

ภาคผนวก ค

ผลการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม

ภาคผนวก ค-1

คุณภาพอากาศจากแหล่งกำเนิด



Analysis / Test Report

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

Sample Number 2523449-1
Sampled Date Apr 02, 2025
Sample Description Emission from Stationary Source
Location 129 มอ 3 ถนนหนองลัก-บ้านค้ายาว กมที่ 1-3
Date Analysis Commenced Apr 03, 2025
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

		Stack Description					
Analyte	Sampled Time	Unit	LOD (LOR)	Result	Guideline Limit	Method	Testing Location
Ambient Pressure	753	mmHg		0.94			
Ambient Temperature	28.0	°C		Circle			
Type of Process				35.2			
Type of Fuel				3.00			
Oxygen		m		20.9			
Carbon Dioxide		%		0.0			
Gas Velocity		m/s		12.6			
Flow Rate (Actual O2)		Nm3/hr		29323			

Air Testing
Total Suspended Particulate 02:50 PM - 03:38 PM mg/m3 0.5 <0.5 400 United States Environmental Protection Agency, EPA Method 5

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).

Sampling By : Suddamrong Chokplatan นิสิตบุญญานันท์ ๓-323-๓-0037

Remark :

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

Technical Management

Tharitat.

Thantia Kulsurwong
Scientist (4)
โทรศัพท์ ๓-323-๓-0029

Approved by

D. J. J. J.

Dej Changchon
Senior Manager
โทรศัพท์ ๓-323-๓-0001

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NIGHT SOLUTIONS นิตกลาง นิตกลาง

2272-407 EMAIL

S:\Reports_Lab_Air_Spec_GL_rpt (22 PM)



Analysis / Test Report

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

Sample Number 2523450-1
Sampled Date Apr 02, 2025
Sample Description Emission from Stationary Source
Location 129 มอ 3 ถนนหนองลัก-บ้านค้ายาว กมที่ 1-3
Date Analysis Commenced Apr 03, 2025
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					
Analyte	Sampled Time	Unit	LOD (LOR)	Result at 7 %O ₂	Guideline Limit	Method	Testing Location
Ambient Pressure	753	mmHg		0.50			
Ambient Temperature	28.0	°C		Circle			
Type of Process				122			
Type of Fuel				9.15			
Oxygen		m		9.5			
Carbon Dioxide		%		6.5			
Gas Velocity		m/s		1.8			
Flow Rate (Actual O2)		Nm3/hr		859			

Air Testing
Oxides of Nitrogen * 03:10 PM - 03:20 PM ppm 1.06 21.6 200 United States Environmental Protection Agency, EPA Method 7

Total Suspended Particulate 03:00 PM - 03:48 PM mg/m3 0.5 1.8 320 United States Environmental Protection Agency, EPA Method 5

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 : Varawut Pibpa

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2272-407 EMAIL

S:\Reports_Lab_Air_Spec_GL_rpt (22 PM)



Analysis / Test Report

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

Sample Number 2523449-1
Sampled Date Apr 02, 2025
Sample Description Emission from Stationary Source
Location 129 มอ 3 ถนนหนองลัก-บ้านค้ายาว กมที่ 1-3
Date Analysis Commenced Apr 03, 2025
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

		Stack Description					
Analyte	Sampled Time	Unit	LOD (LOR)	Result	Guideline Limit	Method	Testing Location
Ambient Pressure	753	mmHg		0.94			
Ambient Temperature	28.0	°C		Circle			
Type of Process				35.2			
Type of Fuel				3.00			
Oxygen		m		20.9			
Carbon Dioxide		%		0.0			
Gas Velocity		m/s		12.6			
Flow Rate (Actual O2)		Nm3/hr		29323			

Air Testing
Total Suspended Particulate 02:50 PM - 03:38 PM mg/m3 0.5 <0.5 400 United States Environmental Protection Agency, EPA Method 5

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).

