Pass
Water	0	0	0	±0	Pass
	25	25	0	±0	Pass
	50	50	0	±0	Pass
AUX	0	0	0	±0	Pass
	25	25	1	±0	Pass
	50	50	1	±0	Pass

MPE (Maximum permissible error of measurement) ค่าความคลาดเคลื่อนสูงสุดของผลการวัด

Calibrated by

Mr. Jittakorn Sriwata
Field Scientist (2)

Approved by

Mr. Natthaporn Jongsakulwong
Specialist (1)

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



Certificate of Calibration

ICS-2100: Anion (ID#659)

This certificate is to verify that Instrument below are calibrated

by Archimica Lab Co., Ltd.

ICS-2100 S/N: 15010977

AS-HV S/N: 5450A36659

For

ALS Laboratory Group (Thailand) Co., Ltd.

Operator Signature: *Nutdanai Laekhwan*

Date: Jan 12, 2023

(Mr. Nutdanai Laekhwan)

Application Chemist

RYG_EN0003

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2643 8201-6 e-mail: service.thailand@sartorius.com



SARTORIUS

REVIEW BY: *Thawatchai*
APPROVED BY: *D. K.*
NEXT CAL DATE: 01/03/24

Certificate of Calibration

Model Number: MSE224S-100-DU Certificate No.: 23BC10115
Description: Analytical Balance Issued Date: Friday, March 03, 2023
Serial Number: 0031709552 Reference No.: 204833
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. Phrak Daeng, Rayong 21140, Thailand

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

Calibrated By: Mr. Chonchai Inthana
Calibration Date: Wednesday, March 01, 2023
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 23.0 °C ± 5.0 °C Humidity 55.0 % RH ± 10.0 % RH Pressure ☐ Equipment Condition: ☒ Good Operation ☐ Fair

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	SPC-RT	C02212565	14-Sep-2023
MHB-382SD	Humidity/Dewpoint/Temp. Lutron MHB-382SD	DKSH	C19220444	5-Sep-2023

This certificate relates 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 (Technical Manager)



Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2643 8201-6 Fax: +66 2643 8357 e-mail: service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

Model Number: MSE224S-100-DU Certificate No.: 23BC10115
Description: Analytical Balance Issued Date: Friday, March 03, 2023
Serial Number: 0031709552 Reference No.: 204833
ID No.: RYG_EN0003
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 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 repeatability quantitatively.	The off-center loading error is yielded by the difference between the result 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 g Tolerance 0.0001 g	Nominal value 100 g Tolerance 0.0004 g
Nominal Value (High Load) 200 g Tolerance 0.0001 g	Difference 1 - 2 0.0001 3 0.0008 4 0.0008 5 0.0001 6 -
Standard Deviation 0.00004 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	0.00013
0.05	0.0500	0.0500	0.0000	0.00013
0.1	0.1000	0.1000	0.0000	0.00013
0.5	0.5000	0.5000	0.0000	0.00014
1	1.0000	1.0000	0.0000	0.00014
5	5.0000	5.0000	0.0000	0.00014
10	10.0000	10.0000	0.0000	0.00014
20	20.0000	20.0000	0.0000	0.00024
50	50.0000	50.0000	0.0000	0.00019
100	100.0000	100.0000	0.0000	0.00019
200	200.0000	200.0001	0.0001	0.00032

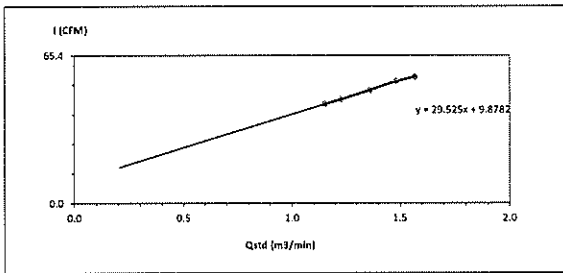
End of Report



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co.,Ltd Barometric Pressure (mm Hg) : 757
Calibrate Location : สำนักงานเขตหนองจอก (A1) Temperature (°C) : 32
Calibrate Date : 16-Oct-23 High Volume ID : RYG-FS0663
Calibration Sheet No. : C-161023-RYG-FS0663 High Volume Model : TE-S009X
Calibrator ID : RYG-FS0205 High Volume S/N : 6260
Calibrator Model : TE-S028A Calibrator Slope : 1.50765
Calibrator S/N : 1166 Calibrator Intercept : -0.02043

Test No.	Delta H ₂ O (inch)	Q _{air} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	3.0	1.1538	44	Slope : 29.5251 Intercept : 9.8782 Correlation Coefficient : 0.9992
2	3.4	1.2270	46	
3	4.2	1.3614	50	
4	5.0	1.4836	54	
5	5.6	1.5689	56	



Calibrated by : (Mr.) Jakkarin Manwicha
Field Scientist(1)

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

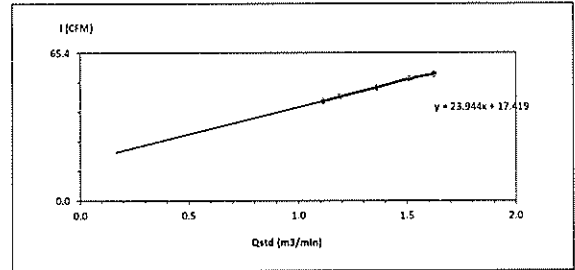
FORM NO. F-06-073 REVISION NO. : ISSUE DATE: 14/03/16



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co.,Ltd Barometric Pressure (mm Hg) : 757
Calibrate Location : สำนักงานเขตหนองจอก (A2) Temperature (°C) : 32
Calibrate Date : 16-Oct-23 High Volume ID : RYG-FS0174
Calibration Sheet No. : C-161023-RYG-FS0174 High Volume Model : TE-S170D
Calibrator ID : RYG-FS0205 High Volume S/N : 4800
Calibrator Model : TE-S028A Calibrator Slope : 1.50765
Calibrator S/N : 1166 Calibrator Intercept : -0.02043

Test No.	Delta H ₂ O (inch)	Q _{air} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.8	1.1153	44	Slope : 23.9443 Intercept : 17.4195 Correlation Coefficient : 0.9989
2	3.2	1.1909	46	
3	4.2	1.3614	50	
4	5.2	1.5125	54	
5	6.0	1.6232	56	



Calibrated by : (Mr.) Jakkarin Manwicha
Field Scientist(1)

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

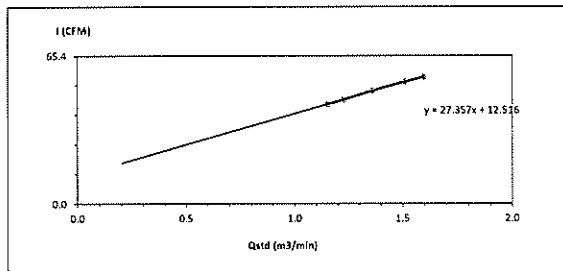
FORM NO. F-06-073 REVISION NO. : ISSUE DATE: 14/03/16



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co.,Ltd Barometric Pressure (mm Hg) : 757
Calibrate Location : สำนักงานเขตหนองจอก (A3) Temperature (°C) : 32
Calibrate Date : 16-Oct-23 High Volume ID : RYG-FS0181
Calibration Sheet No. : C-161023-RYG-FS0181 High Volume Model : TE-S170D
Calibrator ID : RYG-FS0205 High Volume S/N : 5334
Calibrator Model : TE-S028A Calibrator Slope : 1.50765
Calibrator S/N : 1166 Calibrator Intercept : -0.02043

Test No.	Delta H ₂ O (inch)	Q _{air} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	3.0	1.1538	44	Slope : 27.357x + 12.5156 Intercept : 12.5156 Correlation Coefficient : 0.9994
2	3.4	1.2270	46	
3	4.2	1.3614	50	
4	5.2	1.5125	54	
5	5.8	1.5963	56	



Calibrated by : (Mr.) Jakkarin Manwicha
Field Scientist(1)

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

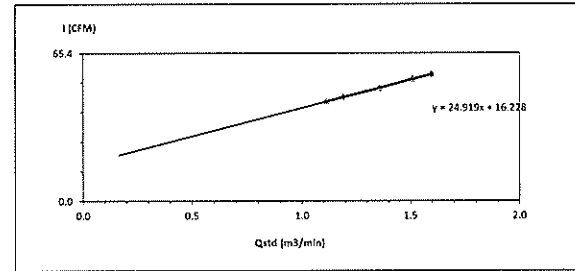
FORM NO. F-06-073 REVISION NO. : ISSUE DATE: 14/03/16



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co.,Ltd Barometric Pressure (mm Hg) : 757
Calibrate Location : สำนักงานเขตหนองจอก (A4) Temperature (°C) : 32
Calibrate Date : 16-Oct-23 High Volume ID : RYG-FS0662
Calibration Sheet No. : C-161023-RYG-FS0662 High Volume Model : TE-S009X
Calibrator ID : RYG-FS0205 High Volume S/N : 6259
Calibrator Model : TE-S028A Calibrator Slope : 1.50765
Calibrator S/N : 1166 Calibrator Intercept : -0.02043

Test No.	Delta H ₂ O (inch)	Q _{air} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.8	1.1153	44	Slope : 24.9187 Intercept : 16.2279 Correlation Coefficient : 0.9998
2	3.2	1.1909	46	
3	4.2	1.3614	50	
4	5.2	1.5125	54	
5	5.8	1.5963	56	



Calibrated by : (Mr.) Jakkarin Manwicha
Field Scientist(1)

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

FORM NO. F-06-073 REVISION NO. : ISSUE DATE: 14/03/16

Sartorius (Thailand) Co., Ltd.
120 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2043 8551-6, e-mail: service.thailand@sartorius.com



SARTORIUS

Certificate of Calibration

Model Number : LA1305-F Certificate No. : 23BC10110
Description : Analytical Balance Issued Date : Friday, March 03, 2023
Serial Number : 25409864 Reference No. : 204833
ID No. : RYG_EN0001
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.Pluek Daeng, Rayong 21140, Thailand.

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

Calibrated By : Mr.Chonchai Inthana Calibration Procedure No. : This calibration was conducted by
Calibration Date : Wednesday, March 01, 2023 Using in-house calibration procedure number (WI-003)
Based on UKAS LAB 14 : 2019

Metrological data : Ambient Conditions :
Capacity : 150 g Readability : 0.0001 g Temperature : 24.2 °C ± 5.0 °C
Humidity : 60.0 % RH ± 10.0 % RH
Pressure : ±
Reasons for calibration : ☐ New Installation ☐ Service / Repair ☒ Re-calibration / Maintenance ☐ Equipment Condition ☐ Good Operation ☐ Fair

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	SPC-RT	C02212565	14-Sep-2023
MHB-382SD	Humidity/Barenometer/Temp. Lutron MHB-382SD	DKSH	C19220444	5-Sep-2023

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.

Chonchai Inthana

Mr.chonchai inthana(Technical Manager)



SOP FM 33 03 February 2022

Sartorius (Thailand) Co., Ltd.
120 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2043 8551-6 Fax: +66 2043 8551-7, e-mail: service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

Model Number : LA1305-F Certificate No. : 23BC10110
Description : Analytical Balance Issued Date : Friday, March 03, 2023
Serial Number : 25409864 Reference No. : 204833
ID No. : RYG_EN0001
Manufacturer : Sartorius Page No. : 2 of 2

Calibration Results : Without Adjustment

Repeatability		Eccentricity (Off-center loading error)	
The repeatability is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement range is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.		The off-center loading error is yielded by the difference between the result of the load, i.e. 10g or 10g of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to DIN EN 876)	
Nominal Value : (Low Load)	10.0000 100.0001	Nominal value :	50 g
10 g	10.0000 100.0002	Tolerance	0.0004 g
Tolerance	10.0001 100.0001		
0.0001 g	10.0000 100.0000		
	9.9999 100.0002		
Nominal Value : (High Load)	10.0000 100.0001		
100 g	10.0001 100.0001		
Tolerance	10.0000 100.0001		
0.0001 g	9.9999 100.0002		
	9.9998 100.0001		
Standard Deviation	0.00009 0.00006		

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
(g)	(g)
0.01	0.0100
0.05	0.0500
0.1	0.1000
0.5	0.5000
1	1.0000
2	2.0000
5	5.0000
10	10.0000
20	20.0000
100	100.0000
Displayed Value	Deviation
(g)	(g)
0.0100	0.0000
0.0500	0.0000
0.1000	0.0000
0.5000	0.0000
1.0000	0.0000
2.0000	0.0000
5.0000	0.0000
10.0001	0.0001
20.0001	0.0001
100.0002	0.0002
Uncertainty	
(g)	
0.00022	
0.00023	
0.00023	
0.00023	
0.00023	
0.00022	
0.00022	
0.00024	
0.00023	
0.00026	

End of Report

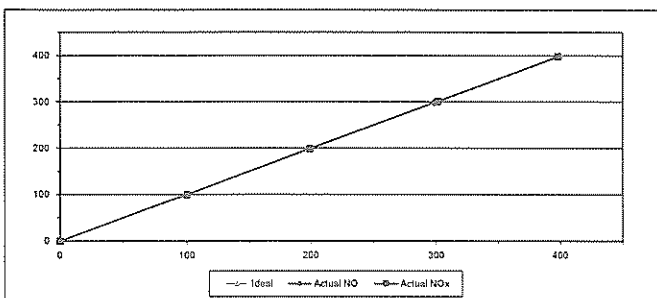
SOP FM 33 03 February 2022



MULTIPOINT CALIBRATION REPORT

Calibration Date	1-Jul-23	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	BQ314J3K	Equipment ID	RYG_FS0284
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947	Cylinder No.	GN0027222
Std. Gas Concentration (PPM)	55.88	Certified By	A/rgas Inc.
Cylinder Pressure (psi)	1800	Expired Date	9-Feb-30
Certified Date	9-Feb-22		

Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.05	0.05	0.05	0.10	0.10	0.10
1	100.00	99.20	-0.80	-0.80	100.10	0.10	0.10
2	200.00	198.40	-1.60	-0.80	199.10	-0.90	-0.45
3	300.00	298.60	-1.40	-0.47	301.50	1.50	0.50
4	400.00	398.10	-1.90	-0.47	398.00	-2.00	-0.50
AVERAGE (%)				-0.50			-0.05



Calibrated By

(Mr.Jhmvut Sakam)
Field Environmental Scientist (3)

Approved By

(Mr.Sanyuth Jitnanont)
Assistant General Manager

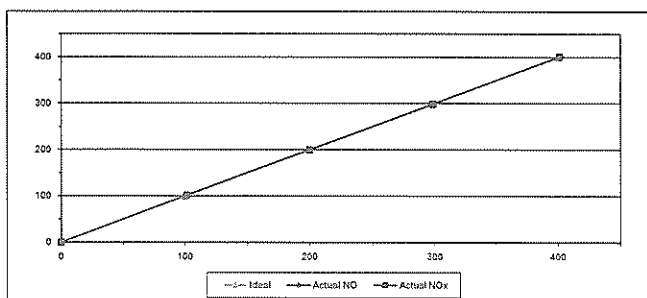
ALS Laboratory Group
FORM NO F 06-055 REVISION NO - ISSUE DATE 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	1-Jul-23	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	AWXG87CR	Equipment ID	RYG_FS0453
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947	Cylinder No.	GN0027222
Std. Gas Concentration (PPM)	55.88	Certified By	A/rgas Inc.
Cylinder Pressure (psi)	1800	Expired Date	9-Feb-30
Certified Date	9-Feb-22		

Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	99.60	-0.40	-0.40	101.40	1.40	1.40
2	200.00	198.60	-1.40	-0.70	199.80	-0.20	-0.10
3	300.00	299.00	-1.00	-0.33	298.50	-1.50	-0.50
4	400.00	402.10	2.10	0.53	401.20	1.20	0.30
AVERAGE (%)				-0.16			0.24



Calibrated By

(Mr.Jhmvut Sakam)
Field Environmental Scientist (3)

Approved By

(Mr.Sanyuth Jitnanont)
Assistant General Manager

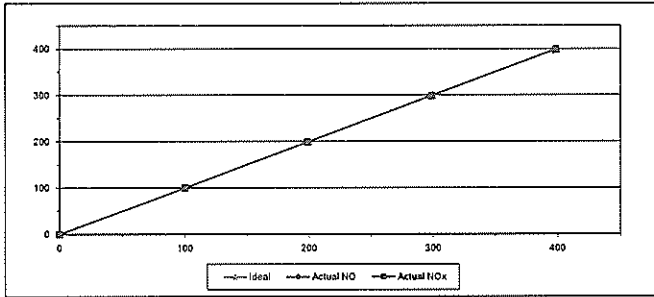
ALS Laboratory Group
FORM NO F 06-055 REVISION NO - ISSUE DATE 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	1-Jul-23	Equipment Name	NOx Analyzer
Manufacturer	Teledyne API	Model	T200
Serial No.	2197	Equipment ID	RYG_FS0255
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	55.88	Cylinder No.	GN0027222
Cylinder Pressure (psi)	1800	Certified By	Algas Inc.
Certified Date	9-Feb-22	Expired Date	9-Feb-30

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	99.60	-0.40	-0.40	100.20	0.20	0.20
2	200.00	198.10	-1.90	-0.95	198.50	-1.50	-0.75
3	300.00	297.50	-2.50	-0.83	298.70	-1.30	-0.43
4	400.00	396.50	-3.50	-0.88	398.60	-1.40	-0.35
AVERAGE (%)				-0.59			-0.25



Calibrated By

(Mr.)Jirawat Sakam
Field Environmental Scientist (3)

Approved By

(Mr.)Sarayuth Jitranont
Assistant General Manager

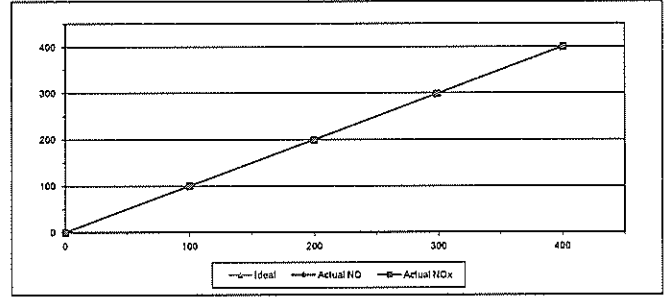
ALS Laboratory Group
FORM NO. F-06-056 REVISION NO. - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	1-Jul-23	Equipment Name	NOx Analyzer
Manufacturer	HDRIBA	Model	APNA-370
Serial No.	T2T8YRLL	Equipment ID	RYG_FS0457
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	55.88	Cylinder No.	GN0027222
Cylinder Pressure (psi)	1800	Certified By	Algas Inc.
Certified Date	9-Feb-22	Expired Date	9-Feb-30

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	98.30	-1.70	-1.70	100.20	0.20	0.20
2	200.00	198.40	-1.60	-0.80	199.60	-0.40	-0.20
3	300.00	297.10	-2.90	-0.97	298.50	-1.50	-0.50
4	400.00	398.60	-1.40	-0.35	400.70	0.70	0.17
AVERAGE (%)				-0.74			-0.05



Calibrated By

(Mr.)Jirawat Sakam
Field Environmental Scientist (3)