Sampling By : Suddamrong Chokplatan นิสิตบุญญานันท์ ๓-323-๓-0037

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Technical Management

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S:\Reports_Lab_Air_Spec_GL_rpt (22 PM)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

P/O : 129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 2523749

Date Received : Apr 02, 2025

Date Reported : Apr 09, 2025

Report Number: 3254904-IC1

Sample Number 2523749-1

Sample Date Apr 02, 2025

Sample Description Emission from Stationary Source

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

Date Analysis Commenced Apr 02, 2025

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	753	mmHg	Diameter	0.50	m	Oxygen	6.5	%	Testing Location
Ambient Temperature	28.0	°C	Shape	Circle		Carbon Dioxide	8.2	%	
Type of Process	Combustion		Stack Temperature	124	°C	Gas Velocity	1.8	m/s	
Type of Fuel	Natural Gas		Moisture	10.32	%	Flow Rate (Actual Q2)	846	Nm ³ /hr	
Analyte	Sampled Time	Unit	LOQ (LOR)	Result at 7 % O ₂	Guideline Limit	Method	Testing Location		
Air Testing	Oxides of Nitrogen *	ppm	1.06	33.2	200	United States Environmental Protection Agency, EPA Method 7	Rayong		
	Total Suspended Particulate	mg/m ³	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 : Warawut Puppa

Remark :

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Technical Management

Thanitak
Thanita Kulburiwong
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Approved by

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Senior Manager
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Technical Management

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Approved by

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Senior Manager
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Analysis / Test Report

Client : Michelin Siam Co., Ltd.

P/O : 129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120

Project Name : Environment : EIA

Project Location :

Lot ID: 2523751

Date Received : May 23, 2025

Date Reported : May 30, 2025

Report Number: 3254908-1

Sample Number 2523751-1

Sample Date May 23, 2025

Sample Description Emission from Stationary Source

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

Date Analysis Commenced May 24, 2025

Condition of Sample

Extracted into two amber plastic bottles, refrigerated

Stack Description

Ambient Pressure	754	mmHg	Diameter	0.80	m	Oxygen	20.9	%	Testing Location
Ambient Temperature	33.0	°C	Shape	Circle		Carbon Dioxide	0.0	%	
Type of Process	Process		Stack Temperature	35.0	°C	Gas Velocity	3.9	m/s	
Type of Fuel	-		Moisture	3.28	%	Flow Rate (Actual Q2)	6487	Nm ³ /hr	
Analyte	Sampled Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location		
Air Testing	Sulfuric acid	ppm	0.01	<0.01	25	U.S. Environmental Protection Agency, EPA Method 8	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 : Jitakorn Srivasa วณิชญานันท์ 7-323-4-0007, Naratip Thueakchalam วณิชญานันท์ 7-204-4-0003

Remark :

- * LOD : Limit of Detection
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Technical Management

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Approved by

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S. Reports_Lab_Sheet_Gr_M (11/32AM)



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: 2523751

Date Received : May 23, 2025
Date Reported : May 31, 2025
Report Number: 3254908-2

Page 1 of 1

Sample Number 2523751-1
Sample Date May 23, 2025
Sample Description Emission from Stationary Source
Location ไผ่ขามสุไพร Poly propylene filter type 1-4
Date Analysis Commenced May 26, 2025
Condition of Sample Extracted into two amber plastic bottles, refrigerated

Stack Description				
Ambient Pressure	754	mmHg	Diameter	0.80
Ambient Temperature	33.0	°C	Shape	Circle
Type of Process			Stack Temperature	35.0
Type of Fuel			Moisture	3.28
Analyte			Unit	LOD (LOR)
			Sampled Time	LOQ
			Method	Result
			Flow Rate (Actual O2)	%
			Gas Velocity	m/s
			Carbon Dioxide	%
			Oxygen	%

Air Testing				
Phosphoric acid	11:40 AM - 12:10 PM	mg/m3	0.05	<0.05
			U.S. Environmental Protection Agency, EPA Method 26	Bangkok

Sampling By: Jitakorn Siwasa , Naratip Thuakchalam

Remark:
LOD : Limit of Detection
"c" : Lower than LOD (Unit of Quantitation) / LOR (Unit of Reporting)

Approved by

Orawan R.

Orawan Rakying
Scientist (3)

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Sitepeds_Air_Spec_MQL_v01 (10/2024)

ภาคผนวก ค-2

คุณภาพอากาศในบรรยากาศ



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 :
Project Name : Environment : EIA
Project Location :
Lot ID: 2523755
Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

Page 1 of 28

Sample Number	2523755-1
Sample Date	Mar 28, 2025
Sample Description	Air Quality
Location	พื้นที่ชุมชนและโรงงาน (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	30.0 °C

Analyte	Sampled Date/Time	Unit	LOD (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing							
Phosphoric acid *	28/03/25 - 29/03/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	28/03/25 - 29/03/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	28/03/25 - 29/03/25	mg/m3	0.002	0.067	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhaonsakda

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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- Sampling is not included in scope of accreditation ISO/IEC 17025

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Approved by

Thanita Kulauriwong
Scientist (4)

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NIGHT SOLUTIONS PRESENTS

2279-671 BKK

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 :
Project Name : Environment : EIA
Project Location :
Lot ID: 2523755
Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

Page 2 of 28

Sample Number	2523755-2
Sample Date	Mar 29, 2025
Sample Description	Air Quality
Location	พื้นที่ชุมชนและโรงงาน (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOD (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing							
Phosphoric acid *	29/03/25 - 30/03/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	29/03/25 - 30/03/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	29/03/25 - 30/03/25	mg/m3	0.002	0.041	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhaonsakda

Remark :

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NIGHT SOLUTIONS PRESENTS

2279-671 BKK



Analysis / Test Report

TESTING
No.0042

Lot ID: 2523755

Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

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 :

Page 3 of 28

Sample Number	2523755-3
Sample Date	Mar 30, 2025
Sample Description	Air Quality
Location	ถนนสุขุมวิทสายใหม่ (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	30/03/25 - 31/03/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	30/03/25 - 31/03/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	30/03/25 - 31/03/25	mg/m ³	-	0.002	0.026	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakda

Remark :

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3277-03 (LMS)

Analysis / Test Report

TESTING
No.0042

Lot ID: 2523755

Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

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 :

Page 4 of 28

Sample Number	2523755-4
Sample Date	Mar 31, 2025
Sample Description	Air Quality
Location	ถนนสุขุมวิทสายใหม่ (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	31/03/25 - 01/04/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	31/03/25 - 01/04/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	31/03/25 - 01/04/25	mg/m ³	-	0.002	0.055	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakda

Remark :

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3277-03 (LMS)



TESTING
No.0042

Lot ID: 2523755

Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

Page 5 of 28

Analysis / Test Report

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

Sample Number : 2523755-5
Sample Date : Apr 01, 2025
Sample Description : Air Quality
Location : ถนนสุขุมวิท (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced : Apr 08, 2025
Condition of Sample : Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated.
Barometric Pressure : 757 mmHg
Atmospheric Temperature : 29.0 °C

Analyte	Sampled Date/Time	Unit	LOD (LOR)	Result	Guideline Limit	Method	Guideline Location
Air Testing							
Phosphoric acid *	01/04/25 - 02/04/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	01/04/25 - 02/04/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	01/04/25 - 02/04/25	mg/m3	0.002	0.078	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakda

Remark :

- LOD : Limit of Detection
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- Sampling is not included in scope of accreditation ISO/IEC 17025

Thank.