Approved By

(Mr.)Sarayuth Jitranont
Assistant General Manager

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



ROTA METER CALIBRATION RESULT OCTOBER 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0577	02 Oct 23	Y = 1.2862x - 1.2952	0.9993
BKK_FS0579	02 Oct 23	Y = 1.2546x + 0.0055	0.9946
BKK_FS0583	03 Oct 23	Y = 1.0773x - 2.4138	0.9989
BKK_FS0584	02 Oct 23	Y = 0.9787x + 12.560	0.9999
BKK_FS0585	18 Oct 23	Y = 1.0322x + 3.7767	0.9998
BKK_FS0586	02 Oct 23	Y = 0.9777x + 15.405	0.9997
BKK_FS0587	18 Oct 23	Y = 1.0175x + 14.717	0.9997
BKK_FS0589	03 Oct 23	Y = 1.0148x + 2.4143	1.0000
BKK_FS0590	03 Oct 23	Y = 1.0088x + 0.8429	1.0000
BKK_FS0591	02 Oct 23	Y = 1.0733x - 88.805	0.9989
BKK_FS0592	18 Oct 23	Y = 1.0037x + 10.388	1.0000
BKK_FS0593	02 Oct 23	Y = 1.0538x - 60.63	0.9996
BKK_FS0594	18 Oct 23	Y = 1.0052x + 5.3238	0.9999
BKK_FS0596	03 Oct 23	Y = 1.0440x - 48.241	0.9996
BKK_FS0597	03 Oct 23	Y = 1.0697x - 63.62	0.9994
BKK_FS1004	02 Oct 23	Y = 0.9855x + 14.75	0.9992
BKK_FS1005	02 Oct 23	Y = 1.02x + 1.767	0.9996
BKK_FS1006	02 Oct 23	Y = 1.1762x - 3.5618	0.9999
BKK_FS1007	18 Oct 23	Y = 1.1405x + 2.6044	0.9993
BKK_FS1008	18 Oct 23	Y = 1.1267x + 4.8333	0.9991
BKK_FS1010	03 Oct 23	Y = 1.0927x + 2.5932	0.9996
BKK_FS1011	02 Oct 23	Y = 1.3811x - 6.2068	0.9998
BKK_FS1012	02 Oct 23	Y = 1.0017x + 0.9	1.0000
BKK_FS1013	02 Oct 23	Y = 1.0593x - 46.02	0.9994
BKK_FS1014	03 Oct 23	Y = 1.0961x - 1.6995	0.9993
BKK_FS1015	03 Oct 23	Y = 0.9978x + 6.2595	0.9993
BKK_FS1016	03 Oct 23	Y = 1.0683x - 82.491	0.9995
BKK_FS1017	06 Oct 23	Y = 0.9981x - 2.2235	0.9998
BKK_FS1018	06 Oct 23	Y = 0.9817x - 20.653	0.9999
BKK_FS1019	06 Oct 23	Y = 1.0152x - 64.485	0.9998
BKK_FS1020	02 Oct 23	Y = 1.2691x - 2.4721	0.9993
BKK_FS1021	02 Oct 23	Y = 1.0036x + 3.3286	0.9999
BKK_FS1022	02 Oct 23	Y = 1.0633x - 73.266	0.9990
BKK_FS1023	03 Oct 23	Y = 1.0870x - 1.0694	0.9984
BKK_FS1024	02 Oct 23	Y = 1.0035x + 1.4857	1.0000
BKK_FS1025	03 Oct 23	Y = 1.0556x - 58.597	0.9999
BKK_FS1026	02 Oct 23	Y = 1.2894x - 1.497	0.9970
BKK_FS1027	02 Oct 23	Y = 1.0032x + 1.5167	1.0000
BKK_FS1028	02 Oct 23	Y = 1.0433x - 30.012	0.9994



ROTA METER CALIBRATION RESULT OCTOBER 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS1029	02 Oct 23	Y = 1.3494x - 3.5078	0.9981
BKK_FS1030	02 Oct 23	Y = 1.0015x + 1.2214	1.0000
BKK_FS1031	02 Oct 23	Y = 1.0516x - 56.996	0.9994
BKK_FS1039	02 Oct 23	Y = 0.9991x + 14.527	0.9994
BKK_FS1040	02 Oct 23	Y = 1.0049x - 2.4324	1.0000
BKK_FS1041	02 Oct 23	Y = 1.1682x - 2.1293	1.0000
BKK_FS1042	02 Oct 23	Y = 1.0051x + 6.2533	0.9989
BKK_FS1043	02 Oct 23	Y = 1.0022x + 3.96	1.0000
BKK_FS1044	02 Oct 23	Y = 1.0706x + 2.0806	0.9993
BKK_FS1164	02 Oct 23	Y = 1.2714x + 0.234	0.9945
BKK_FS1165	02 Oct 23	Y = 1.0029x + 3.3571	0.9994
BKK_FS1166	02 Oct 23	Y = 1.061x - 56.83	1.0000
BKK_FS1200	02 Oct 23	Y = 1.2803x - 1.4589	0.9962
BKK_FS1201	02 Oct 23	Y = 1.0374x - 6.1952	1.0000
BKK_FS1202	02 Oct 23	Y = 1.0486x - 44.05	0.9997
PHK_FS0027	09 Oct 23	Y = 1.1052x + 1.0293	1.0000
PHK_FS0028	09 Oct 23	Y = 1.0377x - 1.9833	1.0000
PHK_FS0029	09 Oct 23	Y = 1.0021x + 7.5248	1.0000
RYG_FS0197	02 Oct 23	Y = 1.0036x + 0.0133	1.0000
RYG_FS0198	02 Oct 23	Y = 0.9991x + 17.568	1.0000
RYG_FS0199	02 Oct 23	Y = 1.0814x - 1.2693	0.9997
RYG_FS0654	02 Oct 23	Y = 1.1168x - 2.1207	1.0000
RYG_FS0655	02 Oct 23	Y = 1.0086x + 6.2733	0.9991
RYG_FS0656	02 Oct 23	Y = 1.0006x + 0.48	1.0000
RYG_FS0657	02 Oct 23	Y = 1.0435x + 2.6459	0.9999
RYG_FS0658	02 Oct 23	Y = 0.9788x + 10.283	0.9962
RYG_FS0659	02 Oct 23	Y = 1.0074x - 6.621	1.0000
SGK_FS0135	18 Oct 23	Y = 0.9831x + 14.843	0.9994
SGK_FS0138	06 Oct 23	Y = 1.0831x - 0.8401	0.9998
SGK_FS0139	06 Oct 23	Y = 0.9826x + 8.6567	1.0000
SGK_FS0140	06 Oct 23	Y = 1.0011x + 7.8005	1.0000
SGK_FS0141	06 Oct 23	Y = 1.125x - 1.2259	0.9998
SGK_FS0142	06 Oct 23	Y = 0.9956x + 10.257	0.9997
SGK_FS0143	06 Oct 23	Y = 1.004x + 3.3105	1.0000

Review By:

(Mr.) Wichan Choonharat
Enviro Field Services Manager

Approved By:

(Mr.) Sarayuth Jitranont
Assistant General Manager

Certificate Number
CL-016-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Cup anemometer
MANUFACTURER: Novolyne
MODEL/TYPE: Sensor: WS-02F
Data logger: 200-WS-251B
SERIAL NUMBER: Sensor: AS369
Data logger: AS369
ID NUMBER: RYG_F0411
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.

Calibration procedure:
The cup anemometer was calibrated against Standard air velocity transducer model: 8155-32 and pitot tube with precision differential pressure meter model: DP42500 in an open test section of Eiffel-type wind tunnel with 500 cm² cross test section area. The WS-CL-007 based on IEC 61400-12-2, Wind energy generation systems - Part 12-2: 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 recognized the national standards, and to realization of the international system of units (SI) through the NMAT (National Metrology Institute of Thailand) via Certificate number: MN-0052 21 and MN-0064 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: 27 Jan 2023
MEASUREMENT DATE: 10 Feb 2023
ISSUE DATE: 10 Feb 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:
Temperature: 23.0 ± 3.0 °C
Relative Humidity: 55.0 ± 15.0 %RH
Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION: Eiffel-type wind tunnel of Jirantee Associates Co., Ltd.

CALIBRATION CONDITIONS:
Wind tunnel cross-section area: 500 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 (23.8) °C, (44.8) %RH and (1010.3) hPa

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:
☒ Mr. Sorawit Thachulad
☒ Miss Jittaporn Jantachol



Approved signature: Mr. Parinya Booncharoen
Calibration Department Manager

Remarks:
* Inside cross-section area of the wind tunnel
* Projected cross-section area of the tested object include mounting pipe
* Diameter of mounting pipe
* Ratio k=2

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 RESULTS¹

The cup anemometer, Unit Under Calibration (UUC) was exercise at 30 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.

U _{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	U _{meas} (m/s)	Error (m/s)	U (k=2) (m/s)
0.93	23.60	23.55	0.8	-0.2	0.15
2.038	23.50	23.55	1.8	-0.2	0.16
3.044	23.50	23.55	2.9	-0.2	0.18
4.147	23.58	23.55	3.9	-0.3	0.19
5.00	23.50	23.55	4.9	-0.1	0.18
5.98	23.62	23.55	5.9	-0.1	0.18
7.04	23.58	23.55	7.0	-0.1	0.18
8.16	23.56	23.55	8.0	-0.2	0.19
9.10	23.26	23.55	9.0	-0.1	0.18
10.07	23.50	23.55	10.0	-0.1	0.19
11.13	23.10	23.55	11.0	-0.2	0.20
12.13	23.50	23.55	12.1	-0.1	0.20
13.21	23.12	23.55	13.1	-0.1	0.22
14.25	23.36	23.55	14.0	-0.2	0.22
15.24	23.10	23.55	15.3	-0.2	0.28
16.28	23.20	23.55	16.0	-0.3	0.24

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 Jirantee Associates Co., Ltd. The cup anemometer shown may differ from the calibrated one. Remark: The proportion of the set-up is not true to scale due to image geometry



Certificate Number
CL-016-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Wind Direction Sensor
MANUFACTURER: Novolyne
MODEL/TYPE: Sensor: WS-02F
Data logger: 200-WS-251B
SERIAL NUMBER: Sensor: AS369
Data logger: AS369
ID NUMBER: RYG_F0411
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.

Calibration procedure:
The wind direction sensor was calibrated against Standard Rotary Encoder model: AK00075-DN04 P3 5.0 in an open test section of Eiffel-type wind tunnel with 500 cm² cross test section area. The WS-CL-008 based on IEC 61400-12-2, Wind energy generation systems - Part 12-2: 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 recognized the national standards, and to realization of the international system of units (SI) through the NMAT (National Metrology Institute of Thailand) via Certificate number: DA-0045 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: 27 Jan 2023
MEASUREMENT DATE: 10 Feb 2023
ISSUE DATE: 10 Feb 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:
Temperature: 23.0 ± 3.0 °C
Relative Humidity: 55.0 ± 15.0 %RH
Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION: Eiffel-type wind tunnel of Jirantee Associates Co., Ltd.

CALIBRATION CONDITION:
Wind tunnel cross-section area: 500 cm²
Win direction frontal area: 129 cm²
Diameter of mounting pipe: - mm
Blockage ratio of test object: 0.143 [-]

Preconditioning: 24 hours at ambient conditions.
Measurement Condition: The average values during measurement are (23.9) °C, (44.3) %RH and (1011.4) hPa

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:
☒ Mr. Sorawit Thachulad
☒ Miss Jittaporn Jantachol



Approved signature: Mr. Parinya Booncharoen
Calibration Department Manager

Remarks:
* Inside cross-section area of the wind tunnel
* Projected cross-section area of the tested object include mounting pipe
* Diameter of mounting pipe
* Ratio k=2

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

Certificate Number

CL-016-66

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

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

Air speed m/s	D _{ref} Degree (°)	D _{meas} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
	0.000	0	0	0.58
	45.000	41	-4	0.58
	90.000	87	-3	0.58
5.00	135.000	135	0	0.58
	180.000	182	2	0.74
	225.000	230	5	0.68
	270.001	275	5	0.58
	315.000	320	5	0.58

Remarks:

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

² Direction of standard

³ Direction of Unit Under Calibration



End of Certificate of Calibration



JIRANATEE ASSOCIATES CO., LTD.

Jirantee Associates Co. Ltd.
6/124 15, 6/15-30
Petchaburi 7, 7/1, 40 Vachapha, Bangkok,
Bangkok 10250 (Thailand)
Tel: +662 6505012
Mobile: +662 6505013
E-mail: jirantee@jirantee.com
Web site: www.jirantee.com

Accredited calibration laboratory
ISO/IEC 17025:2017
MSC-TEC-27025
CALIBRATION 0367

Air speed measurement laboratory
Calibration services department

REVIEW BY: *[Signature]*
APPROVED BY: *[Signature]*
TEST CAL. DATE: 5/4/24

Certificate Number

CL-001-66

Certificate Number

CL-001-66

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The cup anemometer, Unit Under Calibration (UUC) was exercised 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 _{uuc} (m/s)	Error (m/s)	U (k=2) (m/s)
0.583	23.82	23.85	0.7	-0.3	0.16
2.031	23.90	23.85	1.7	-0.3	0.16
3.051	24.00	23.85	2.9	-0.2	0.20
4.132	23.84	23.85	3.9	-0.2	0.20
5.00	23.88	23.85	4.9	-0.1	0.24
5.98	23.94	23.85	5.8	-0.2	0.18
7.00	23.82	23.85	6.9	-0.2	0.19
8.17	23.90	23.85	8.0	-0.1	0.22
9.08	23.72	23.85	9.0	-0.1	0.21
10.09	23.86	23.85	9.9	-0.2	0.20
11.14	23.60	23.85	11.0	-0.1	0.26
12.14	23.74	23.85	12.1	-0.1	0.28
13.21	23.68	23.85	13.0	0.2	0.21
14.28	23.70	23.85	14.1	-0.2	0.27
15.26	23.64	23.85	15.0	-0.3	0.26
16.30	23.60	23.85	16.1	-0.2	0.28

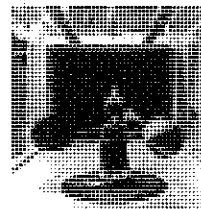
Remarks:

¹ Calibration results only count for the tested circumstances and environmental conditions during which the test was carried out.

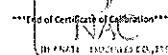
² Velocity of standard

³ Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



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



Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS RECEIVED

CUSTOMER

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

ENVIRONMENTAL CONDITIONS:

Ambient conditions in the laboratory are as follows:

Temperature

Relative Humidity

Atmospheric Pressure

PLACE OF CALIBRATION

CALIBRATION CONDITIONS

Wind tunnel cross-section area¹

Wind direction frontal area²

Diameter of mounting pipe³

Blockage ratio of test object⁴

Preconditioning

Measurement Condition

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

1) Mr. Soravit Thachalad

2) Miss Jiraporn Lertsomphol

Remark:

¹ Inside 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 1/2



Approved signature:

Mr. Parinya Boonchroen

Calibration Department Manager

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



JIRANATEE ASSOCIATES CO., LTD.

Jirantee Associates Co. Ltd.
6/124 15, 6/15-30
Petchaburi 7, 7/1, 40 Vachapha, Bangkok,
Bangkok 10250 (Thailand)
Tel: +662 6505012
Mobile: +662 6505013
E-mail: jirantee@jirantee.com
Web site: www.jirantee.com

Accredited calibration laboratory
ISO/IEC 17025:2017
MSC-TEC-27025
CALIBRATION 0367

Air speed measurement laboratory
Calibration services department

Certificate Number

CL-001-66

Certificate Number

CL-001-66

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

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

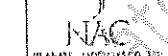
Air speed m/s	D _{ref} Degree (°)	D _{uuc} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
	0.000	0	0	0.58
	45.000	41	-4	0.74
	90.000	87	-3	0.68
	135.000	134	-1	0.74
5.02	180.001	181	1	0.74
	225.000	228	3	0.74
	270.001	273	3	0.74
	315.000	318	3	0.68

Remarks:

¹ Calibration results only count for the tested circumstances and environmental conditions during which calibration test place.

² Direction of standard

³ Direction of Unit Under Calibration



End of Certificate of Calibration

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS RECEIVED

CUSTOMER

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

ENVIRONMENTAL CONDITIONS:

Ambient conditions in the laboratory are as follows:

Temperature

Relative Humidity

Atmospheric Pressure

PLACE OF CALIBRATION

CALIBRATION CONDITION

Wind tunnel cross-section area¹

Wind direction frontal area²

Diameter of mounting pipe³

Blockage ratio of test object⁴

Preconditioning

Measurement Condition

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

1) Mr. Soravit Thachalad

2) Miss Jiraporn Lertsomphol

Remark:

¹ Inside 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 1/2



Approved signature:

Mr. Parinya Boonchroen

Calibration Department Manager

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

RECEIVED BY *Manon P*
APPROVED BY *Manon P*
NOT CAL DATE 18/2/26
Certificate Number
CWS-004-56

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
Cup anemometer
MANUFACTURER
Novalyne
MODEL/TYPE
Sensor: WS-02F
Data logger: ASD-WS-25LB
Sensor: WS-D-AS191
Data logger: AS191
SERIAL NUMBER
RVO_F50226
ID NUMBER
Used item
CONDITION AS-RECEIVED
Customer
ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand

Calibration procedure:
The cup anemometer was calibrated against standard air velocity transducer model: D455-12 and pitot tube with precision differential pressure meter model: DPM2500 in an close test section of Eiffel-type wind tunnel with 500 cm² cross test section area. The WS-02F based on IEC 61400-12 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 recognized the national standards, and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: MW-0052-21 and MW-0065-22

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 Aug 2023
MEASUREMENT DATE
18 Aug 2023
ISSUE DATE
21 Aug 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:
Temperature: 23.0 ± 3.0 °C
Relative Humidity: 55.0 ± 15.0 %RH
Atmospheric Pressure: 1010 ± 10 hPa

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

CALIBRATION CONDITIONS
Wind tunnel cross-section area¹ 900 cm²
Wind direction frontal area² 100 cm²
Diameter of mounting pipe³ mm
Blockage ratio of test object⁴ 0.111 [-]

Preconditioning
24 hours at ambient conditions.
Measurement Condition
The average values during measurement are (24.1) °C, (44.3) %RH and (1005.44) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:
☒ Mr. Sorawit Thachulaid
☐ Miss Jitraporn Jantongphol



Approved signature:
Mr. Pinyia Booncharoen
Calibration Department Manager

Remarks:
¹ Measuring 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 % to

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

Certificate Number
CWD-004-56

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 counterclockwise directions after offset adjustment has been made. The flow speed of wind tunnel (usually 5 m/s) is kept constant while the sensor is rotated around its vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below.

Air speed m/s	D ₁₀₀ Degree (°)	D ₁₀₀ Degree (°)	Error Degree (°)	U (k=2) Degree (°)
5.01	45.000	42	-3	3.0
	50.000	47	-3	3.0
	135.000	133	-2	3.0
	160.000	162	2	3.0
	225.000	229	4	3.0
	270.000	275	5	3.0
	315.000	320	5	3.0
	360.000	359	-1	3.0

Remarks:
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



Certificate Number
CWD-004-56

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
Cup anemometer
MANUFACTURER
Novalyne
MODEL/TYPE
Sensor: WS-02F
Data logger: ASD-WS-25LB
Sensor: WS-D-AS191
Data logger: AS191
SERIAL NUMBER
RVO_F50226
ID NUMBER
Used item
CONDITION AS-RECEIVED
Customer
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: AK400075-D404 P3-5-UD in an close test-section of Eiffel-type wind tunnel with 500 cm² cross test section area. The WS-02F based on IEC 61400-12 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 recognized 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-0049-22

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 Aug 2023
MEASUREMENT DATE
18 Aug 2023
ISSUE DATE
21 Aug 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:
Temperature: 23.0 ± 3.0 °C
Relative Humidity: 55.0 ± 15.0 %RH
Atmospheric Pressure: 1010 ± 10 hPa

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

CALIBRATION CONDITIONS
Wind tunnel cross-section area¹ 900 cm²
Wind 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 (23.9) °C, (41.2) %RH and (1009.3) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:
☒ Mr. Sorawit Thachulaid
☐ Miss Jitraporn Jantongphol



Approved signature:
Mr. Pinyia Booncharoen
Calibration Department Manager

Remarks:
¹ Measuring 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 % to

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



RECEIVED BY *Manon P*
APPROVED BY *Manon P*
NOT CAL DATE 18/2/26
Certificate Number
CWS-003-56

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
Cup anemometer
MANUFACTURER
Novalyne
MODEL/TYPE
Sensor: WS-02F
Data logger: ASD-WS-25LB
Sensor: WS-D-AS191
Data logger: AS191
SERIAL NUMBER
RVO_F50226
ID NUMBER
Used item
CONDITION AS-RECEIVED
Customer
ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand

Calibration procedure:
The cup anemometer was calibrated against Standard air velocity transducer model: D455-12 and pitot tube with precision differential pressure meter model: DPM2500 in an close test section of Eiffel-type wind tunnel with 500 cm² cross test section area. The WS-02F based on IEC 61400-12 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 recognized the national standards, and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: MW-0052-21 and MW-0065-22

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 Aug 2023
MEASUREMENT DATE
18 Aug 2023
ISSUE DATE
21 Aug 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:
Temperature: 23.0 ± 3.0 °C
Relative Humidity: 55.0 ± 15.0 %RH
Atmospheric Pressure: 1010 ± 10 hPa

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

CALIBRATION CONDITIONS
Wind tunnel cross-section area¹ 900 cm²
Wind direction frontal area² 100 cm²
Diameter of mounting pipe³ mm
Blockage ratio of test object⁴ 0.111 [-]

Preconditioning
24 hours at ambient conditions.
Measurement Condition
The average values during measurement are (24.3) °C, (43.1) %RH and (1003.55) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:
☒ Mr. Sorawit Thachulaid
☐ Miss Jitraporn Jantongphol



Approved signature:
Mr. Pinyia Booncharoen
Calibration Department Manager

Remarks:
¹ Measuring 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 % to

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

Certificate Number
CWS-003-66

Page 2 of 2 Pages

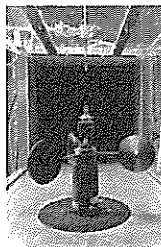
MEASUREMENT RESULTS¹

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 200 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_{UUC} (m/s)	Error (m/s)	U (k=2) (m/s)
1.032	24.10	24.30	0.8	-0.1	0.31
2.095	24.54	24.30	1.9	-0.2	0.31
3.006	24.08	24.30	2.9	-0.1	0.31
4.222	24.04	24.30	4.0	-0.2	0.31
5.00	23.78	24.30	4.9	-0.1	0.31
5.97	23.91	24.30	5.9	-0.1	0.31
7.01	23.78	24.30	6.9	-0.1	0.31
8.13	24.00	24.30	8.0	-0.3	0.31
9.07	23.82	24.30	9.0	-0.1	0.31
10.07	23.90	24.30	9.9	-0.1	0.31
11.13	23.64	24.30	11.1	0.0	0.31
12.13	23.80	24.30	12.0	-0.1	0.31
13.19	23.82	24.30	13.2	0.0	0.31
14.24	23.74	24.30	14.1	-0.1	0.31
15.20	23.80	24.30	15.2	0.0	0.31
16.26	23.74	24.30	16.1	-0.2	0.31

Remark:
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 Iiranate Associates Co., Ltd. The cup anemometer shown may differ from the calibrated one. Remark: The proportion of the set-up is not true to scale due to imaging geometry.