Approved by

Thanita Kulurwong
Scientist (4)

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232-63/046



Analysis / Test Report

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

Sample Number : 2523755-6
Sample Date : Apr 02, 2025
Sample Description : Air Quality
Location : ถนนสุขุมวิท (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced : Apr 08, 2025
Condition of Sample : Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated.
Barometric Pressure : 757 mmHg
Atmospheric Temperature : 29.0 °C

Analyte	Sampled Date/Time	Unit	LOD (LOR)	Result	Guideline Limit	Method	Guideline Location
Air Testing							
Phosphoric acid *	02/04/25 - 03/04/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	02/04/25 - 03/04/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	02/04/25 - 03/04/25	mg/m3	0.002	0.049	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakda

Remark :

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Thank.

Thanita Kulurwong
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 :

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 2523755

Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

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Sample Number	2523755-7
Sample Date	Apr 03, 2025
Sample Description	Air Quality
Location	อำเภอวังจันทร์ (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	03/04/25 - 04/04/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	03/04/25 - 04/04/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	03/04/25 - 04/04/25	mg/m ³	-	0.002	0.032	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakda

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Thanitak.

Approved by

Thanita Kulsurirong
Scientist (4)

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237462/THAI

Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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21120

P/O :

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 2523755

Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

Page 8 of 28

Sample Number	2523755-8
Sample Date	Mar 28, 2025
Sample Description	Air Quality
Location	อำเภอวังจันทร์ (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	30.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	28/03/25 - 29/03/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	28/03/25 - 29/03/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	28/03/25 - 29/03/25	mg/m ³	-	0.002	0.050	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	NEB No.24 Rayong	

Guideline :

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

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Analysis / Test Report

TESTING
No.0042

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21120

P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 2523755

Date Received : Apr 04, 2025

Date Reported : Apr 18, 2025

Report Number: 3254920-1

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Sample Number	2523755-9							
Sampled Date	Mar 29, 2025							
Sample Description	Air Quality							
Location	ชุมชนบ้านใหม่ (A2) (GPS 47° 07'42.003, 141°17'39.7)							
Date Analysis Commenced	Apr 08, 2025							
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	29.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	29/03/25 - 30/03/25	mg/m3	-	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG
Sulfuric acid *	29/03/25 - 30/03/25	mg/m3	-	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG
Total Suspended Particulate	29/03/25 - 30/03/25	mg/m3	-	-	0.002	0.032	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008

Guideline :

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Analysis / Test Report

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21120

P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 2523755

Date Received : Apr 04, 2025

Date Reported : Apr 18, 2025

Report Number: 3254920-1

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Sample Number	2523755-10								
Sampled Date	Mar 30, 2025								
Sample Description	Air Quality								
Location	ชุมชนบ้านใหม่ (A2) (GPS 47° 07'42.003, 141.7397)								
Date Analysis Commenced	Apr 08, 2025								
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	29.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Location	

Guideline :

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

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Analysis / Test Report

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21120

P/O :

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 2523755

Date Received : Apr 04, 2025

Date Reported : Apr 18, 2025

Report Number : 3254920-1

Page 11 of 26

Sample Number	2523755-11
Sample Date	Mar 31, 2025
Sample Description	Air Quality
Location	บริเวณบ้าน (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	31/03/25 - 01/04/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	31/03/25 - 01/04/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	31/03/25 - 01/04/25	mg/m ³	-	0.002	0.031	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakda

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Thanitak.

Approved by

Thanita Kulsurwong
Scientist (4)

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2375-02/EMAIL



Analysis / Test Report

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21120

P/O :

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 2523755

Date Received : Apr 04, 2025

Date Reported : Apr 18, 2025

Report Number : 3254920-1

Page 12 of 26

Sample Number	2523755-12
Sample Date	Apr 01, 2025
Sample Description	Air Quality
Location	บริเวณบ้าน (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	01/04/25 - 02/04/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	01/04/25 - 02/04/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	01/04/25 - 02/04/25	mg/m ³	-	0.002	0.057	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	NEB No.24 Rayong	

Guideline :

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Thanita Kulsurwong
Scientist (4)

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Analysis / Test Report

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No.0042

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21120
P/O :
Project Name : Environment : EIA
Project Location :