J NAC
 IRANATE ASSOCIATES CO., LTD.
 8/14 15 8/15-36
 Petcharoen 77/1, 14 Vithayalai, Bangkok 10500 (Thailand)
 Tel: +66(0)29432
 Mobile: +66(0)29432
 E-mail: jnac-calibration@iranate.com
 Web site: www.jiranate.com

Accredited calibration laboratory
 ISO/IEC 17025:2017
 TSC-7150-715 17025
 CALIBRATION 0167

Air speed measurement laboratory
 Calibration services department.

Certificate Number
CWD-003-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

Wind Direction Sensor

MANUFACTURER

Novelty

MODEL/TYPE

Sensor: WS-20F

SERIAL NUMBER

Data logger: 200-WS-2518

ID NUMBER

Sensor: WSD-A5130

CONDITION AS-RECEIVED

Data logger: A5130

CUSTOMER

RYG_F50329
 Used item
 ALS Laboratory Group (Thailand) Co., Ltd.
 104 Phatthanasak 40, Phatthanasak JM, Khwaeng Suan Luang,
 Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

11 Aug 2023

MEASUREMENT DATE

18 Aug 2023

ISSUE DATE

21 Aug 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: 1010.1 ± 10 hPa

PLACE OF CALIBRATION

Effel-type wind tunnel of Iiranate 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 (23.9)°C, (44.8) %RH and (1009.2) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

☒ Mr. Sorawit Thairatad
☐ Miss Atthaporn Jantaporn



Approved signature:

[Signature]
 Mr. Pinyaya Booncharoen
 Calibration Department Manager

Remarks:

- ¹ Inside 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 $\frac{A_2}{A_1}$

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

Certificate Number
CWD-003-66

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

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

Air speed m/s	D'_{90} Degree (°)	D'_{270} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
5.00	45.000	41	-4	1.0
	90.000	87	-3	1.0
	135.000	132	-3	1.0
	180.000	178	-2	1.0
	225.000	226	1	1.0
	270.000	272	2	1.0
	315.000	319	4	1.0
	360.000	359	-1	1.0

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



ROTA METER CALIBRATION RESULT JULY 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0577	03 Jul 23	Y = 1.2484x - 0.6741	0.9931
BKK_FS0579	03 Jul 23	Y = 1.0897x - 0.4018	1.0000
BKK_FS0583	01 Jul 23	Y = 1.0068x + 1.6459	0.9998
BKK_FS0584	01 Jul 23	Y = 0.9804x + 9.469	0.9999
BKK_FS0585	07 Jul 23	Y = 1.0248x + 0.8333	0.9996
BKK_FS0586	01 Jul 23	Y = 0.9907x + 11.074	1.0000
BKK_FS0587	07 Jul 23	Y = 0.986x + 17.77	0.9993
BKK_FS0588	01 Jul 23	Y = 0.9751x + 0.8452	0.9999
BKK_FS0589	03 Jul 23	Y = 1.0174x + 0.0381	1.0000
BKK_FS0590	01 Jul 23	Y = 1.0127x - 3.4333	1.0000
BKK_FS0591	03 Jul 23	Y = 1.0452x - 51.824	0.9998
BKK_FS0592	07 Jul 23	Y = 1.0003x + 14.344	1.0000
BKK_FS0593	01 Jul 23	Y = 1.0386x - 41.415	0.9997
BKK_FS0594	07 Jul 23	Y = 1.0025x + 6.32	0.9999
BKK_FS0595	01 Jul 23	Y = 1.0871x - 114.87	0.9985
BKK_FS0596	03 Jul 23	Y = 1.038x - 51.974	0.9993
BKK_FS0597	01 Jul 23	Y = 1.0050x - 0.9086	1.0000
BKK_FS1004	01 Jul 23	Y = 1.0186x + 6.731	0.9998
BKK_FS1005	01 Jul 23	Y = 0.9922x + 13.993	0.9970
BKK_FS1006	01 Jul 23	Y = 1.1747x - 3.1235	0.9991
BKK_FS1007	07 Jul 23	Y = 1.0737x + 0.8677	0.9997
BKK_FS1008	07 Jul 23	Y = 1.0446x + 1.2156	0.9999
BKK_FS1009	01 Jul 23	Y = 1.1044x - 0.8245	1.0000
BKK_FS1010	03 Jul 23	Y = 1.2271x - 2.0139	1.0000
BKK_FS1011	03 Jul 23	Y = 1.261x - 1.7093	1.0000
BKK_FS1012	03 Jul 23	Y = 0.9978x - 3.7238	0.9990
BKK_FS1013	03 Jul 23	Y = 1.0245x - 28.65	0.9999
BKK_FS1014	01 Jul 23	Y = 1.3135x - 7.0966	0.9961
BKK_FS1015	01 Jul 23	Y = 0.9802x + 3.8214	0.9999
BKK_FS1016	01 Jul 23	Y = 1.0728x - 85.581	0.9995
BKK_FS1020	01 Jul 23	Y = 1.1161x - 1.1986	1.0000
BKK_FS1021	01 Jul 23	Y = 0.9566x + 16.524	0.9987
BKK_FS1022	01 Jul 23	Y = 1.0712x - 89.51	0.9990
BKK_FS1023	01 Jul 23	Y = 1.3791x - 8.8721	0.9944
BKK_FS1024	01 Jul 23	Y = 0.9449x + 11.421	0.9993
BKK_FS1025	01 Jul 23	Y = 1.0477x - 41.116	1.0000
BKK_FS1026	01 Jul 23	Y = 1.3388x - 4.918	1.0000
BKK_FS1027	01 Jul 23	Y = 0.9852x + 1.5238	1.0000
BKK_FS1028	01 Jul 23	Y = 1.0281x - 19.897	0.9996

Page 1 of 2

ALS Laboratory Group



ROTA METER CALIBRATION RESULT JULY 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS1029	01 Jul 23	Y = 1.3382x - 8.9776	0.9941
BKK_FS1030	01 Jul 23	Y = 0.9818x + 2.3476	0.9995
BKK_FS1031	01 Jul 23	Y = 1.0526x - 64.415	0.9907
BKK_FS1039	01 Jul 23	Y = 0.998x + 14.823	0.9907
BKK_FS1040	01 Jul 23	Y = 1.0041x - 2.7552	0.9999
BKK_FS1041	01 Jul 23	Y = 1.116x - 1.0078	0.9999
BKK_FS1042	01 Jul 23	Y = 1.0209x + 3.56	0.9980
BKK_FS1043	01 Jul 23	Y = 1.0039x - 5.0143	0.9999
BKK_FS1044	01 Jul 23	Y = 1.0807x + 0.9937	0.9998
BKK_FS1164	03 Jul 23	Y = 1.0589x + 4.6061	0.9906
BKK_FS1165	03 Jul 23	Y = 0.9809x + 7.5262	0.9961
BKK_FS1166	03 Jul 23	Y = 1.0567x - 50.446	0.9999
BKK_FS1200	03 Jul 23	Y = 1.3634x - 1.3916	0.9901
BKK_FS1201	03 Jul 23	Y = 1.0388x - 7.0524	0.9999
BKK_FS1202	03 Jul 23	Y = 1.0518x - 59.531	0.9998
RYG_FS0197	01 Jul 23	Y = 1.0087x - 3.2838	0.9999
RYG_FS0198	01 Jul 23	Y = 0.9877x + 35.487	0.9999
RYG_FS0199	01 Jul 23	Y = 1.0299x - 0.367	0.9992
PHK_FS0027	13 Jul 23	Y = 1.1219x - 2.2432	0.9984
PHK_FS0028	13 Jul 23	Y = 1.0341x - 6.7967	0.9999
PHK_FS0029	13 Jul 23	Y = 0.9977x + 8.7929	0.9999
SGK_FS0135	14 Jul 23	Y = 0.9877x + 11.513	0.9974
SGK_FS0138	13 Jul 23	Y = 1.0571x - 1.1665	0.9991
SGK_FS0139	13 Jul 23	Y = 0.9801x + 8.6267	0.9997
SGK_FS0140	13 Jul 23	Y = 0.9970x + 11.644	1.0000
SGK_FS0141	13 Jul 23	Y = 1.1349x - 2.2867	0.9990
SGK_FS0142	13 Jul 23	Y = 0.9915x + 11.403	0.9994
SGK_FS0143	13 Jul 23	Y = 1.0054x - 4.0648	1.0000

Review By :

 (Mr. Wichan Choonharat)
 Enviro Field Services Manager

Approved By :

 (Mr. Sarayuth Jittrantont)
 Assistant General Manager

 Sartorius (Thailand) Co., Ltd.
 129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
 Tel: +66 2643 8301-6, e-mail: service.thailand@sartorius.com


SARTORIUS

 NAC-TIS-TIS 17025
 CALIBRATION 0426

 REVIEW BY
 APPROVED BY
 NEXT CAL DATE 01/09/24

Certificate of Calibration

 Model Number : MSE125P-100-DU Certificate No. : 23BCI0114
 Description : Semi-micro Balance Issued Date : Friday, March 03, 2023
 Serial Number : 0033108993 Reference No. : 204833
 ID No. : RYG_EN0004
 Manufacturer : Sartorius Page No. : 1 of 3

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

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

 Calibrated By : Mr Chonchai Inthana Calibration Procedure No. : This calibration was conducted by
 Calibration Date : Wednesday, March 01, 2023 Using in-house calibration procedure number (WI-003)
 Based on UKAS LAB 14 : 2019

 Metrological data : Ambients Conditions:
 Capacity : 120 g Readability : 0.00001 g Temperature : 24.0 °C ± 5.0 °C
 Humidity : 63.0 % RH ± 10.0 % RH
 Pressure : Reasons for calibration
☐ New Installation ☐ Service / Repair ☒ Re-calibration/ Maintenance ☐ Good Operation ☐ For

 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
YGS011-522-00	Sartorius weight set 1mg - 5000g E2 YGS011-522-00	SPC-RT	C02212555	14-Sep-2023
MHB-382SD	Humidity/Barometer/Temp Lutron MHB-382SD	DKSH	C19220444	6-Sep-2023

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 (Technical Manager)

SOP FM 33 03 February 2022


 Sartorius (Thailand) Co., Ltd.
 129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
 Tel: +66 2643 8301-6 Fax: +66 2643 8307, e-mail: service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

 Model Number : MSE125P-100-DU Certificate No. : 23BCI0114
 Description : Semi-micro Balance Issued Date : Friday, March 03, 2023
 Serial Number : 0033108993 Reference No. : 204833
 ID No. : RYG_EN0004
 Manufacturer : Sartorius Page No. : 2 of 3

Calibration Results : Without Adjustment

Repeatability				Eccentricity (Off-center loading error)			
The reproducibility is the ability of a weighing instrument to display nearly identical readings under consistent test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.				The off-center loading error is yielded by the difference between the resultant 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 R110).			
Nominal Value (Low Load)	5.00002	50.00002		Nominal value	50	9	
5 g	5.00002	50.00002		Tolerance	0.00015	9	
Tolerance	5.00001	50.00002					
0.000015 g	5.00002	50.00001					
	5.00000	50.00001					
Nominal Value (High Load)	5.00002	50.00000					
50 g	5.00001	50.00000					
Tolerance	5.00001	50.00000					
0.000015 g	5.00002	50.00001					
	5.00002	50.00002					
Standard Deviation	0.000007	0.000009					
Linearity				Linearity			
The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.				The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.			
Tolerance	0.00004	g		Tolerance	0.0001	g	
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Nominal Value	Conventional Mass Value	Displayed Value	Deviation
(g)	(g)	(g)	(g)	(g)	(g)	(g)	(g)
0.03	0.01000	0.01000	0.00000	65	65.0000	65.0000	0.0000
0.1	0.10000	0.10000	0.00000	70	70.0000	70.0000	0.0000
1	1.00000	1.00000	0.00000	75	75.0000	75.0000	0.0000
2	2.00002	2.00002	0.00000	80	80.0000	80.0000	0.0000
5	5.00002	5.00001	-0.00001	85	85.0001	85.0001	0.0000
10	10.00002	10.00002	0.00000	90	90.0001	90.0001	0.0000
20	20.00000	20.00000	0.00000	95	95.0001	95.0001	0.0000
30	30.00002	30.00002	0.00000	100	100.0000	100.0000	0.0000
40	40.00003	40.00002	-0.00001	110	110.0000	110.0000	0.0000
50	50.00002	50.00001	-0.00001	120	120.0000	120.0000	0.0000

 Sartorius (Thailand) Co., Ltd.
 129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
 Tel: +66 2643 8301-6 Fax: +66 2643 8307, e-mail: service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

 Model Number : MSE125P-100-DU Certificate No. : 23BCI0114
 Description : Semi-micro Balance Issued Date : Friday, March 03, 2023
 Serial Number : 0033108993 Reference No. : 204833
 ID No. : RYG_EN0004
 Manufacturer : Sartorius Page No. : 3 of 3

Calibration Results : Without Adjustment

Repeatability				Eccentricity (Off-center loading error)			
The reproducibility is the ability of a weighing instrument to display nearly identical readings under consistent test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.				The off-center loading error is yielded by the difference between the resultant 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 R110).			
Nominal Value (Low Load)	100.0000	100.0000		Nominal value	50	9	
g	100.0000	100.0000		Tolerance	0.00015	9	
Tolerance	0.000015	100.0000					
0.000015 g	100.0000	100.0000					
	100.0000	100.0000					
Nominal Value (High Load)	100.0000	100.0000					
100 g	100.0001	100.0001					
Tolerance	100.0000	100.0000					
0.000015 g	100.0000	100.0000					
	100.0000	100.0000					
Standard Deviation	0.00003						
Linearity				Linearity			
The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.				The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.			
Tolerance	0.0001	g		Tolerance	0.0001	g	
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Nominal Value	Conventional Mass Value	Displayed Value	Deviation
(g)	(g)	(g)	(g)	(g)	(g)	(g)	(g)
65	65.0000	65.0000	0.0000	65	65.0000	65.0000	0.0000
70	70.0000	70.0000	0.0000	70	70.0000	70.0000	0.0000
75	75.0000	75.0000	0.0000	75	75.0000	75.0000	0.0000
80	80.0000	80.0000	0.0000	80	80.0000	80.0000	0.0000
85	85.0001	85.0001	0.0000	85	85.0001	85.0001	0.0000
90	90.0001	90.0001	0.0000	90	90.0001	90.0001	0.0000
95	95.0001	95.0001	0.0000	95	95.0001	95.0001	0.0000
100	100.0000	100.0000	0.0000	100	100.0000	100.0000	0.0000
110	110.0000	110.0000	0.0000	110	110.0000	110.0000	0.0000
120	120.0000	120.0000	0.0000	120	120.0000	120.0000	0.0000

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Srinthorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACC23005
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-75
Serial No. : 35002736
ID No. : RYG_FS0496

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 : 06 JANUARY 2023
Calibration Date : 17 JANUARY 2023
Date of Issue : 19 JANUARY 2023

Calibrated by : Nathakorn 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.

QF-TS12-04-04-020664

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACC23005
Job No. : VC66AC0024
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL-BP_04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL-BP_03/0265	09-Feb-23
Digital Multimeter	33461A	MY60024273	EEL-BP_05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KA1	34560495	AA-3005-22	22-Feb-23
Audio Analyzer	AVR-3360A	V744B6069	EF-0010-22	07-Feb-23

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

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

3.1 National Institute of Metrology (Thailand).

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

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Srinthorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL23081
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00296518 / 66239 / 34375
ID No. : RYG_FS0431

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 : 24 JANUARY 2023
Calibration Date : 25-26 JANUARY 2023
Date of Issue : 27 JANUARY 2023

Calibrated by : Nathakorn 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.

QF-TS12-04-04-020664

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACC23005
Job No. : VC66AC0024
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit (dB)
94	93.98	-0.02	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1000.0	0.0	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
0.35	0.10	3.0

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

End of Calibration Certificate

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23081
Job No. : VC66AC0031
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Antecholch 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-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

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).

Continuation of Calibration Certificate

Cert. No. : ACL23081
Job No. : VC66AC0031
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	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

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T. Petch

QF-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23081
Job No. : VC66AC0031
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
21.7

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

Frequency Weighting	Measured value (dB)
A - weight	13.1
C - weight	19.0
Flat	24.7

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.0	0.0	0.0	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	-0.4	-0.3	-0.3	± 5.0

Continuation of Calibration Certificate

Cert. No. : ACL23081
Job No. : VC66AC0031
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

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T. Petch

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T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23081
Job No. : VC66AC0031
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	53.9	-0.1	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	38.9	-0.1	±1.1
34.0	33.9	-0.1	±1.1
30.0	29.9	-0.1	±1.1
29.0	28.9	-0.1	±1.1
28.0	27.8	-0.2	±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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7. Petch -

Continuation of Calibration Certificate

Cert. No. : ACL23081
Job No. : VC66AC0031
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	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
SEL	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.8	-0.6	±3.0

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

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7. Petch -

Continuation of Calibration Certificate

Cert. No. : ACL23081
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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

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY451-451/1 Sirinthorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL23081
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00296517 / 135220 / 87527
ID No. : RYG_FS0434

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 : 24 JANUARY 2023
Calibration Date : 25-26 JANUARY 2023
Date of Issue : 27 JANUARY 2023

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.

QF-TS12-04-04-020664

7. Petch -

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23080
Job No. : VC66AC0031
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

T. Petcha-

Continuation of Calibration Certificate

Cert. No. : ACL23080
Job No. : VC66AC0031
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
17.1

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

Frequency Weighting	Measured value (dB)
A - weight	14.2
C - weight	19.9
Flat	25.5

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	-1.5	-1.4	-1.4	± 5.0

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T. Petcha-

Continuation of Calibration Certificate

Cert. No. : ACL23080
Job No. : VC66AC0031
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	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

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T. Petcha-

Continuation of Calibration Certificate

Cert. No. : ACL23080
Job No. : VC66AC0031
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

QF-TS12-04-04-020664

T. Petcha-

Continuation of Calibration Certificate

Cert. No. : ACL23080
Job No. : VC66AC0031
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

Continuation of Calibration Certificate

Cert. No. : ACL23080
Job No. : VC66AC0031
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, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
SEL	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.2	-0.2	±3.0

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

QF-TS12-04-04-020664

T. Petchum

QF-TS12-04-04-020664

T. Petchum

Continuation of Calibration Certificate

Cert. No. : ACL23080
Job No. : VC66AC0031
Pages : 8 of 8

11. Overload Indication

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

12. High level stability

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

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

End of Calibration Certificate

451-451/1 Srinthom Rd, Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL23078
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00296515 / 179119 / 87526
ID No. : RYG_FS0432

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KJWAENG 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 : 24 JANUARY 2023
Calibration Date : 25-26 JANUARY 2023
Date of Issue : 27 JANUARY 2023

Calibrated by : Nathakorn Pisutpaisan

Approved by : T. Petchum
(Thanakul Petchum)

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

QF-TS12-04-04-020664

T. Petchum

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23078
Job No. : VC66AC0031
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL-BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL-BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL-BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23078
Job No. : VC66AC0031
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.6

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

Frequency Weighting	Measured value (dB)
A - weight	11.6
C - weight	17.7
Flat	23.4

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.0	0.0	0.0	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	-0.4	-0.3	-0.3	± 5.0

QF-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23078
Job No. : VC66AC0031
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	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

QF-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23078
Job No. : VC66AC0031
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	0.0	±2.0
125	0.0	0.1	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	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

QF-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23078
Job No. : VC66AC0031
Pages : 6 of 8

7. Level linearity on the reference level range

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

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T. Petchum

Continuation of Calibration Certificate

Cert. No. : ACL23078
Job No. : VC66AC0031
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, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.2	-0.2	±3.0

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

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T. Petchum

Continuation of Calibration Certificate

Cert. No. : ACL23078
Job No. : VC66AC0031
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11. Overload Indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.7	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

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY451-451/1 Sirinthorn Rd, Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL23079
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00296516 / 180412 / 88182
ID No.: RYG_FS0433

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 : 24 JANUARY 2023
Calibration Date : 25-26 JANUARY 2023
Date of Issue : 27 JANUARY 2023

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchum
(Thanakul Petchumai)

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

QF-TS12-04-01-020664

T. Petchum

QF-TS12-04-01-020664

Continuation of Calibration Certificate

Cert. No. : ACL23079
Job No. : VC66AC0031
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anchoic 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-0007-22	04-Feb-23
Waveform Generator	33511B	MYS2302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MYS3220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MYS3220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

7. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23079
Job No. : VC66AC0031
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	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	17.5
Flat	23.3

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.0	0.1	0.1	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	0.4	0.5	0.4	± 5.0

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7. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23079
Job No. : VC66AC0031
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	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

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7. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23079
Job No. : VC66AC0031
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long-term stability

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

QF-TS12-04-04-020664

7. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23079
Job No. : VC66AC0031
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	29.8	-0.2	±1.1
29.0	28.8	-0.2	±1.1
28.0	27.8	-0.2	±1.1
27.0	26.9	-0.1	±1.1
26.0	25.8	-0.2	±1.1
25.0	24.8	-0.2	±1.1

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T. Petchum

Continuation of Calibration Certificate

Cert. No. : ACL23079
Job No. : VC66AC0031
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, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	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	-
One	136.4	136.3	-0.1	±3.0

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

QF-TS12-04-04-020664

T. Petchum

Continuation of Calibration Certificate

Cert. No. : ACL23079
Job No. : VC66AC0031
Pages : 8 of 8

11. Overload Indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.7	0.2	±1.5

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-04-020664

T. Petchum

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY451-451/1 Sirinthorn Rd, Bangbunmu, Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiphorn.com http://www.sithiphorn.comCert. No. : ACC23089
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No. : 34178121
ID No. : RYG_FS0213

Condition As Found : GOOD

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

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

Received Date : 24 JANUARY 2023
Calibration Date : 26 JANUARY 2023
Date of Issue : 27 JANUARY 2023

Calibrated by : Nathakorn Pisupaisan

Approved by : T. Petchum
(Thanakul Petchum)

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QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACC23009
Job No. : VC66AC0031
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY52302742	EE-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	33461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KA1	34560495	AA-3005-22	22-Feb-23
Audio Analyzer	AVR-3360A	V744D6069	EF-0010-22	07-Feb-23

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).

Continuation of Calibration Certificate

Cert. No. : ACC23009
Job No. : VC66AC0031
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit (dB)
94	94.16	0.16	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1003.2	0.3	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
1.97	0.10	3.0

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

- End of Calibration Certificate -

QF-TS12-04-04-020664

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY451-451/1 Sirinthorn Rd., Bangumru, Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL22296
Pages : 1 of 9

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-21 / Microphone UC-52 / Preamplifier NH-21
Serial No. : 00376364 / 71486 / 23142
ID No. : RYG_FS0012

Condition As Found : GOOD

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

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

Received Date : 07 DECEMBER 2022
Calibration Date : 16-20 DECEMBER 2022
Date of Issue : 21 DECEMBER 2022

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.

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22296
Job No. : VC66AC0016
Pages : 2 of 9

Calibration Procedure : CP-AC-02

Calibration Method :

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

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EE-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	8846A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KA1	34560495	AA-3005-22	22-Feb-23

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22296
Job No. : VC66AC0016
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Summary of Measurement Result :

Parameter	Pass	Fail	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

QF-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL22296
Job No. : VC66AC0016
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Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
24.0

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

Frequency Weighting	Measured value (dB)
A - weight	22.2
C - weight	21.9
Flat	21.6

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	0.0	0.1	0.1	±1.5
1000	0.0	0.0	0.0	±1.0
8000	0.2	0.4	0.4	±5.0

QF-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL22296
Job No. : VC66AC0016
Pages : 5 of 9

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	±0.2
Flat	94.1	0.1	±0.2

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

QF-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL22296
Job No. : VC66AC0016
Pages : 6 of 9

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
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

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T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL22296
Job No. : VC66AC0016
Pages : 7 of 9

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	±0.5
120	94.0	94.0	0.0	±0.5
110	94.0	94.0	0.0	±0.5
100	94.0	94.0	0.0	±0.5
90	94.0	94.0	0.0	±0.5

Level linearity on each level range

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	43.0	43.0	0.0	±0.5
120	33.0	33.0	0.0	±0.5

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	108.0	0.0	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	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

Continuation of Calibration Certificate

Cert. No. : ACL22296
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10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepenk (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
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	-
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	Value (dB)	Limits (dB)
89.4	89.2	-0.2	±1.5

QT-TS12-04-04-020664

T. Petch...

Continuation of Calibration Certificate

Cert. No. : ACL22296
Job No. : VC66AC0016
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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 a calculation, providing a level of confidence of approximately 95 %

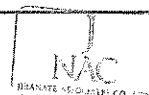
End of Calibration Certificate

QT-TS12-04-04-020664

T. Petch...

63/14 15,67/35 36, Soi Petchkasem 7,7/1, Petchkasem Rd,
Wattapra, Bangkokkyol, Bangkok 10600 Thailand.
Tel: (66) 02-8680812#13 Fax: (66) 02-8680860 www.jiranalee.com

CERTIFICATE OF CALIBRATION

Certificate No : CL-035-66
Page 1 of 2Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 16006713
ID No: RYG_FS0218Received date: 07 Feb 2023
Calibration date: 14 Feb 2023
Issue date: 14 Feb 2023Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khuang Sun Luang, Khet Sun Luang, Bangkok
10250 ThailandReference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00891 Due date: 22 July 2023Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (55±15)%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.Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22Calibrated by
☐ Mr. Sorawit Thachalsad
☒ Miss Jitraporn LertsompholApproved Signatory: Mr. Parinya Booncharoen
Calibration Department Manager

QT-TS12-04-04-020664

T. Petch...

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 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.063	20.1	0.0	0.099
60	25.059	25.1	0.0	0.099
90	30.051	30.1	0.0	0.099
60	35.050	35.1	0.1	0.099
60	40.048	40.2	0.2	0.099

Table 2: 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)
70	20.063	20.3	0.2	0.099
70	25.059	25.1	0.0	0.099
70	30.051	30.0	-0.1	0.099
70	35.051	34.9	-0.2	0.099
70	40.048	39.8	-0.2	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 22035462.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.063	20.1	0.0	0.099
110	25.059	25.1	0.0	0.099
110	30.051	30.2	0.1	0.099
110	35.051	35.2	0.1	0.099
110	40.048	40.2	0.2	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

Certificate No.: CL-162-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 15030244
ID No: RYG_F50236

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

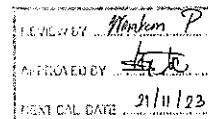
Received date: 15 Nov 2022
Calibration date: 21 Nov 2022
Issue date: 23 Nov 2022

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
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)%


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.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22



Calibrated by
☒ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol



Approved Signatory: 
Mr. Pannya Booncharoen
Calibration Department Manager

THIS CERTIFICATE REPORT 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: 20030506.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.062	20.1	0.0	0.099
30	25.050	25.1	0.1	0.099
30	30.044	30.1	0.1	0.099
30	35.035	35.1	0.1	0.099
30	40.031	40.1	0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15033223.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.064	20.1	0.0	0.099
70	25.049	24.9	-0.1	0.099
70	30.042	29.7	-0.3	0.099
70	35.035	34.5	-0.5	0.099
70	40.032	39.4	-0.6	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 17000664.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.064	20.0	-0.1	0.099
110	25.050	25.0	-0.1	0.099
110	30.042	30.0	0.0	0.099
110	35.034	35.0	0.0	0.099
110	40.031	40.0	0.0	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

Certificate No.: CL-012-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 1B018311
ID No: RYG_F90356

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

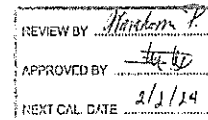
Received date: 23 Jan 2023
Calibration date: 02 Feb 2023
Issue date: 06 Feb 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
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)%


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.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22



Calibrated by
☒ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol



Approved Signatory: 
Mr. Pannya Booncharoen
Calibration Department Manager

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HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.



63/14-15,67/35-36, Soi Petchkasem 7/71, Petchkasem Rd,
Wathapra, Banghohyal, Bangkok 10600 Thailand.
Tel: (66) 02-8680812#13 Fax: (66) 02-8680860 www.jiranatee.com



Certificate No.: CL-012-66
Page 2 of 2

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: 18021466.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.055	20.0	-0.1	0.099
60	25.048	25.0	0.0	0.099
60	30.039	30.0	0.0	0.099
60	35.030	35.0	0.0	0.099
60	40.016	40.0	0.0	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 18021258.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.057	20.2	0.1	0.099
70	25.048	25.1	0.1	0.099
70	30.039	30.0	0.0	0.099
70	35.029	35.0	0.0	0.099
70	40.015	39.9	-0.1	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 18020493.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.056	20.1	0.0	0.099
110	25.047	25.1	0.1	0.099
110	30.039	30.1	0.1	0.099
110	35.028	35.1	0.1	0.099
110	40.015	40.1	0.1	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 ★



63/14-15,67/35-36, Soi Petchkasem 7/71, Petchkasem Rd,
Wathapra, Banghohyal, Bangkok 10600 Thailand.
Tel: (66) 02-8680812#13 Fax: (66) 02-8680860 www.jiranatee.com



CERTIFICATE OF CALIBRATION

Certificate No.: CL-013-66
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Oita OHM
Model: HD32.2
Serial No: 18018312
ID No: RYG_FS0357

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwang Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 23 Jan 2023
Calibration date: 02 Feb 2023
Issue date: 06 Feb 2023

Reference Used During Calibration

1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
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)%

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.

Traceability

The measurement results are traceable to the
International system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22

REVIEW BY	<i>Manom P.</i>
APPROVED BY	<i>Manom P.</i>
NEXT CAL DATE	2/2/24

Calibrated by
☒ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol



Approved Signatory: *Manom P.*
Mr. Parinya Booncharoen
Calibration Department Manager

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TION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.



63/14-15,67/35-36, Soi Petchkasem 7/71, Petchkasem Rd,
Wathapra, Banghohyal, Bangkok 10600 Thailand.
Tel: (66) 02-8680812#13 Fax: (66) 02-8680860 www.jiranatee.com



Certificate No.: CL-013-66
Page 2 of 2

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: 18021464.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.061	20.0	-0.1	0.099
60	25.047	25.0	0.0	0.099
60	30.040	30.0	0.0	0.099
60	35.034	35.0	0.0	0.099
60	40.020	40.0	0.0	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 18021263.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.060	20.1	0.0	0.099
70	25.048	25.0	0.0	0.099
70	30.040	29.9	-0.1	0.099
70	35.034	34.9	-0.1	0.099
70	40.021	39.8	-0.2	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 18020495.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.060	20.1	0.0	0.14
110	25.047	25.0	0.0	0.099
110	30.040	30.0	0.0	0.099
110	35.034	35.0	0.0	0.099
110	40.020	40.0	0.0	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 ★



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CERTIFICATE OF CALIBRATION

Certificate No.: CL-014-66
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Oita OHM
Model: HD32.2
Serial No: 18018313
ID No: RYG_FS0358

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwang Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 23 Jan 2023
Calibration date: 02 Feb 2023
Issue date: 06 Feb 2023

Reference Used During Calibration

1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
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)%

Calibration Procedure

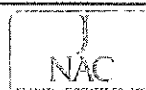
The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability

The measurement results are traceable to the
International system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22

REVIEW BY	<i>Manom P.</i>
APPROVED BY	<i>Manom P.</i>
NEXT CAL DATE	2/2/24

Calibrated by
☒ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol



Approved Signatory: *Manom P.*
Mr. Parinya Booncharoen
Calibration Department Manager

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TION 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: 18021467.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.055	20.1	0.0	0.099
60	25.048	25.1	0.1	0.099
60	30.039	30.1	0.1	0.099
60	35.029	35.1	0.1	0.099
60	40.018	40.1	0.1	0.099

Table 2: 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)
70	20.051	20.2	0.1	0.099
70	25.051	25.1	0.0	0.099
70	30.039	30.0	0.0	0.099
70	35.029	35.0	0.0	0.099
70	40.021	39.9	-0.1	0.099

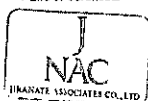
Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 18020497.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.053	20.1	0.0	0.099
110	25.050	25.1	0.1	0.099
110	30.038	30.1	0.1	0.099
110	35.029	35.1	0.1	0.099
110	40.020	40.1	0.1	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

Certificate No.: CL-015-66
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 18018314
ID No: RYG_FS0359

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanasak 40, Phatthanasak Rd.,
Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 23 Jan 2023
Calibration date: 02 Feb 2023
Issue date: 06 Feb 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No: 667682-09, Due date: 23 Mar 2023
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)%

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.

Traceability
The measurement results are traceable to the
International system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22

REVIEW BY	<i>Phanlorn P.</i>
APPROVED BY	<i>Mr. P.</i>
NEXT CAL. DATE	2/2/24

Calibrated by
☒ Mr. Sorawit Theachalad
☐ Miss Jitratporn Lertsomphol



Approved Signatory: *Mr. P.*
Mr. Parinya Booncharoen
Calibration Department Manager

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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 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.061	20.0	-0.1	0.099
60	25.048	25.0	0.0	0.099
60	30.045	30.0	0.0	0.099
60	35.030	35.0	0.0	0.099
60	40.021	40.0	0.0	0.099

Table 2: 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)
70	20.062	20.1	0.0	0.099
70	25.048	24.9	-0.1	0.099
70	30.040	29.9	-0.1	0.099
70	35.032	34.8	-0.2	0.099
70	40.021	39.8	-0.2	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 20008280.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.060	20.0	-0.1	0.099
110	25.050	25.1	0.1	0.099
110	30.039	30.1	0.1	0.099
110	35.032	35.1	0.1	0.099
110	40.022	40.1	0.1	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

Certificate No.: CL-016-66
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 18018316
ID No: RYG_FS0360

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanasak 40, Phatthanasak Rd.,
Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 23 Jan 2023
Calibration date: 03 Feb 2023
Issue date: 06 Feb 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No: 667682-09, Due date: 23 Mar 2023
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)%

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.

Traceability
The measurement results are traceable to the
International system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22

REVIEW BY	<i>Phanlorn P.</i>
APPROVED BY	<i>Mr. P.</i>
NEXT CAL. DATE	2/2/24

Calibrated by
☒ Mr. Sorawit Theachalad
☐ Miss Jitratporn Lertsomphol



Approved Signatory: *Mr. P.*
Mr. Parinya Booncharoen
Calibration Department Manager

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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: 18021471.
Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.061	20.0	-0.1	0.099
60	25.053	25.0	-0.1	0.099
60	30.042	30.0	0.0	0.099
60	35.029	35.0	0.0	0.099
60	40.014	40.0	0.0	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 18021266.
Dimension: Diameter 14 mm, Length 150 mm.

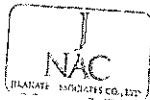
Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.062	20.1	0.0	0.099
70	25.053	25.0	-0.1	0.099
70	30.043	30.0	0.0	0.099
70	35.030	34.9	-0.1	0.099
70	40.015	39.9	-0.1	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 18020502.
Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.059	20.1	0.0	0.099
110	25.053	25.1	0.0	0.099
110	30.044	30.1	0.1	0.099
110	35.029	35.1	0.1	0.099
110	40.017	40.1	0.1	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

Certificate No.: CL-042-66
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Doka OHM
Model: HD32.2
Serial No: 20032240
ID No: RYG_FS0520

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: 21 Feb 2023
Calibration date: 24 Feb 2023
Issue date: 28 Feb 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667882-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI 1000-A MK
II, Serial No.: 671407-0091 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (55±15)%

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.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22

Calibrated by
☒ Mr. Sotawit Thachalid
☒ Miss Jitraporn Lertsomphol



Approved Signatory: *P. Booncharoen*
Mr. Panya Booncharoen
Calibration Department Manager

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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: 21001213.
Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.064	20.1	0.0	0.099
60	25.061	25.2	0.1	0.099
60	30.054	30.2	0.1	0.099
60	35.046	35.2	0.2	0.099
60	40.045	40.2	0.2	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 21001790.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.064	20.1	0.0	0.099
70	25.061	24.9	-0.2	0.099
70	30.054	29.9	-0.2	0.099
70	35.046	34.8	-0.2	0.099
70	40.045	39.7	-0.3	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 21001245.
Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.064	20.1	0.0	0.099
110	25.061	25.1	0.0	0.099
110	30.054	30.1	0.0	0.099
110	35.045	35.1	0.1	0.099
110	40.045	40.1	0.1	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 ★



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL: 0-2717-9664-75 FAX: 0-2719-4454



Cert.No.: 23CH275
Page: 1 of 3

Certificate of Calibration

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : SevenCompact S220
Serial No. : C104059460
ID No. : RYG_EN0183

Condition As-Received: Used Item

Received Date : 24 February 2023

Calibration Date : 27 February 2023

Reference : 2302-0866DSC-2

Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
(Rayong Branch)
816/10 Moo 5, T. Maenam Khu, A. Phusakaeng,
Rayong 21140, Thailand

Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %

Calibration Procedure :
In-house method :
- CP-CHS by direct measurement with standard
voltage calibrator and direct measurement with
certified reference material (CRM)
- CP-CHS by comparison with standard thermometer

Calibrated by : Watalak Sinihaen

Approved by : *Sathip*
Approved Signatory

() Malee Butkruea
(✓) Sathip Meangmai
() Warakorn Lertagatrakul

Issue Date : 28 February 2023
The Uncertainties are for a confidence probability of approximately 95%

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Approval of the Head of Corporate Services & Equipment Calibration and Testing Services



Cert.No.: 23CH275
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	22E2769	24 Aug 2023
2) Ref. Standard Thermometer	4982054	110RC044	22H1306	27 Oct 2023

This certification is traceable to the International System of Unit maintained at:-
- Traceable to National Institute of Metrology (Thailand), NIMT

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	826588	09 July 2024
pH 6.987	CPA chem	826589	09 July 2023
pH 10.010	CPA chem	863835	28 Dec 2023

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 (\pm mV)	Coverage factor k
			mV	pH		
pH Meter S/N: C104059460	4.000	177.48	177.4	4.000	0.058	2.00
	7.000	0.00	-0.1	7.000	0.058	2.00
	10.000	-177.48	-177.5	10.000	0.058	2.00

Sailip

a 1149925



Cert.No.: 23CH275
Page: 3 of 3

Calibration Results

Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (\pm)	Coverage factor k
pH Electrode S/N: 1453404	4.008	4.008	179.1	0.0046	2.00
	6.987	6.988	4.7	0.0084	2.00
	10.010	10.013	-172.4	0.0089	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model :	InLabExpert Pro-ISM
- Serial No. :	1453404
- Dimension of probe :	
- Length :	120 mm.
- Diameter :	12 mm.
- Immersion Depth :	100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (\pm °C)	Coverage factor k
25.0	25.001	24.8	-0.201	0.13	2.00

Remark :- UUC* = Unit Under Calibration

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

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Sailip

a 1149924



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND)-JAPAN
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/44 DATTAJAKARN ROAD SOI 18, SUKHUMVIT, SUKHUMVIT, BANGKOK 10250
TEL. 0-2319-3006-24 FAX. 0-2319-9448



Certificate of Calibration

Certificate No.: 23E753
Page: 1 of 2

Equipment :	pH Meter	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
Manufacturer :	Mettler Toledo	
Model :	SevenCompact S220	
Serial No. :	C104059480	
ID No. :	RYG_EN0183	
Condition As-Received :	Used Item	
Received Date :	24 February 2023	
Calibration Date :	28 February 2023	
Reference :	2302-0886DSC	Submitted by: ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
Ambient Temperature :	(23 ± 2) °C	616/10 Moo 5, T.Mae Nam Khu, A Phukdaeng,
Relative Humidity :	(50 ± 10) %	Rayong 21140, Thailand

Procedure used: Calibration were conducted using In-house calibration Procedure CP-E17 According to direct measurement method with Multi-Product Calibrator.