Lot ID: 2523755

Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

Page 13 of 28

Sample Number	2523755-13
Sampled Date	Apr 02, 2025
Sample Description	Air Quality
Location	ชุมชนบ้านใหม่ (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOD (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing							
Phosphoric acid *	02/04/25 - 03/04/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	02/04/25 - 03/04/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	02/04/25 - 03/04/25	mg/m3	0.002	0.037	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	NEB No.24-Rayong

Guideline :

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Sampled By : Anurak Tongkhajonsakda

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2523755-13



Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
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21120
P/O :
Project Name : Environment : EIA
Project Location :

Lot ID: 2523755

Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

Page 14 of 28

Sample Number	2523755-14
Sampled Date	Apr 03, 2025
Sample Description	Air Quality
Location	ชุมชนบ้านใหม่ (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOD (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing							
Phosphoric acid *	03/04/25 - 04/04/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	03/04/25 - 04/04/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	03/04/25 - 04/04/25	mg/m3	0.002	0.021	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakda

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2523755-14

Approved by

Approved by

Thanita Kulsuriwong
Scientist (4)

Thanita Kulsuriwong
Scientist (4)



Analysis / Test Report

TESTING
No.0042

Lot ID: 2523755
Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

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

P/O :
Project Name : Environment : EIA
Project Location :

Page 15 of 26

Sample Number	2523755-15
Sample Date	Mar 28, 2025
Sample Description	Air Quality
Location	บ้านสวน (A3) (GPS 47P 0744066, 1430470)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	30.0 °C

Analyte	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing								
Phosphoric acid *	28/03/25 - 29/03/25	mg/m ³	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	28/03/25 - 29/03/25	mg/m ³	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	28/03/25 - 29/03/25	mg/m ³	0.002	0.039	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	NEB No.24 Rayong	

Guideline :

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Sampled By : Anurak Tongkajonsakda

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- Sampling is not included in scope of accreditation ISO/IEC 17025

Thanitak.

Approved by

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Scientist (4)

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2372 62/THAI



Analysis / Test Report

TESTING
No.0042

Lot ID: 2523755
Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

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

P/O :
Project Name : Environment : EIA
Project Location :

Page 16 of 28

Sample Number	2523755-16
Sample Date	Mar 29, 2025
Sample Description	Air Quality
Location	บ้านสวน (A3) (GPS 47P 0744066, 1420470)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing								
Phosphoric acid *	29/03/25 - 30/03/25	mg/m ³	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	29/03/25 - 30/03/25	mg/m ³	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	29/03/25 - 30/03/25	mg/m ³	0.002	0.068	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkajonsakda

Remark :

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Thanitak.

Approved by

Thanita Kulsurwong
Scientist (4)

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RIGHT SOLUTIONS THROUGH BETTER TESTING

2372 62/THAI



TESTING
No.0042

Lot ID: 2523755

Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

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 :
Project Name : Environment : EIA
Project Location :

Page 17 of 28

Sample Number	2523755-17
Sampled Date	Mar 30, 2025
Sample Description	Air Quality
Location	บ้านสวน (A3) (GPS 47° 07'40.66, 142°04'70)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	30/03/25 - 31/03/25	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	30/03/25 - 31/03/25	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	30/03/25 - 31/03/25	mg/m3	-	0.002	0.088	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakda

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MIGHT SOLUTIONS THROUGH PARTNERS

3254920-1/17



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 :
Project Name : Environment : EIA
Project Location :

Page 18 of 28

Sample Number	2523755-18
Sampled Date	Mar 31, 2025
Sample Description	Air Quality
Location	บ้านสวน (A3) (GPS 47° 07'40.66, 142°04'70)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	31/03/25 - 01/04/25	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	31/03/25 - 01/04/25	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	31/03/25 - 01/04/25	mg/m3	-	0.002	0.052	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakda

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MIGHT SOLUTIONS THROUGH PARTNERS