Condition of this result of calibration

1. Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Multi-Product Calibrator	550QA	6440007	22E1670	18 May 2023

2 This result of calibration was made on request of the point specified by customer

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

4 This Certification is traceable to the International System of Unit maintained at:-

- National Institute of Metrology Thailand (NIMT)

Calibrated by: Wutcharoepom Wongchutkrane Approved Signatory: *[Signature]*
Issue Date: 02 March 2023
[] Phatinee Pratsapal
[x] Nuntawat Khanchai
[] Pomsithpa Tameyakul

a 0309672



Cert. No.: 23E753
Page: 2 of 2

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

Function:	DC voltage measurement	Range:	2000 mV	
	Standard Value	UUC* Reading	Error	Uncertainty
	(mV)	(mV)	(mV)	(\pm μ V)
	-200.0000	-200.0	0.0	72
	-150.0000	-150.0	0.0	69
	-100.0000	-100.0	0.0	65
	-50.0000	-50.0	0.0	62
	0.0000	0.0	0.0	58
	50.0000	50.0	0.0	62
	100.0000	99.9	-0.1	65
	150.0000	149.9	-0.1	69
	200.0000	199.9	-0.1	72

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

UUC* = Unit Under Calibration.

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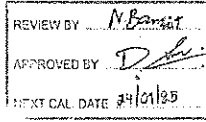
a 1150477



Cert.No.: 23TW168
Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102798
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 Butkuea
(✓) Sathip Meangmal
() Warakorn Lemgagrakul

Issue Date : 26 July 2023

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	-	139BU10	23CG1172	22 Mar 2025
2) Balance	1125143764	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) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (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

-o0o-

B 0320211

a 1172155



Cert. No.: 23LM125
Page.: 1 of 2

Certificate of Calibration

Equipment : DO Meter with Sensor
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102798
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 Hahib

Approved by :
Approved Signatory

() Pornthippa Tamayakul
() Malee Butkuea
(✓) 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



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-DT01 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: 1226475367

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
20.00	100	20.011	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 0053516

a 1159515



Cert. No.: 23TM962
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. Pluakdaeng, Rayong 21140 Thailand
Location: BOD Room
Received Order: 29 May 2023
Calibration Date: 29 May 2023
Ambient Temperature: (26 ± 10) °C
Relative Humidity: (50 ± 30) %

Calibrated by: Man Paltanapongpaiboon

Approved by:
Approved Signatory

() Pornthipha Tameyakul
() Malesa Butkrua
(x) Suwit Imjai

Issue Date: 7 June 2023

The Uncertainties are for a confidence probability of approximately 95%

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A 0054967



Equipment: Low Temp. Incubator
Condition As-Received: Used Item
Reference: 2305-08980C-2
Procedure Used: -

Cert. No.: 23TM962
Page: 2 of 3

Calibration were conducted using calibration procedure CP-OT02 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	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY57013711	22LM93	02 Jul 2023

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

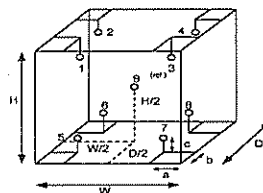
3. This certification is traceable to the International System of Unit.

Result of Calibration:-

(*) Without Adjustment

Function of UUC*: Temperature Source

Fresh air setting: Close



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 = 0.75 m³

Environment during calibration		
	Beginning	Finished
Temp. (°C)	23	23
REL.Humid. (%)	54	56
AC Supply (Volt)	223	222

Position:	Ref. Std. ID No.:
1	18-18RTD-01
2	18-18RTD-02
3	18-18RTD-03
4	18-18RTD-04
5	18-18RTD-05
6	18-18RTD-10
7	18-18RTD-07
8	22-18RTD-08
9 (ref.)	18-18RTD-09

a 1165130

RYG_EN0002



Equipment: Low Temp. Incubator
Condition As-Received: Used Item
Reference: 2305-08980C-2
Result of Calibration: (*) Without Adjustment
Function of UUC*: Temperature Source
Fresh air setting: Close

Cert. No.: 23TM962
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	0.019	0.72	1.0	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	19.547	19.780	19.487	19.529	19.408	20.139	20.112	20.406	20.116	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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Sartorius (Thailand) Co., Ltd.
124 Rama 9 Road, Huaywang, Huaywang, Bangkok 10310
Tel: +66 2843 8361-6, e-mail: service.thailand@sartorius.com



SARTORIUS

Certificate of Calibration

Model Number: MSE224S-100-DU
Description: Analytical Balance
Serial Number: 0026207038
ID No.: RYG_EN0002
Manufacturer: Sartorius

Certificate No.: 23BCI0112
Issued Date: Friday, March 03, 2023
Reference No.: 204833

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 Intana

Calibration Date: Wednesday, March 01, 2023

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

Ambients Conditions:

Temperature: 23.6 °C ± 5.0 °C
Humidity: 60.0 % RH ± 10.0 % RH
Pressure: ±

Reasons for calibration

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

Equipment Condition:

☒ Good Operate ☐ Fair

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	SPC-RT	C02212565	14-Sep-2023
MHB-382SD	Humidity/Barometer/Temp. Lutron MHB-382SD	DKSH	C19220444	6-Sep-2023

This certificate relate and apply this equipment only

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Mr. Chonchai Intana (Technical Manager)

SOP FM 33 03 February 2022

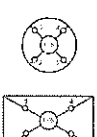


a 1165129

Certificate of Calibration

Model Number : MSE224S-100-DU Certificate No. : 23BC0112
Description : Analytical Balance Issued Date : Friday, March 03, 2023
Serial Number : 0025297038 Reference No. : 204833
ID No. : RYG_EN0002
Manufacturer : Sartorius Page No. : 2 of 2

Calibration Results : Without Adjustment

Repeatability <i>The repeatability is the ability of a weighing instrument to display nearly identical readings under identical test conditions when the same load within a measurement range is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.</i>			Eccentricity (Off-center loading error) <i>The off-center loading error is yielded by the difference between the result of the load, i.e. 1/10 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R110).</i>		
Nominal Value : (Low Load)	20.0000	199.9999	Nominal value :	100	g
20 g	20.0000	200.0000	Tolerance	0.0004	g
Tolerance	20.0000	199.9999			
0.0001 g	20.0000	200.0000			
	20.0000	199.9999			
Nominal Value : (High Load)	20.0000	199.9999			
200 g	19.9999	200.0000			
Tolerance	20.0000	200.0000			
0.0001 g	20.0000	199.9999			
	20.0000	200.0000			
Standard Deviation	0.00003	0.00005			

Linearity <i>The linearity also called linearity error. Describes the deviation of the characteristic curve of a weighing instrument from the linear slope.</i>		
Tolerance	0.0002 g	
Nominal Value	Conventional Mass Value	Displayed Value
(g)	(g)	(g)
0.01	0.0100	0.0100
0.05	0.0500	0.0500
0.1	0.1000	0.1000
0.5	0.5000	0.5000
1	1.0000	1.0000
5	5.0000	5.0000
10	10.0000	10.0001
20	20.0000	20.0000
50	50.0000	50.0000
100	100.0000	99.9999
200	200.0000	200.0000
End of Report		

SOP FM 33 03 February 2022



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CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
534-4 PATTANAKARN ROAD 508 18, SI LANLUANG, SUANLUANG BANGKOK 10250
TEL: 0-2717-1000-27 FAX: 0-2710-9484



Cert. No.: 22TM1517
Page : 1 of 3

Certificate of Calibration

Equipment : Hot Air Oven
Manufacturer : Memmert
Model : UFE 500
Serial No. : G511.1672
ID No. : RYG_EN0010
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
618/10 Moo 5 T. Maenam Khu,
A. Phukdaeng,
Rayong 21140 Thailand
Location : Oven Room
Received Order : 20 October 2022
Calibration Date : 20 October 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Man Pattanapongsaiboon

REVIEW BY : *Man*
APPROVED BY : *Man*
NEXT CAL DATE : 20/04/24

Approved by : *Man*
Approved Signatory
() Pornthippa Tameyakul
() Malee Butkruea
() Suwit Injai

Issue Date : 2 November 2022

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services & Equipment Calibration and Testing Services

A 0046908



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2210-0376OC-2

Cert. No.: 22TM1517
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	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY46023932	22LM97	29 Jul 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.

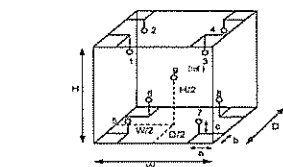
Result of Calibration :- () Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	25	25
REL Humid. (%)	54	59
AC Supply (Volt)	223	225

Ref. Std. ID No.: @ Calibration Point		
Position :	(180) °C	(104) °C
1	21-16TC-01	20-16RTD-01
2	21-16TC-02	20-16RTD-02
3	21-16TC-03	20-16RTD-03
4	21-16TC-04	20-16RTD-04
5	21-16TC-05	22-16RTD-05
6	21-16TC-06	20-16RTD-06
7	21-16TC-07	20-16RTD-07
8	21-16TC-08	22-16RTD-08
9 (ref.)	21-16TC-09	22-16RTD-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 : 2210-0376OC-2

Cert. No.: 22TM1517
Page : 3 of 3

Result of Calibration : () Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
104.0	104.0	104.0	0.076	0.52	0.60	0.42	2
180.0	180.0	180.0	0.13	0.88	1.2	1.1	2

Measured Temperature (°C)									
Calibration Point (°C)	1	2	3	4	5	6	7	8	9 (ref.)
104.0	103.768	103.734	103.723	103.800	104.215	104.131	104.132	103.740	103.747
180.0	179.723	179.359	179.439	179.489	180.361	180.114	180.131	180.243	179.605

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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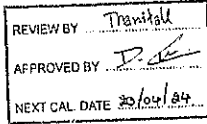
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TEL. 0-2717-3000-27 FAX. 0-2719-9184



Cert. No.: 22TM1492
Page: 1 of 3

Certificate of Calibration

Equipment: Hot Air Oven
Manufacturer: Memmert
Model: UM 400
Serial No.: b495.0699
ID No.: RYG_EN0006
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: 20 October 2022
Calibration Date: 20 October 2022
Ambient Temperature: $(26 \pm 10) ^\circ\text{C}$
Relative Humidity: $(50 \pm 30) \%$
Calibrated by: Preecha Hahib
Approved by:
() Pornthippa Tameyakul
() Maloo Bulkruea
() Suwit Imjai



Issue Date: 2 November 2022

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services & Equipment Calibration and Testing Services

A 0046905



Equipment: Hot Air Oven
Condition As-Received: Used Item
Reference: 2210-0376OC-1
Procedure Used:-

Cert. No.: 22TM1492
Page: 2 of 3

Calibration were conducted using calibration procedure CP-OT02 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	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY44035217	21LM30	23 Dec 2022

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

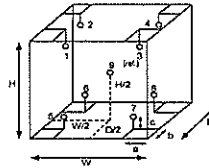
3. This certification is traceable to the International System of Unit.

Result of Calibration:- () Without Adjustment

Function of UUC*: Temperature Source

Fresh air setting: Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	28	29
REL.Humid. (%)	43	47
AC Supply (Volt)	220	221



Probe Installation Details: Dimension of Chamber:
a = 5.0 cm D = 0.33 m
b = 5.0 cm W = 0.40 m
c = 5.0 cm H = 0.40 m
Capacity = 0.053 m³

Position:	Ref. Std. ID No.:
1	18-10RTD-01
2	18-10RTD-02
3	18-10RTD-03
4	18-10RTD-04
5	18-10RTD-05
6	18-10RTD-06
7	18-10RTD-07
8	18-10RTD-08
9 (ref.)	18-10RTD-09

a 1132473

RYG_EN00061



Equipment: Hot Air Oven
Condition As-Received: Used Item
Reference: 2210-0376OC-1
Result of Calibration: () Without Adjustment
Function of UUC*: Temperature Source
Fresh air setting: Close

Cert. No.: 22TM1492
Page: 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
70.0	70.0	70.0	0.079	0.47	0.77	0.42	2

Measured Temperature (°C)									
Calibration Point (°C)	Position								
70.0	1	2	3	4	5	6	7	8	9 (ref.)
	70.262	69.995	70.079	70.177	70.664	70.039	70.688	70.149	70.328

Average*: The average of 30 values in each position.

Temperature stability: One-half of the greatest maximum difference of measured temperature at any one sense
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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a 1132472



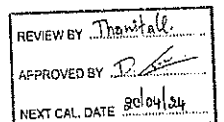
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TEL. 0-2717-3000-27 FAX. 0-2719-9184



Cert. No.: 22TM1491
Page: 1 of 3

Certificate of Calibration

Equipment: Water Bath
Manufacturer: Memmert
Model: WNB22
Serial No.: L513.0648
ID No.: RYG_EN00061
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5, T. Maenam Khu,
A. Pluakdaeng,
Rayong 21140, Thailand
Location: Wat Chemistry Lab
Received Order: 20 October 2022
Calibration Date: 20 October 2022
Ambient Temperature: $(26 \pm 10) ^\circ\text{C}$
Relative Humidity: $(50 \pm 30) \%$
Calibrated by: Preecha Hahib
Approved by:
() Pornthippa Tameyakul
() Maloo Bulkruea
() Suwit Imjai



The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services & Equipment Calibration and Testing Services

A 0046906



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2210-0375OC-4
Procedure Used :-

Cert. No.: 22TM1491
Page : 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT04 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	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY44035217	21LM30	23 Dec 2022

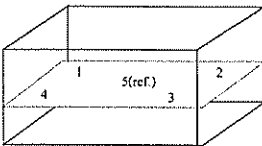
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	24	53	222
Finished of Calibration	24	50	221



Front

Position :	Ref. Std. S/N.:
1	N37P300726
2	N37F300727
3	N37P300728
4	N37P300729
5(ref.)	N37P300730

Walu .

a 1132471



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2210-0375OC-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 22TM1491
Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)				
			Position				
			1	2	3	4	5 (ref.)
85.0	85.0	85.0	84.527	84.563	84.628	84.516	84.580

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor k
85.0	0.12	0.081	0.18	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 %.

-00-

Walu .

a 1132470



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
54/1 PATTANAKARN ROAD SOI 18, SUANLIANG SUANLIANG BANGKOK 10250
TEL 0 2113 84629 FAX 0 2113 0444



Cert.No.: 23CH1088
Page.: 1 of 2

Certificate of Calibration

Equipment : Conductivity Meter
Manufacturer : Mettler Toledo
Model : 5230
Serial No. : B241407147
ID No. : RYG_EN0029
Condition As-Received : Used Item
Received Date : 01 September 2023
Calibration Date : 04 September 2023
Reference : 2309-0010DSC-7
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. Rayong Branch
616/10 Moo 5, T.Maenam Khu,
A.Pluakdaeng, Rayong 21140, Thailand

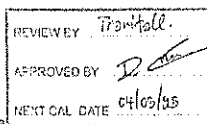
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In-house method :
- CP-CH6 : based on direct measurement by using certified reference material (CRM)

Calibrated by : Warakorn Lemgagrakul

Approved by :

(✓) Saithip Meangmai
() Warakorn Lemgagrakul
() Ponpan Palpim

Issue Date : 7 September 2023



The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services & Equipment Calibration and Testing Services

A 0056059



Cert.No.: 23CH1088
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instrument :-

Instrument	Serial No.	ID No.	Certificate No.	Due date
1) Thermometer	9549224	130RC003	23435	10 Apr 2024

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

2. Certified Reference Materials :-

- Conductivity calibration solution, CPA chem Ltd., The measurement results are traceable to SI through CPA chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Conductivity Solution	Manufacturer	Lot No.	Exp. date
84.000 µS/cm	CPA Chem	885120	28 Mar 2024
1413.0 µS/cm	CPA Chem	913598	14 July 2024
12.880 mS/cm	CPA Chem	885123	28 Mar 2024

- Control Conductivity calibration solution temperature by Water bath (25±0.1) °C

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

Calibration results

Function : Conductivity Measurement

(*) After Adjustment at 1413.0 µS/cm

Conductivity Electrode Serial No.: 5823251000

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement (±)	Coverage factor k
84.000 µS/cm	83.8 µS/cm	85.3 µS/cm	0.62 µS/cm	2.00
1413.0 µS/cm	1388 µS/cm	1413 µS/cm	9.2 µS/cm	2.00
12.880 mS/cm	12.41 mS/cm	12.63 mS/cm	0.086 mS/cm	2.00

Remark : - UUC* = Unit Under Calibration

- Cell constant = 0.545371 cm⁻¹

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

-00-

Saithip

a 1178950



Cert.No.: 23CH442
Page.: 1 of 2

Certificate of Calibration

Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: Seven2Go TM pH/mV S2
Serial No.: C202355606
ID No.: RYG_FS0574
Condition As-Received: Used Item
Received Date: 31 March 2023
Calibration Date: 03 April 2023
Reference: 2303-1133DSC-3
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd. Rayong Branch
616/10 Moo 5, T.Maenam Khu,
A.Pluakdaeng, 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)

Calibrated by: Warakorn Lemgatrakul

Approved by:
Approved Signatory

(/) Malee Bulkruea
() Sathip Meangmal
() Warakorn Lemgatrakul

Issue Date: 5 April 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 0052954



Cert.No.: 23CH442
Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument: -

Instrument: Serial No. ID No. Cert. No. Due Date
1) Document Process Calibrator 54030049 130RC116 22E2769 24 Aug 2023

This certification is traceable to the International System of Unit maintained at:
- Traceable to National Institute of Metrology (Thailand), NIMT

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	863832	28 Dec 2024
pH 6.987	CPA chem	826589	09 July 2023
pH 10.010	CPA chem	863835	28 Dec 2023

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.: C202355606	4.00	177.48	177	4.00	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	10.00	-177.48	-178	10.00	0.58	2.00

Function: pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)		Uncertainty of pH measurement (±)	Coverage factor k
			mV	pH		
pH Electrode S/N.: 2015870	4.008	4.01	170	4.01	0.0071	2.00
	6.987	7.00	-5	7.00	0.011	2.00
	10.010	10.01	-181	10.01	0.0095	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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Wak.

a 1156432



Cert.No.: 23LM86
Page.: 1 of 2

Certificate of Calibration

Equipment: pH Meter with Sensor
Manufacturer: Mettler Toledo
Model: Seven2GoTM pH/mV S2
Serial No.: C202355606
ID No.: RYG_FS0574
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: 31 March 2023
Calibrated Date: 05 April 2023
Ambient Temperature: (28 ± 10) °C
Relative Humidity: (50 ± 30) %
AC Line Voltage: (220 ± 22) V

Calibrated by: Preecha Hahib

Approved by:
Approved Signatory

(/) Ponthipha Temeyakul
(/) Malee Bulkruea
() Suwit Imjai

Issue Date: 21 April 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 0053338



Equipment: pH Meter with Sensor
Condition As-Received: Used Item
Reference: 2303-1133DSC-4

Cert.No.: 23LM86
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: Model Serial No. Cert. No. Due Date
1) Digital Thermometer 1502A A52847 22H325 31 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.

Result of Calibration: () Without Adjustment

Function: Temperature measurement.

This instrument was connected with temperature sensor, S/N.: 2015870

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
25.0	100	25.002	25.1	0.098	0.16	2.00
40.0	100	40.001	40.2	0.199	0.16	2.00
60.0	100	60.005	60.5	0.495	0.16	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 %.

-o-o-

Wak.

a 1157393

7700 Series ICP-MS Preventive Maintenance Checklist - Standard



Agilent Preventive Maintenance provides factory recommended service for your analytical systems to assure reliable operation and the accuracy of your results. Delivered by highly-trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak.

For more information about Agilent Technologies services please visit our web site using the following URL: <http://www.chem.agilent.com/en-us/products/services/pages/default.aspx>

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of additional or special procedures and/or parts for the instrument service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Service Engineer's Responsibilities

- Only complete/printout pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using a "X" or tick mark "✓" in the checkbox.
- Complete Not Applicable check boxes to indicate services not delivered, as needed.
- Complete the PM service in the order of the tasks listed.
- Complete the Service Review section together with the customer.

REVIEW BY	<i>S. S. S. S.</i>
APPROVED BY	<i>S. S. S. S.</i>
NEXT CAL DATE	11/26/2014

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7700 Series ICP-MS Preventive Maintenance Checklist - Standard



System Information

Instrument system name and ID	7700X ICP-MS
Instrument system site and location	ALS Laboratory Group (Thailand) Co., Ltd.
List system component product numbers	List the serial numbers of each component
1. 63281A	1. 7812094612
2. 63292A	2. 4N1220700
3. ASX 500	3. VS 021295A510
4.	4.
5.	5.
6.	6.
7.	7.

ICP-MS configuration table	Circle the type or write in the type if other
Nebulizer	MicroMist Micro Flow (Micro Mist) other
Spray Chamber	Quartz PFA other
Torch	Quartz Demountable other
Sampling Cone	S Pt other
Skimmer Cone	S Pt Ni plated other

Preparation

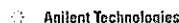
- ☒ Discuss any specific issues with the customer prior to starting.
- ☒ Review the instrument logbook.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform general inspection of system for cleanliness.
- ☒ Check for proper installation of safety-related parts, assemblies, sensors etc.
- ☒ Check for required firmware updates and verify with customers if they would like it installed.
- ☒ Begin system vent.

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7700 Series ICP-MS Preventive Maintenance Checklist - Standard



Inspect and clean system while venting

- ☒ Perform a general inspection of the system.
- ☒ Look for any obvious external damage or problems.
- ☒ Check mechanical pumps for evidence of excessive fluid leaks.
- ☒ Inspect vacuum hoses, pump exhaust tubes and power cord for excessive wear.
- ☒ Inspect Shield plate contacts. Clean if needed.
- ☒ Inspect the tape lining on the peristaltic pump clamp; replace the tape if worn (5043-0030).
- ☒ Check electronics for dust accumulation, clean if necessary.

Mechanical vacuum pumps

- ☒ Drain and replace mechanical pump fluid.
- ☒ Verify proper oil recycling function of mechanical pumps, the gas ballast valve must be open.
- ☒ Replace the oil mist filter.
- ☒ Inspect and clean or replace the inlet filter (P/N 5199-0145 for E2M18, P/N SR03700237 for DS402)
- ☒ Verify proper oil recycling function of mechanical pumps, the gas ballast valve must be open when connected to an Edwards E2M18.

Cooling water system

- ☒ Drain cooling fluid
- ☒ Remove, clean and reinstall metal mesh filter.
- ☒ Re fill Polyclear cooling fluid (G3202-80010)
- ☒ Clean the Air filter and the Condenser by compressed air or vacuum cleaner

Ion lens cleaning

- ☒ Remove extraction, omega lenses and clean all lenses.
- ☒ Remove ORS cell, plate bias and deflect lens, clean all lenses.
- ☒ Replace octopole. Reinstall all lenses and the ORS cell and close analyzer.

Auto Sampler ASX500 Series

- ☒ Clean external surfaces of the Autosampler, this will protect the service technician from potential chemical burns
- ☒ Z-Axis Inspection. Inspect the Z-axis PEEK drive cable for kinks or slight bends. Power off the autosampler and manually move the Z-drive up and down using the rotor on the rear of the instrument. Inspect the Z-axis drive cable for kinks or slight bends or if the movement is rough and hard to move then replace Z-axis drive cable (P/N G3286-80331) or Z-axis drive assembly (P/N G3286-80330)

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Pump Tubing Replacement

Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles

QC Testing

Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and ensure that the probe is centered in the vial

Final Inspection

Check that all components are tight

Auto Sampler I-AS

- ☐ Clean external surfaces of the Autosampler, this will protect the service technician from potential chemical burns

Pump Tubing Replacement

Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles.

QC Testing

Using customer's tray and move the sample probe to the sample vial 1, wash vial and rinse port and ensure that the probe is centered in the vial.

ISIS

- ☒ Replace ISIS valve seal (P/N G3138-65117)

- ☒ Inspect the tape lining on the peristaltic pump clamp; replace the tape if worn (5043-0030).

QC test

Verify the function of valve and Peripump. Make sure that there is no leak from the valve and pump tubing connections.

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Restore Instrument

- ☒ Pump system down.
- ☒ Perform the system post check.
- ☒ Check quadrupole matching.
- ☒ Perform octopole matching.
- ☒ Verify good gas control function by changing the flow and observing the meter readings, perform an automatic offset adjustment for the MFC's.
- ☒ Verify in Tune (using the customer's last tune) that changes in lens voltage result in the expected sensitivity change.
- ☒ Perform Startup including performance report and an Autotune. Print the Autotune report and attach it to this checklist.
- ☒ Check the instrument status and record the measurements in the status table. (Use "Record Log" in "Maintenance LogBook" with G7200B software, Use Performance report with G7201A/B software)
- ☒ Record the EM and discriminator Voltages in the results table.
- ☒ Run 10 minute stability test with tune solution. Check the result of RSD is below 4%.

Guidance

If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Make an entry in the MassHunter Maintenance Log Book recording the PM activities.
- ☒ Update/reset instrument maintenance counters as appropriate
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section below if there are additional comments
- ☒ Review the service and any test results with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box below or if necessary, in the customer's IQ records.

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7700 Series ICP-MS Status Results Table

☐ Check this box if you have run a performance report to record the meter readings. Print out the report and attach it to this checklist, instead of completing the table.

Measurement	Standby Mode	Analysis Mode No Gas Mode	Analysis Mode H ₂ Gas @ 4ml/min	Analysis Mode He Gas @ 4ml/min
IP/DK Press	2.65 Pa	2.62 Pa	- Pa	2.62 Pa
TMP Revolution	1.00 %	1.00 %	- %	1.00 %
Analyzer Press	1.54x10 ⁻⁵ Pa	2.35x10 ⁻⁴ Pa	- Pa	4.15x10 ⁻⁴ Pa
Water RF/WO/IF	0	1.50 L/min		
Water Temperature		22.1 °C		
Inlet Temp	14.0 °C	29.9 °C		
Internal Temp	15.0 °C	16.0 °C		
RF Power		1591 Watts		
RF Reflect		5 Watts		
Plasma Freq.		2677 MHz		
Carrier Gas (BP)		4.91 kPaG		
Ar Gas Tank Press		5.01 kPaG		
Carrier Gas		1.00 L/min		
MU/DIL Gas		0.10 L/min		
Plasma Gas		15.00 L/min		
Aux Gas		0.50 L/min		
S/C Temperature		2.0 °C		
OP Gas Tank Press*1	- kPaG	- kPaG		
Optional Gas *1	-	-		

Do not fill in the shaded cells in the table. There are no measurements for these combinations.

Notes:

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7700 Series ICP-MS Test Results Table

Test Description	Expected Test Result	Actual Test Result
Analog HV Voltage	Not applicable	1701 V
Pulse HV Voltage	Not applicable	1486 V
Discriminator Voltage	Not applicable	4.5 mV

7700 Series ICP-MS Parts List Table

Part Description	Part Number	Product/Model # where used	Quantity Consumed
1L Rough Pump Oil	6040-0834	7700 ICP-MS	2
Oil Mist Filter Kit for E2M18	3162-1056	7700 ICP-MS	1
Oil Mist Filter for DS402	9495342M002	7700 ICP-MS	-
Graphite Gasket for Sample Cone (3pk)	G3280-67009	7700 ICP-MS	1
7700 Octopole	G3280-67045	7700 ICP-MS	1
Polyclear cooling fluid	G3280-80910	G1870B/G3292A	1
Rinse / Drain tubing	G3280-80117	ASX-500	1
Tubing / connection kit for drain	G3280-80118	ASX-500	1
Peristaltic pump tubing set	G3160-65326	I-AS	-
Drain tubing to rinse bottle and drain bottle	G3160-65328	I-AS	-
Rotor seal for Valve (ISIS)	G3138-65117	ISIS	1
Additional parts may be required from engineers stock:			
Inlet Filter E2M18	6190-0145	7700 ICP-MS	-
Inlet Filter DS402	SR03700237	7700 ICP-MS	-
Peristaltic pump tape (30m roll)	6043-0030	7700 ICP-MS	-
Polishing Paper Kit (#400/#1200, 5 sheets each)	G1833-65404	7700 ICP-MS	-
Cotton Swabs, ultra-fine conical bud shape at both ends (100/pk)	9300-2574	7700 ICP-MS	-
Alumina Powder	8660-0791	7700 ICP-MS	-
Lint-free paper	05080-69051	7700 ICP-MS	-
Z-Axis Drive PEEK Cable (Anti-Kink)	G3280-80331	ASX-500	-
Z-Axis Drive Assembly (PEEK, Anti-Kink)	G3280-80330	ASX-500	-

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Service Engineer Comments (Optional)

If there are any specific points you wish to note as part of performing the service or other items of interest for the customer, please write in this box.

Other Important Customer Web Links

- ☐ How to get information on your product: Literature Library - <http://www.agilent.com/chem/library>
- ☐ Need to know more? - www.agilent.com/chem/education
- ☐ Need technical support, FAQs? - www.agilent.com/chem/techsupp
- ☐ Need supplies? - www.agilent.com/chem/supplies

Service Completion

Service request number W0 6142623 Date service completed 12 June 2013

Agilent signature [Signature] Customer signature [Signature]

Document part number: G3280-80078

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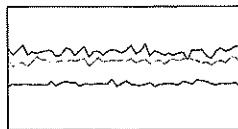
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Tune Report

Operator Name Supakwan Mak
Acq/Data Batch C:\Agilent\CPM\H11\user\Tune.b
Acq. Date-Time 6/12/2023 4:05:12 PM
Report Comment PM 12 June 2023
Instrument Name 63281A JP12091612

(No Gas)

Sensitivity



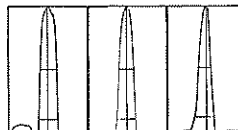
Mass	Range	Count	RSD%	Background
7	10000	6340	4.494	2.100
89	50000	27817	3.328	3.600
205	80000	18555	3.537	8.800

Sampling Period [sec] 0.311
Integration Time [sec] 0.1

Oxide/Doubly Charged Ratio

Oxide 155 / 140 1.402 %
Doubly Charged 70 / 140 1.508 %

Resolution/Auto



Mass	Peak Height	Axis	W-60%	W-10%
7	6337.88	7.00	0.64	0.730
89	27561.94	89.00	0.55	0.710
205	19216.73	205.00	0.46	0.728

Integration Time [sec] 0.1
Acquisition Time [sec] 22.74
Y Axis Linear

Tune Parameters

Plasma Parameters

Plasma Mode --- Nebulizer Gas 1.00 L/min Makeup Gas 0.10 L/min
RF Power 1550 W Option Gas --- Auxiliary Gas 0.00 L/min
RF Matching 1.60 V Nebulizer Pump 0.10 rps Plasma Gas 15.0 L/min
Sample Depth 8.0 mm S/C Temp 2 °C

Lens Parameters

Extract 1 0.0 V Omega Lens 6.4 V Deflect 11.8 V
Extract 2 -145.0 V Cell Entrance -30 V Plate Bias -40 V
Omega Bias -50 V Cell Exit -50 V

Cell Parameters

Use Gas No 3rd Gas Flow --- Energy Discrimination 5.0 V
He Flow 0.0 mL/min O2P Bias -8.0 V

1 of 3

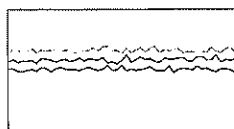
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Tune Report

H2 Flow --- O2P RF 190 V
QP Parameters
Mass Gain 145 Axis Gain 1.0021 QP Bias -3.0 V
Mass Offset 124 Axis Offset 0.12
Hardware Settings
Torch
Torch H -0.4 mm Torch V 0.0 mm
EM
Discriminator 4.5 mV Analog HV 1748 V Pulse HV 1456 V

(He)

Sensitivity



Mass	Range	Count	RSD%	Background
59	25000	11826	2.752	7.200
89	20000	13307	2.527	5.800
205	90000	25871	2.705	13.300

Sampling Period [sec] 0.31
Integration Time [sec] 0.1

Oxide/Doubly Charged Ratio

Oxide 155 / 140 1.169 %
Doubly Charged 70 / 140 1.508 %

Tune Parameters

Plasma Parameters

Plasma Mode --- Nebulizer Gas 1.00 L/min Makeup Gas 0.10 L/min
RF Power 1550 W Option Gas --- Auxiliary Gas 0.00 L/min
RF Matching 1.60 V Nebulizer Pump 0.10 rps Plasma Gas 15.0 L/min
Sample Depth 8.0 mm S/C Temp 2 °C

Lens Parameters

Extract 1 0.0 V Omega Lens 7.4 V Deflect 3.6 V
Extract 2 -200.0 V Cell Entrance -90 V Plate Bias -115 V
Omega Bias -90 V Cell Exit -70 V

Cell Parameters

Use Gas Yes 3rd Gas Flow --- Energy Discrimination 3.0 V
He Flow 4.5 mL/min O2P Bias -21.0 V
H2 Flow --- O2P RF 200 V

QP Parameters

Mass Gain 145 Axis Gain 1.0021 QP Bias -18.0 V
Mass Offset 124 Axis Offset 0.12

Hardware Settings

Torch
Torch H -0.4 mm Torch V 0.0 mm

2 of 3

6/12/2023 4:05 PM

Tune Report

EM
Discriminator 4.5 mV Analog HV 1748 V Pulse HV 1456 V

3 of 3

6/12/2023 4:05 PM



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T Banpa, A.Kaengkhoi, Saraburi 18110

Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

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

Certificate No. T231676

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Certificate of Calibration

Equipment : HEATING BLOCK

Manufacturer : Environmental Express

Model : SC 196

Serial No. : 6974CECW3285

Customer Code : BKK_EL0054

ID No. : T5306A3

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


104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : Acid Digestion Lab

Date of Receipt : 13 September 2023

Calibrated By : Saneek Musikawan (Site Calibration Manager)

Approved By :  / Sujjar Naknakred (Site Calibration Manager)

Date of Issue : 26 SEP 2023

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-L12 109 30:05-57



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110

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

Certificate No. T231676

Page 2 of 6

Calibration Report

Equipment : HEATING BLOCK
Date of Calibration : 22 September 2023
Environment : Temperature : 21.8-23.1 °C
Line Voltage : 221.6-226.3 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert 20 standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20

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

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN21-TN30	T230014	17 January 2024
TC	TYPE T	TN31-TN40	T230014	17 January 2024
DATA LOGGER	34970A	T151	T230014	17 January 2024

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

Equipment Description :

Time Constant 2 Hour 20 Minute At 95 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

() without adjustment (X) after adjustment

Approved By

FM-L13 108/30-05-57



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Certificate No T231676

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Calibration Report

Measurement Results

Calibration Point		Average Standard Reading at each position (°C)					
R1 Hole1-Hole6	TN21	TN22	TN23	TN24	TN25	TN26	
	Max	95.01	94.41	95.20	95.41	95.17	
	Min	94.57	93.95	94.75	94.92	94.00	94.72
Average		94.79	94.18	94.98	95.17	94.26	94.95
R2 Hole7-Hole12	TN27	TN28	TN29	TN30	TN31	TN32	
	Max	95.36	95.43	95.19	95.16	95.35	94.97
	Min	94.94	94.95	94.72	94.71	94.90	94.57
Average		95.15	95.19	94.96	94.94	95.13	94.77
R3 Hole13-Hole18	TN33	TN34	TN35	TN36	TN37	TN38	
	Max	95.37	95.50	95.22	95.21	95.33	95.31
	Min	94.99	95.09	94.78	94.82	94.88	94.96
Average		95.18	95.30	95.00	95.02	95.11	95.13
R4 Hole19-Hole24	TN39	TN40	TN21	TN22	TN23	TN24	
	Max	95.59	94.42	94.52	94.24	94.63	94.67
	Min	95.21	94.06	94.13	93.88	94.28	94.27
Average		95.40	94.24	94.33	94.06	94.45	94.47
R5 Hole25-Hole30	TN25	TN26	TN27	TN28	TN29	TN30	
	Max	95.19	95.38	92.93	95.30	95.14	95.03
	Min	94.83	95.03	92.56	94.95	94.79	94.70
Average		95.01	95.20	92.75	95.12	94.96	94.87
R6 Hole31-Hole36	TN31	TN32	TN33	TN34	TN35	TN36	
	Max	94.63	94.90	94.77	94.31	94.24	93.87
	Min	94.24	94.55	94.44	93.98	93.92	93.56
Average		94.43	94.72	94.60	94.14	94.08	93.71
R7 Hole37-Hole42	TN37	TN38	TN39	TN40	TN21	TN22	
	Max	94.30	94.44	94.04	93.81	94.89	95.35
	Min	93.95	94.05	93.67	93.48	94.39	94.90
Average		94.13	94.24	93.86	93.65	94.64	95.12
R8 Hole43-Hole48	TN23	TN24	TN25	TN26	TN27	TN28	
	Max	95.99	95.63	95.28	95.29	95.45	94.87
	Min	95.57	95.15	94.82	94.84	94.99	94.48
Average		95.78	95.39	95.05	95.07	95.22	94.68

Approved By

FM-L13 108/30-05-57



Metrological Center

SCI ECO Services Company Limited

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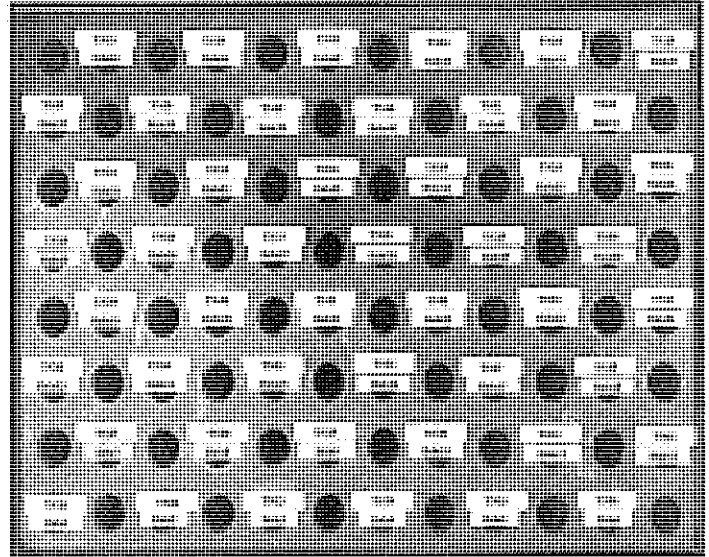
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Certificate No. T231676

Page 3 of 6

Calibration Report



FRONT CONTROL

Approved By

FM-L13 108/30-05-57



Metrological Center

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Certificate No T231676

Page 5 of 6

Calibration Report

Measurement Results

Calibration Point		Average Standard Reading at each position (°C)					
R1 Hole1-Hole6	TN21	TN22	TN23	TN24	TN25	TN26	
	Max	105.23	104.32	105.43	105.25	104.44	105.27
	Min	104.94	103.95	105.15	105.04	104.11	104.96
Average		105.09	104.13	105.29	105.15	104.28	105.12
R2 Hole7-Hole12	TN27	TN28	TN29	TN30	TN31	TN32	
	Max	105.30	105.12	105.18	105.22	105.12	105.16
	Min	105.11	104.92	104.96	105.00	104.92	104.97
Average		105.20	105.02	105.07	105.11	105.02	105.06
R3 Hole13-Hole18	TN33	TN34	TN35	TN36	TN37	TN38	
	Max	105.37	105.63	105.02	104.80	104.69	105.19
	Min	105.17	105.37	104.75	104.59	104.50	105.00
Average		105.27	105.50	104.88	104.69	104.60	105.09
R4 Hole19-Hole24	TN39	TN40	TN21	TN22	TN23	TN24	
	Max	105.31	104.43	106.41	104.71	105.63	105.82
	Min	105.08	104.22	106.15	104.41	105.37	105.56
Average		105.19	104.33	106.28	104.56	105.50	105.69
R5 Hole25-Hole30	TN25	TN26	TN27	TN28	TN29	TN30	
	Max	104.95	106.26	103.34	105.78	105.59	105.87
	Min	104.67	105.96	103.08	105.56	105.36	105.68
Average		104.81	106.11	103.21	105.67	105.48	105.77
R6 Hole31-Hole36	TN31	TN32	TN33	TN34	TN35	TN36	
	Max	104.75	104.86	104.80	105.20	104.50	104.39
	Min	104.54	104.63	104.59	105.00	104.32	104.18
Average		104.65	104.75	104.69	105.10	104.41	104.28
R7 Hole37-Hole42	TN37	TN38	TN39	TN40	TN21	TN22	
	Max	104.30	104.90	104.85	104.65	104.88	104.85
	Min	104.09	104.72	104.66	104.49	104.63	104.52
Average		104.19	104.81	104.75	104.57	104.76	104.68
R8 Hole43-Hole48	TN23	TN24	TN25	TN26	TN27	TN28	
	Max	105.71	105.88	105.39	105.61	105.42	105.19
	Min	105.45	105.61	105.14	105.27	105.18	104.94
Average		105.58	105.73	105.27	105.44	105.30	105.07

Approved By

FM-L13 108/30-05-57

Calibration Report

Measurement Results:

HEATING BLOCK			Temperature Distribution	
Setting (°C)	Reading (°C)		Stability (± °C)	Uncertainty (± °C)
	Min, Max	Average		
100.0	100.3, 100.5	100.4	0.26	0.81
107.0	107.0, 107.1	107.1	0.19	0.78

* The quoted uncertainty exclude " uniformity "

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By, _____

FM-L13 105/30-05-57

Calibration Report

Equipment : Chamber (Cold Room)
Date of Calibration : 30 June - 1 July 2022
Environment : Temperature : 18.9-23.7 °C
Line Voltage : 222.9-226.5 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

- This equipment was calibrated by insert nine standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986). All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .
- Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN161-TN170	T210009	30 July 2022
TC	TYPE T	TN171-TN180	T210009	30 July 2022
DATA LOGGER	34970A	T149	T210009	30 July 2022
- This certificate is traceable to :
National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244)
- Condition of calibrated item : good
Equipment Description :
Time Constant 3 Hour - Minute At 3 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available
- Adjustment :
() without adjustment (X) after adjustment

Approved By, _____

FM-L15 117/15-05-63

Certificate of Calibration

Equipment : Chamber (Cold Room)
Manufacturer : KOLDTECH
Model : KM 320
Serial No. : TBN-1012061/05
Customer Code : BKK_EN0167
ID No. : T2463A3
Customer : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok 10250
Customer Location : Environmental Laboratory
Date of Receipt : 27 June 2022
Calibrated By : Sujjar Nakkared (Site Calibration Manager)
Approved By : _____ / Boonchai Suriyawong (Site Calibration Manager)
Date of Issue : 04 JUL 2022

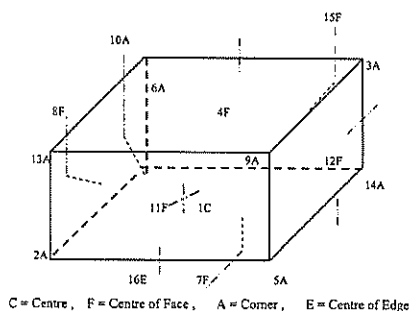
REVIEW BY	<u>Sujjar P.</u>
APPROVED BY	<u>VL AL</u>
NEXT CAL DATE	<u>30/12/23</u>

The uncertainties are for a confidence probability of approximately 95%.

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FM-L14 117/01-02-64

Calibration Report



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

Approved By, _____

FM-L15 117/15-05-63

Calibration Report

Measurement Results:

Calibration Point	Average Standard Reading at each position (°C)									
	TN161	TN162	TN163	TN164	TN165	TN166	TN167	TN168	TN169	TN170
3	2.71	2.82	2.75	2.89	2.95	3.68	3.02	2.96	3.03	2.85
	TN171	TN172	TN173	TN174	TN175	TN176				
	2.97	3.02	2.89	3.04	2.97	3.33				

Chamber (Cold Room)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage
	Min , Max	Average					Factor k
3.0	2.9 , 4.0	3.2	2.99	1.05	1.30	1.66	2.00

* The quoted uncertainty exclude " uniformity "

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By:

FM-L15 11/7/15-05-63

Agilent 5100, 5110 Preventive Maintenance Checklist



Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.
- For customers using HF applications, the instrument should be returned to its standard sample introduction system

Agilent CrossLab Start Up Services

Agilent 5100 5110 ICP-OES Preventive Maintenance

REVIEW BY	<i>Charatt 2</i>
APPROVED BY	<i>Sam 7 M</i>
TEST CAL DATE	01/03/24

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides what you need to reduce unplanned downtime and keep your systems operating at their peak performance.

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.

Revision A.02, Issued 21 January 2022
Document Number G8014-90075
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Page 1 of 1



Agilent 5100, 5110 Preventive Maintenance Checklist



Important Customer Web Links

- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
 - Sample Prep and Containment
 - Chemical Standards
 - Analysis
 - Service and Support
 - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- Need to place a service call?** Flexible Repair Options | Agilent



Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit
- Only select those pages that relate to the system or module being serviced
- Complete empty fields with the relevant information
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓"
- Check "Service not applicable" check boxes to indicate services/tasks not delivered, as appropriate
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the **Service Review** section together with the customer
- Complete the fields for page numbers at the foot of each selected page
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Completion section
- Ask the customer to sign the **Service Verification** section including the customer's and your signature.

Instrument Maintenance

System information

- ☐ Check this box if an Instrument configuration report is attached instead of completing the table

Instrument System Name and ID	G5010A ; MY16010005
Instrument System Site and Location	ALS C BUK

List System Component Product Numbers	List the Serial Numbers of each Component
1 G9010A	MY16010005
2 G9410A	AU15440964
3 G7212	2005-00159
4 G9485	AU16040115
5	
6	
7	
8	
9	

ICP-OES Configuration Table	Circle the type or write in the type if other
Nebulizer Type	ScoSpray OneNeb Conkal Other
Spray Chamber	Cyclonic Single Pass Cyclonic Double Pass Other
Torch	Radial Dual View Other
Torch Type	One Piece Semi Dismountable Fully Dismountable Other
Injector Diameter	2.4mm 1.8mm 1.4mm 0.8mm Other
Injector Material	Quartz Ceramic Other

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments
- ☒ Save instrument control settings before starting the procedure
- ☒ Perform a general inspection of the system for cleanliness
- ☒ Check for proper installation of parts, assemblies, sensors etc
- ☒ Check system for required installation of components and implementation of Service Notes
- ☒ Check for required firmware/software updates and verify with customers if they would like them installed
- ☒ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it
- ☐ Ask the customer to remove any samples from the ICP-OES sample introduction area, auto sampler or around the ICP-OES.

Preventive Maintenance Procedures

Record Pre-PM instrument performance

- ☒ Run Instrument Performance test
- ☒ Record results in Instrument Performance Test Results Table – Pre-PM.

Clean and inspect ICP-OES system

- ☒ Look for any obvious external damage or problems
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter
- ☒ Replace high capacity air inlet dust filter element if installed
- ☒ Remove and clean instrument water inlet filter

Agilent Water Recirculator

- ☐ Service not applicable
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter if present.
- ☒ Re fill with Agilent Cool Clear cooling fluid.
- ☒ Clean the cooling system Air filter and the condenser

SPS 3 Auto Sampler

- ☒ Service not applicable
- ☐ Power cycle the autosampler and verify successful initialization
- ☐ Inspect X and Z axis belts for wear. Replace if necessary
- ☐ Clean X and Z axis slide shafts.
- ☐ Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and rinse port, ensure that the probe is approximately centered in the vial.

SPS 4 Auto sampler

- ☐ Service not applicable
- ☒ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☒ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner.
- ☒ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☒ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☒ Pump Tubing Replacement. Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles
- ☒ Test using customer's tray and move the sample probe to the sample vial 1, wash vial and rinse port and ensure that the probe is centered in the vial. If not use calibration wizard and calibrate the position.

AVS 4, 6, 7 Advanced Valve System

- ☐ Service not applicable
- ☒ Replace valve rotor seal - Suspect
- ☒ Check fittings for signs of leaks
- ☒ Check tubing including autosampler tubing for kinks or excessive wear
- ☒ Check high flow pump for signs of leaks

ICP-OES adjustment

- ☒ Check position of Zn peak, adjust if required
- ☒ Check Argon Ratio, adjust to specified value if required
- ☒ Perform Detector Calibration
- ☒ Perform Instrument Calibration

Record Post-PM Instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above, run the following Instrument tests

- ☒ Subsystem Communications Test
- ☒ Air Flow
- ☒ Water Flow
- ☒ Gas Flows
- ☒ RF Generator
- ☒ Camera Test
- ☒ Optics Test
- ☒ Nebulizer Test

- ☒ Record the result in the Instrument Test Results Table

Restore Instrument

- ☐ For HF applications, ask the customer to reinstall their sample introduction system
- ☒ Leave system in an idle state - on and purging.
- ☒ Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook
- ☒ Record the PM event in the Smart Alerts logbook, if applicable
- ☒ Update/reset instrument maintenance counters as appropriate
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request
- ☒ Complete the Service Engineer Comments section if there are additional comments
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☐ Complete the Signature Page with both Service Engineer and Customer signatures.

Test Results

Instrument Performance Test Results Table

Note: These measurements do not form part of any specification and are for reference only

	Pre PM Sensitivity Check		Post PM Sensitivity Check	
	Radial	Axial *	Radial	Axial*
Zn 213.857 nm SRBR	79603.9	146365.1	79,349.7	146359.5
Mn 257.610 nm SRBR	153678.7	670560.3	159,750.0	217496.1
Al 396.152 nm SBR	29893.5	200,141.7	28995.9	196602.0
K 766.491 nm SBR	99816.7	3151217.9	99,399.4	2983994.1

* Axial result is not applicable for G8016AA, G8012AA Radial View instruments

Instrument Test Results Table

Note: The Instrument Test results are for systems using ICP Expert version 7.3 and above only

Instrument Test	Result
Subsystem Communications Test	Pass
Air Flow	Pass
Water Flow	Pass
Gas Flows	Pass
RF Generator	Pass
Camera Test	Pass
Optics Test	Pass
Nebulizer test	Pass

ICP-OES Status Results Table

Note: These measurements do not form part of any specification and are for reference only.

Measurement	Standby Mode	Plasma On
Mains Voltage	218.598 VAC	215.135 VAC
Mains Current	0.217 A	0.116 A
Instrument Temperature	24.4 °C	24.3 °C
RF Air Flow (sensor speed)	16.0 Hz	20.0 Hz
Plasma Exhaust Temperature	No measurement	49.3 °C
Water Flow Oscillator	No measurement	1.20 L/min
Water Flow Detector	1.12 L/min	1.09 L/min
Water Inlet Temperature	20.0 °C	23.5 °C
Polychromator Temperature	35.0 °C	35.0 °C
CCD Temperature	-40.0 °C	-40.0 °C
Thermal Stabilizer	34.8 °C	35.0 °C
Argon Supply Pressure	613.93 kPa	541.92 kPa
Purge Gas Supply Pressure*1	609.38 kPa	567.97 kPa
Option Gas Supply Pressure*1	— kPa	— kPa
Nebulizer Flow	No measurement	0.90 L/min
Nebulizer Back Pressure	No measurement	153.36 kPa
Plasma Gas Flow	No measurement	11.98 L/min
Auxiliary Gas Flow	No measurement	1.0 L/min
RF Power	No measurement	1199.9 W
RF Supply Current	No measurement	8.223 A
RF Supply Voltage	No measurement	194.412 V

*1 If option installed

Consumed PM Parts

Part Description	Part Number	Product or Model# where used	Quantity consumed
Axial Pre-Optic Window	G6010-66014	G6010A, G6011A, G6014A/G6015A	1
Radial Pre-Optic Window	G6010-66015	All	1
Agilent Cool Clear Coolant Fluid	5799-0037	Agilent Water Recirculator	—
Purge Gas Filter	G6010-60136	All	1
Air Inlet filter	G6006-66002	All	1
High Capacity Air Filter	G6010-60189	Optional	—
Rotor seal for 6-7 port valve for AVS6/7	G6454-60002	G6494A/G6495	—
Rotor seal for 4 port valve for AVS4	G6453-60002	G6493A	—
Rinse solution to rinse station 2 5mm id x 1m	G6410-80123	SPS 4	1
Barb connector 2 5mm-1 5mm ID	G6410-80124	SPS 4	1
PVC waste tubing 6mm od x 5mm id, 2m	G6410-80122	SPS 4	1
Additional Parts may be required from engineer's stock:			
X axis drive belt	5410047503	SPS 3	—
Z axis drive belt	5410047400	SPS 3	—
Peristaltic pump tubing, PVC SolvaFlex 3 bridged,	3710049000	SPS 4	—

Consumed Parts Reference

(Purchased by customer, not included as part of PM)

☐ Section Not Applicable

Part Description	Part Number	Product or Model# where used	Quantity consumed
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Signature Page

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

- During PM found water tubing in instrument broken then water leaking inside instrument.
- Replace all water tube inside instrument, after replace found water flow sensor water leak also.
- Replace water module and continue PM without deviation.

Service Verification

Service Request Number: 6005835494 Date Service Completed: 2 - May - 2023

Service Engineer Name: Burton Ngamvijit Customer Name: Thitiya Rungtany

Service Engineer Signature: Burton Ng. Customer Signature: Thitiya R.

Total number of pages in this document:

ภาคผนวก จ

สำเนาหนังสือใบอนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน



ที่ อก ๐๓๑๐(๑)/ ๑๐๖๕

กรมโรงงานอุตสาหกรรม
ถนนพหลโยธินที่ ๖ เขตราชเทวี
กรุงเทพมหานคร ๑๐๕๐๐

๒๘ มกราคม ๒๕๖๕

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และนิติสถานของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๓๐ กรกฎาคม ๒๕๖๓

สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ แผ่น
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๓ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุ
หนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๕-๙-๔๗๐๕ สถานที่ตั้งเลขที่ ๓๐๕
ซอยพัฒนาการ ๕๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร
ต่อกรมโรงงานอุตสาหกรรม ขึ้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ความเห็นชอบต่ออายุห้องปฏิบัติการวิเคราะห์เอกชน
จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓๖๒ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๕๕ รายการ น้ำเสีย
จำนวน ๑๒๖ รายการ อากาศเสีย ๓๖ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน ๓๕ รายการ และดิน
จำนวน ๑๒๕ รายการ รวมทั้งสิ้นจำนวน ๓๖๓ รายการ ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กันยายน ๒๕๖๖ หากประสงค์จะต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ไปเป็นคำขอต่ออายุพร้อมเอกสารประกอบคำขอ
ต่อกรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์
เอกชน ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายศิระ จันทร์เล็ก)
อธิบดีกรมโรงงานอุตสาหกรรม
ผู้อำนวยการกองส่งเสริมและสนับสนุนโรงงาน
ปฏิบัติการทางเคมีและชีวเคมี

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๒๐๒ ๕๓๕๖ ๐ ๒๒๐๒ ๕๐๐๒

โทรสาร ๐ ๒๕๕๕ ๓๑๐๕ ๐ ๒๕๕๕ ๓๑๕๕

เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๒๐๕
ที่ อก ๐๓๑๐(๑)/ ๑๐๖๕ ลงวันที่ ๒๘ มกราคม ๒๕๖๕

๖. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๒๖ ราย

๑) นางสาวจินดา ไชยธรรมะ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๒) นางสาวสวรินทร์ น้อยเสถียร ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๓) นางสาวอริสรา งามชื่น ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๔) นางสาววันวิมล สายเน้ง ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๕) นางสาวปิ่นวิมล สมบูรณ์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๖) นางสาวศรัณยา เกลิมอักษร ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๗) นางสาวสวรินทร์ มงคลจิตรกุล ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๘) นางสาวศิริลักษณ์ พึ่งแพง ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๙) นายณพพงศ์ จันทร์พันธุ์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๑๐) นายบรรณรักษ์ โกมลาลัย ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๑๑) นายธีรนาถ จันทะ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๑๒) นางสาวเกศรินทร์ แก้วมื่น ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๑๓) นางสาวสุวิมล ชัยเรืองวุฒิ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๑๔) นางสาวสุภาวดี อรรณพการ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๑๕) นางสาวณัฏฐา ชัยเศรษฐกุล ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๑๖) นางสาวศศิธร พุ่มศิริดี ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๑๗) นางสาวเสาวลักษณ์ ภูมิกษาพร ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๑๘) นายอภิสิทธิ์ สิงหา ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๑๙) นายศักดิ์สิทธิ์ โพธิ์ศรีสุทธิ์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๒๐) ว่าที่ร้อยตรีหญิง พรหมนิภา ช่างเจริญ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๒๑) นายฉัตร คำถนอม ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๒๒) นางสาวอรพรรณ รักอง ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๒๓) นางสาวพรวิมล อัมมกรานนท์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๒๔) นายจุลเดช วารินทร์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๒๕) นางสาวศุภาวิมล ร้องคำ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๒๖) นายณกร สุขเจริญ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๒๗) นายปัญชา นามเชลล์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๒๘) นายพรมณ์ ศรีปลื้มเนตร ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๒๙) นายภูษิต ภูมิลิ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๓๐) ว่าที่ร้อยตรี เกลิมเกียรติ อมรศรีธรรม ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๓๑) นางสาววิภา สว่างนา ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๓๒) นายอรรถกร วัฒนศิริประเสริฐ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๓๓) นางสาวจุฬารัตน์ โอนสันเทียะ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๓๔) นางสาวจางวรรณ พึ่งพิชิตกุล ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕

(นายศิระ จันทร์เล็ก)

อธิบดีกรมโรงงานอุตสาหกรรม
ผู้อำนวยการกองส่งเสริมและสนับสนุนโรงงาน
ปฏิบัติการทางเคมีและชีวเคมี

๓๕) นางสาวปรางค์ทิพย์...

เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๒๐๕
ที่ อก ๐๓๑๐(๑)/ ๑๐๖๕ ลงวันที่ ๒๘ มกราคม ๒๕๖๕

๖. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย

๑) นางสาวสุพัตรา จันทร์เป่ง ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๒) นางสาวรัชชัญ โภมากรกุล ณ นคร ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๓) นายศุภราช จิตราพันธ์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๔) นางสาวกนกกร เอนก ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๕) นายสุริยา สอนแก้ว ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๖) นายวิชาญ ชุมพรี ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕

(นายศิระ จันทร์เล็ก)

อธิบดีกรมโรงงานอุตสาหกรรม
ผู้อำนวยการกองส่งเสริมและสนับสนุนโรงงาน
ปฏิบัติการทางเคมีและชีวเคมี

๓๕) นางสาวปรางค์ทิพย์ กิจไพศาลศักดิ์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๓๖) นางสาวเดือนใจ พงกกลาง ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๓๗) นางสาวจิราพร ศิริวง ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๓๘) นายวรารักษ์ ภูมิกิจ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๓๙) นายพนง วิริยะสนกิจ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๔๐) นายธนิต เจนจน ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๔๑) นายคณิต จันทร์เพชร ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๔๒) นายอรรถพล นิธิวิทยาพันธ์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๔๓) นายภูวิช พรหมเสนา ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๔๔) นายณเดช โกภาศิริวัฒน์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๔๕) นายชวฤทธิ์ วงษ์จันทร์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๔๖) นายอภิรักษ์ ศรีสน ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๔๗) นายเจษฎาพร คงศักดิ์ไทย ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๔๘) นายจิรัช ภูมิกิจ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๔๙) นายอนันต์ เอนก ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๕๐) นายอภิวัฒน์ ทุมพร ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๕๑) นางสาวสุภาวดี ภูมิกิจ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๕๒) นางสาวทิพร ชวาลสมบุญ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๕๓) นางสาวอริยา ภูมิกิจ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๕๔) นางสาวกนกกร จันทร์เพชร ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๕๕) นางสาวกานดา สุวรรณ์กุล ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๕๖) นางสาวกานดา นามวิมล ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๕๗) นางสาวสุภาวดี ภูมิกิจ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๕๘) นางสาวสุภาวดี ภูมิกิจ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๕๙) นายธีรวัฒน์ ปางพูน ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๖๐) นายอิทธิพล ยะสิทธิ์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๖๑) นายประจักษ์ วรรณสุขิทธิ์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๖๒) นายชยธร พงษ์พันธ์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๖๓) นางสาวกนกกร จันทนา ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๖๔) นางสาวกนกกร นิลกัญ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๖๕) นายสิทธิโชค ธงเงิน ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๖๖) นายศิริวรรณ ใจบุญ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๖๗) นางสาวพรรณิศา ทุมพร ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๖๘) นางสาวศรัณย์ มีงศ์ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๖๙) นายวชิร ทรัพย์วิริยะ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๗๐) นายสุริยา ทองอ้อม ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕
๗๑) นายวิญญู ภูมิกิจ ทะเบียนเลขที่ ๖-๒๐๕-๙-๔๗๐๕

(นายศิระ จันทร์เล็ก)

อธิบดีกรมโรงงานอุตสาหกรรม
ผู้อำนวยการกองส่งเสริมและสนับสนุนโรงงาน
ปฏิบัติการทางเคมีและชีวเคมี

๓๖) นายสมบุญ...

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 Method ⁽⁴⁾
22	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
23	2,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
24	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
25	2,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
26	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
27	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
28	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
29	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
30	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
31	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
32	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
33	Formaldehyde	Distillation, Colorimetric Method ⁽³⁾
34	Free Chlorine	1) DPD Ferrous Titrimetric Method ⁽⁴⁾ 2) Iodometric Method ⁽⁴⁾
35	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
36	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
37	Hexavalent Chromium	Filtration, 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	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 Method ⁽⁴⁾

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.....ศูนย์วิจัยสิ่งแวดล้อม

44 Methomyl...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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 ⁽³⁾
54	Total Dissolved Solids	Dried at 180 °C ⁽⁴⁾
55	Total Kjeldahl Nitrogen	Semi-Micro Kjeldahl Method ⁽⁴⁾
56	Total Suspended Solids	Dried at 103-105 °C ⁽⁴⁾
57	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
58	Trivalent Chromium	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ⁽⁴⁾
59	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁴⁾

หน้าถัดไป 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⁾

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3 Aldrin...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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⁾

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
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⁾

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
34 Chromium (III)...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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	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⁾


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
51 ds-1,2-Dichloroethylene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
51	ds-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
57	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
58	Diethyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
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⁾


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
68 Fluorene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
68	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
69	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
70	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
74	α-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
75	β-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
76	γ-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
81	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
83	Mercury	1) Cold Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾


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84 Methanol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾ 2) Equilibrium Headspace, 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	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⁾


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97 Pentachlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
98	pH	Electrometric Method ⁽⁴⁾
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
100	Phenol	1) Distillation, Direct Photometric Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
102	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
103	Silver	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
104	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
105	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
106	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
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 ₉)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
110	TPH (C ₁₀ -C ₁₆)	Solvent Extraction, Gas Chromatographic Method ⁽²⁾⁽⁴⁾
111	TPH (C ₁₇ -C ₃₃)	Solvent Extraction, Gas Chromatographic Method ⁽²⁾⁽⁴⁾
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⁾



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114 1,1,2-Trichloroethane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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⁾


รายการเสีย (ต่อเนื่องมา) จำนวน 16 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
2	Arsenic	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁴⁾


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3 Carbon Monoxide...


ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Carbon Monoxide	1) Sampling Bag Non-Dispersive Infrared Method ⁽³⁾ 2) Non-Dispersive Infrared Method ⁽³⁾ 3) Instrumental Analyzer Method ⁽³⁾
4	Chlorine	1) Absorption Sampling, Ion Chromatographic Method ⁽³⁾ 2) Isokinetic Sampling, Ion Chromatographic Method ⁽⁴⁾
5	Copper	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
6	Dioxins	Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory or Analysis by Department of Industrial Works Registered Laboratory (Dioxins/Furans Analysis Approved) ⁽³⁾
7	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method ⁽³⁾ 2) Isokinetic Sampling, Ion Chromatographic Method ⁽⁴⁾
8	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ⁽³⁾
9	Lead	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
10	Mercury	1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽³⁾ 2) Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
11	Opacity	Ringelmann's Method ⁽²⁾
12	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method ⁽³⁾ 2) Chemiluminescence Method ⁽⁴⁾ 3) Instrumental Analyzer Method ⁽³⁾
13	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method ⁽³⁾ 2) UV Fluorescence Method ⁽³⁾ 3) Instrumental Analyzer Method ⁽³⁾
14	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method ⁽³⁾
15	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ⁽³⁾
16	Xylene	Absorption Sampling, Gas Chromatographic Method ⁽³⁾


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สิ่งปลูกถ่าย...


สิ่งปลูกถ่ายหรือวัสดุที่นำใช้แล้ว จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁾⁽³⁾ 3) Automated Soxhlet Extraction, Gas Chromatographic Method ⁽²⁾⁽³⁾
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ⁽¹⁾⁽⁴⁾⁽⁵⁾ 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽¹⁾⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹³⁾ 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁷⁾⁽¹⁴⁾
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ⁽¹⁾⁽⁴⁾⁽⁵⁾ 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽¹⁾⁽⁴⁾⁽⁵⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹³⁾ 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁷⁾⁽¹⁴⁾
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ⁽¹⁾⁽⁴⁾⁽⁵⁾ 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽¹⁾⁽⁴⁾⁽⁵⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹³⁾ 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁷⁾⁽¹⁴⁾
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ⁽¹⁾⁽⁴⁾⁽⁵⁾ 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽¹⁾⁽⁴⁾⁽⁵⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹³⁾ 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁷⁾⁽¹⁴⁾


 (นางวิภาดาญ์ ชัตรสกุลไธ)


6 Cadmium...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
9	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method ^(1.6.15,17) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method ^(1.6.16,17) 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.15,17) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.16,17)
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^(1.6.17) 2) Alkaline Digestion, Colorimetric Method ^(3.17)


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
11 Cobalt...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25)


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
2) Soxhlet...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
17	Dieldrin	2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31) 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25)
18	Endrin	2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31) 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25)
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
20	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
21	Lindane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1.6.18)


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
2) Waste Extraction...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
23	Methoxychlor	2) Waste Extraction, Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^(1.6.19) 3) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^(1.6.20) 4) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1.6) 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^(1.6) 6) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽²⁰⁾
24	Mirex	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)


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
27 Polychlorinated...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 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',5,6-Nonachlorobiphenyl	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,9,22) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,23) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,23)


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28 Pentachlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,23) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,23)
29	pH	Electrometric Method ^(29,30)
30	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14)
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,23)
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,15)



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4) Digestion...

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


เดิม จำนวน 125 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
4	Anthracene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
8	Barium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)


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9 Benz(a)anthracene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Benz(a)anthracene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
11	Benzo(b)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
12	Benzo(k)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
13	Benzoic acid	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
14	Benzo(a)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
15	Benzo(g,h,i)perylene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
17	Bis(2-chloroethyl)ether	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
18	Bis(2-ethylhexyl)phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
20	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
21	Butanol	Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(12,24)
22	Butyl Benzyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
24	Carbazole	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)


 (นางวิภาคุณ นัครสกุลวิไล)
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26 Carbon tetrachloride...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
28	p-Chloroaniline	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
32	2-Chlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7,15,17) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7,16,17)
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^(8,17)
36	Chrysene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
37	Cyanide	Extraction, Distillation, Colorimetric Method ^(24,27,28)
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
39	DDD	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)

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40 DDE...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
40	DDE	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
41	DDT	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
42	Dibenz(a,h)anthracene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
43	Di-n-Butyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
47	3,3-Dichlorobenzidine	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
53	2,4-Dichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)

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57 Dieldrin...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
58	Diethyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
59	2,4-Dimethylphenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
60	2,4-Dinitrophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
61	2,4-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
62	2,6-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
63	Di-n-Octyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
67	Fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
68	Fluorene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
70	Heptachlor Epoxide	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)

Signature
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
71 Hexachlorobenzene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
74	α-HCH	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
75	β-HCH	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
76	γ-HCH	1) Soxhlet Extraction, Gas Chromatographic/ Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
77	Hexachlorocyclopentadiene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
78	Hexachloroethane	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
79	Indeno(1,2,3-cd)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
80	Isophorone	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
81	Lead	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽¹⁸⁾

Signature
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2) Thermal...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
84	Methanol	2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry ^(1,17) 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽²⁰⁾ Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(19,24)
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
88	2-methylphenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
89	2-Methylnaphthalene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
91	Naphthalene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
93	Nitrobenzene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
94	N-Nitrosodiphenylamine	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
95	N-Nitrosodi-n-propylamine	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic Method ^(10,22)


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- Aroclor 1242...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
	- Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3,3',4,6'-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6'-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5',6'-Heptachlorobiphenyl - 2,2',3,4,4',5,5',6'-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl - Pentachlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
97	Phenanthrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
98	Phenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
99	Pyrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
100		


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 กระทรวงมหาดไทย

101 Selenium...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
101	Selenium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
102	Silver	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
103	Styrene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
106	Toluene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
108	TPH (C ₉ -C ₁₀)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
109	TPH (C ₉ -C ₁₀)	1) Solvent Extraction, Gas Chromatographic Method ^(11,21) 2) Automated Soxhlet Extraction, Gas Chromatographic Method ^(11,21)
110	TPH (C ₁₁ -C ₁₅)	1) Solvent Extraction, Gas Chromatographic Method ^(11,21) 2) Automated Soxhlet Extraction, Gas Chromatographic Method ^(11,21)
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
115	2,4,5-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)



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116 2,4,6-Trichlorophenol...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
116	2,4,6-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
118	Vanadium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
119	Vinyl Acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
120	Vinyl Chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
121	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
122	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
123	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
125	Zinc	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)

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ନି.ପା. ୦୩୦୦(କ)/ ୯୩୩୯

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพมหานคร ๑๐๕๐๐

០៩ មិថុនា ២៥៦៦

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดการมลพิษของหอปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๔ กุมภาพันธ์ ๒๕๖๖

คณะปณิธิถึงอึ้งถึง บริษัท เอนอแกเอส แลบริทอรี่ กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอชแมก เลขทะเบียน ว-๒๐๙ สถานที่ตั้งเลขที่ ๑๐๙ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ
เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดดังนี้ นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ไก่ยกเลิกลูกเข้าหน้าแม่ที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓๔ ราย

- | | |
|------------------------------------|---|
| ๑) นายทน สุนทรธัญ | ท |
| ๒) นายปิยธิดา นามะเจต | ท |
| ๓) นางสาวอรุณพล นิยมบริยาพันธ์ | ท |
| ๔) นางสาวพัชรียา หงษ์สมบัติ | ท |
| ๕) นางสาวภาณุภาณี สุวรรณศิริตระกูล | ท |
| ๖) นางสาวศรวิภาณี ยิ่งดี | ท |
| ๗) นายสมณโกษ วิโนลา | ท |
| ๘) นายณัฐนันท์ ปานประเสริฐ | ท |
| ๙) ว่าที่ร้อยตรีภาณุพงศ์ แสนศรี | ท |
| ๑๐) นายมนูพันธ์ หุตุศิริ | ท |
| ๑๑) นายณัฐดนัย เชื้อทองทอง | ท |
| ๑๒) นางสาวกาญจนาฯ คงคุณ | ท |
| ๑๓) นางสาวจิรนิกร เนียมกลาง | ท |
| ๑๔) นางสาวกาญจนาพรรัตน์ ศรีวิไลหา | ท |
| ๑๕) นายศิริวิมลน์ พานิชย์ | ท |
| ๑๖) นางสาวกนกภรณ์ สุระ | ท |
| ๑๗) นางสาวจิรสุภา ประเทืองสุข | ท |
| ๑๘) นางสาวอริสา วิริยะนจิตรวง | ท |
| ๑๙) นางสาวณิศา ยอดอนันต์ | ท |

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(นางวิภาดา จันทนกุลกิจ)
ผู้อำนวยการกลุ่มงานวิชาการและบริหาร
และทะเบียนศิลปวัฒนธรรม

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์เกษตรและเกษตรอินทรีย์ห้องปฏิบัติการ กอริจัยและเคียนกับนคหิยโรเงาน กรมโรเงานอุททากรรม ไพร. ๐ ๒๖๖๒ ๔๐๐๒, ๔๓๔๖

-b-

๒. ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ ราย

- | | |
|------------------------------------|----------------------------|
| ๑) นายกนกพงศ์ชาติ กิตติคุณาภิรักษ์ | ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๓ |
| ๒) นายภัทรพล สว่างใจธรรม | ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๒ |
| ๓) นายธนารักษ์ เทือกชัยคำ | ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๓ |
| ๔) นายศิริโชค พงษ์ประเสริฐ | ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๓ |
| ๕) นายณัฏฐาธิ คำแพง | ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๔ |

อนึ่ง หนังสือฉบับนี้จะแจกจ่ายให้คนในสังกัดที่อยู่ในพื้นที่ของเขื่อนภูมิพลจัดการวิเคราะห์เอกสาร
ที่ ออ ๐๓๐๓(๘)/๑๐๒๖ ลงวันที่ ๒๔ มกราคม ๒๕๖๕ ตั้งแต่วันที่ ๒ กันยายน ๒๕๖๖ ทั้งนี้ สามารถยื่นคำขอ
ผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ห้าหมื่นสี่พันปี

จึงเวียนมาเพื่อทราบ

ขอแสดงความนับถือ

Small

(ឈានវិភាគច្បាប់ ជំនាញពុទ្ធវិទ្យា)

นักวิทยาศาสตร์ชำนาญการพิเศษ ศึกษาราชการแทน

ผู้ชำนาญการกองวิจัยและพัฒนาสถิติแรงงาน

ปฏิบัตินโยบายการทอนอธิปไตยของงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

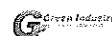
กลุ่มมาตรฐานวิชาการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

កែវ, ០ បេតុង បញ្ចប់ ពី បេតុង-៥

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๖๑๙๔

ไปรษณีย์อิเล็กทรอนิกส์ sarabangediw@mail.go.th

๒. ให้เพิ่มเจ้าหน้าที...



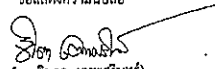
“សង្គម ឧទ្ទេសន៍ត្រូវ ឱ្យ មាន លក្ខណៈ ប្រសើរ ឡើង បន្ត ពី គ្រប់ ជំនាន់ មុន មក ដល់ ថ្ងៃ បច្ចុប្បន្ន”



ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนไว้วิเคราะห์เป็นน้ำเสีย จำนวน ๑๔ รายการ
อากาศเสีย (ปล่อยระบาย) จำนวน ๗ รายการ และน้ำใต้ดิน จำนวน ๓ รายการ รวมทั้งสิ้นจำนวน ๒๔ รายการ
ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้มีอายุ ๓ ปี นับจากวันที่กรมโรงงานอุตสาหกรรมออกหนังสือ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

 (นางนิตยา เทชะกรีนทร์)
 ผู้อำนวยการกองควบคุมและส่งเสริมโรงงาน
 ปฏิบัติการแทนเจ้าพนักงานอุตสาหกรรม
 ๒๔ มิ.ย. ๒๕๖๕

กองวิจัยและเตือนภัยมลพิษโรงงาน
 ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
 โทร. ๐ ๙๔๐๕ ๙๐๖๓-๓
 ไปรษณีย์อิเล็กทรอนิกส์ envwddiv@mail.go.th

เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
 บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๓๒๓
 ที่ อก ๐๓๑๐(๓)/ ๒๔๗๐ ลงวันที่ ๒๔ มิถุนายน ๒๕๖๕

ขอขยายผลการปฏิบัติงานที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๔ รายการ

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

อากาศเสีย (ปล่อยระบาย) จำนวน 7 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Carbon Monoxide	1) Sampling Bag, Non-Dispersive Infrared Method ^[3]
2	Hydrogen Sulfide	2) Instrumental Analyzer Method ^[4]
3	Opacity	Absorption Sampling, Iodometric Method ^[3]
4	Oxide of Nitrogen	Ringelmann's Method ^[3,4]
5	Sulfur Dioxide	1) Absorption Sampling, Phenoldisulfonic Acid Method ^[4]
		2) Instrumental Analyzer Method ^[3]
		1) Absorption Sampling, Barium-Thorin Titrimetric Method ^[3]
		2) Instrumental Analyzer Method ^[1,4]

วิภา วัฒนกุล
 (นางสาววิภา สัมฤทธิ์ผล)
 ผู้อำนวยการ
 ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก Sulfuric Acid...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
6	Sulfuric Acid	Isokinetic Sampling, Barium - Thorin Titrimetric Method ^[6]
7	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ^[7]

น้ำเสีย จำนวน 3 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Cyanide	Distillation, Colorimetric Method ^[2]
2	pH	Electrometric Method ^[2]
3	Phenols	Distillation, Direct Photometric Method ^[2]

เอกสารอ้างอิง

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วิภา วัฒนกุล
 (นางสาววิภา สัมฤทธิ์ผล)
 ผู้อำนวยการ

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก กองวิจัยและเตือนภัยมลพิษโรงงาน กรมโรงงานอุตสาหกรรม โทร ๐ ๙๔๐๕ ๙๐๖๓-๓

สำเนา

ที่ อก ๐๓๑๐/ ๒๐๕๓

กรมโรงงานอุตสาหกรรม
 ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
 เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๖ มิ.ย. ๒๕๖๕

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอเปลี่ยนแปลงบุคลากร ของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๑๕ มีนาคม ๒๕๖๖

ตามที่หนังสือที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๓๒๓ สดกนที่ ๒๒๖/๑๐ หมู่ที่ ๕ ตำบลแม่น้ำคู่ อำเภอปลวกแดง จังหวัดระยอง ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

ก. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ ราย

- นางสาวเจษฎาพร ศรีบุญเรือง ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นางสาวเจษฎาพร สิงห์งาม ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นางสาวจินดา ผดุงจิตต์ ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นายศุภณัฐ พิธีพันธ์ ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นายสิทธิชัย แก้วเกตุ ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
- ข. ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๒ ราย
- นายณัฐพงษ์ เพ็งขาวนา ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นางสาวกัญญ์พรพรรณ รักดี ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นางสาวจุฬารัตน์ สีทองหลาง ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นางสาวจิตติภา ประเทืองสุข ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นายสุรพล คุ้มบุญ ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นายณัฐวุฒิ อมรมรรษา ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นายจักรกร สีระลา ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นายสิทธิพรวิทย์ สุวรรณรัตน์ ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นายสิทธิพรวิทย์ แสนวิชา ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นายอนุวัฒน์ เตมา ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นายสุรวิทย์ บรรารักษ์ ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓
 - นายอดิศักดิ์ ทะริศบุญ ทะเบียนเลขที่ ๖-๒๒๓-๖-๐๐๑๓

อนึ่ง...

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ที่ อก ๐๓๒๐/๒๕๖๒ ลงวันที่ ๒๘ มิถุนายน ๒๕๖๔ คือในวันที่ ๒๘ มิถุนายน ๒๕๖๔ ทั้งนี้ สามารถยื่นคำขอผ่าน
ระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรมตาม QR Code หายหนังสือนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



(นายทวี อ้าพาทันท์)

ผู้อำนวยการศูนย์วิจัยและเฝ้าระวังมลพิษโรงงานภาคตะวันออก
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม



ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์

ศูนย์วิจัยและเฝ้าระวังมลพิษโรงงานภาคตะวันออก
โทร ๐ ๓๓๑๓ ๖๐๕๙ ต่อ ๕๐๐๑-๒
ไปรษณีย์อิเล็กทรอนิกส์ einw@diw.mail.go.th



ที่ อก ๐๓๒๐/๒๕๖๔

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๐ พ.ย. ๒๕๖๓

เรื่อง เปลี่ยนแปลงสารมลพิษของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอเปลี่ยนแปลงสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๕ ตุลาคม ๒๕๖๒

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำนวน ๓ หน้า

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๓๒๓ สถานที่ตั้งเลขที่ ๖๓๖/๑๐ หมู่ที่ ๕ ตำบลแม่ไม้ อำเภอปลวกแดง
จังหวัดระยอง ขอเปลี่ยนแปลงสารมลพิษของห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย)
จำกัด เพิกถอนคำขอสารมลพิษที่วิเคราะห์ในน้ำเสีย จำนวน ๑๓ รายการ และนี้ให้คืน ๓ รายการ ตามสิ่งที่ส่ง
มาด้วย

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์
เอกชนที่ อก ๐๓๒๐(๒)/๒๕๖๒ ลงวันที่ ๒๘ มิถุนายน ๒๕๖๔ คือในวันที่ ๒๘ มิถุนายน ๒๕๖๔ ทั้งนี้ สามารถ
ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



(นายทวี อ้าพาทันท์)

ผู้อำนวยการศูนย์วิจัยและเฝ้าระวังมลพิษโรงงานภาคตะวันออก
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเฝ้าระวังมลพิษโรงงานภาคตะวันออก
โทร ๐ ๓๓๑๓ ๖๐๕๙ ต่อ ๕๐๐๑-๒
ไปรษณีย์อิเล็กทรอนิกส์ einw@diw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๓๒๓
ที่ อก ๐๓๒๐/๒๕๖๔ ลงวันที่ ๑๐ พ.ย. ๒๕๖๓

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๖ รายการ
แนบท้าย จำนวน 13 รายการ

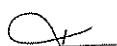
ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
1	Biochemical Oxygen Demand	1) 5-Day BOD Test, Membrane Electrode Method
2	Chemical Oxygen Demand	2) 5-Day BOD Test, Azide Modification Method
3	Color	1) Open Reflux, Titrimetric Method
4	Cyanide	2) Closed Reflux, Colorimetric Method
5	Free Chlorine	3) Closed Reflux,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

แนบท้าย จำนวน 3 รายการ

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
1	Cyanide	Distillation, Colorimetric Method
2	pH	Electrometric Method
3	Phenols	Distillation, Direct Photometric Method

เอกสารอ้างอิง

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



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right solutions.
right partner.