3254920-1/18



Analysis / Test Report

TESTING
No.0042

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: 2523755
Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

Page 19 of 28

Sample Number 2523755-19
Sample Date Apr 01, 2025
Sample Description Air Quality
Location ตำบลบ้านใหม่ (A3) (GPS 47P 0744066, 1420470)
Date Analysis Commenced Apr 08, 2025
Condition of Sample Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 29.0 °C

Analyte	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing								
Phosphoric acid *	01/04/25 - 02/04/25	mg/m ³	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	01/04/25 - 02/04/25	mg/m ³	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	01/04/25 - 02/04/25	mg/m ³	0.002	0.178	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakda

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277497/THM



Analysis / Test Report

TESTING
No.0042

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: 2523755
Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

Page 20 of 28

Sample Number 2523755-20
Sample Date Apr 02, 2025
Sample Description Air Quality
Location ตำบลบ้านใหม่ (A3) (GPS 47P 0744066, 1420470)
Date Analysis Commenced Apr 08, 2025
Condition of Sample Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 29.0 °C

Analyte	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing								
Phosphoric acid *	02/04/25 - 03/04/25	mg/m ³	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	02/04/25 - 03/04/25	mg/m ³	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	02/04/25 - 03/04/25	mg/m ³	0.002	0.082	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	NEB No.24 Rayong	

Guideline :

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

Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Bankhai, Rayong Thailand
21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2523755
Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

TESTING
No.0042

Lot ID: 2523755
Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

Page 21 of 28

Page 22 of 28

Sample Number	2523755-21
Sample Date	Apr 03, 2025
Sample Description	Air Quality
Location	ท่าเรือ (A3) (GPS 47P 0744066, 1420470)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	03/04/25 - 04/04/25	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	03/04/25 - 04/04/25	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	03/04/25 - 04/04/25	mg/m3	-	0.002	0.040	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tonghajsakda

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0272-621940

Sample Number	2523755-22
Sample Date	Mar 28, 2025
Sample Description	Air Quality
Location	ท่าเรือ (A4) (GPS 47P 0747515, 1419157)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	30.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	28/03/25 - 29/03/25	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	28/03/25 - 29/03/25	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	28/03/25 - 29/03/25	mg/m3	-	0.002	0.105	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tonghajsakda

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0272-621940



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 :

Project Name : Environment : EIA

Project Location :

Lot ID: 2523755

Date Received : Apr 04, 2025

Date Reported : Apr 18, 2025

Report Number : 3254920-1

Page 23 of 28

Sample Number	2523755-23
Sampled Date	Mar 29, 2025
Sample Description	Air Quality
Location	บริเวณทางเข้า (A4) (GPS 47P 0747515, 1419157)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	29/03/25 - 30/03/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	29/03/25 - 30/03/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	29/03/25 - 30/03/25	mg/m ³	-	0.002	0.068	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	NEB No.24 Rayong

Guideline :

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Sampled By : Anurak Tongkijjongsakda

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2272-62/THAI



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 :

Project Name : Environment : EIA

Project Location :

Lot ID: 2523755

Date Received : Apr 04, 2025

Date Reported : Apr 18, 2025

Report Number : 3254920-1

Page 24 of 28

Sample Number	2523755-24
Sampled Date	Mar 30, 2025
Sample Description	Air Quality
Location	บริเวณทางเข้า (A4) (GPS 47P 0747515, 1419157)
Date Analysis Commenced	Apr 08, 2025
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	30/03/25 - 31/03/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	30/03/25 - 31/03/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	30/03/25 - 31/03/25	mg/m ³	-	0.002	0.042	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	NEB No.24 Rayong

Guideline :

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Analysis / Test Report

TESTING
No.0042

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

Lot ID: 2523755

Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

Page 25 of 28

Sample Number	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	31/03/25 - 01/04/25	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	31/03/25 - 01/04/25	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	31/03/25 - 01/04/25	mg/m3	-	0.002	0.025	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tonghajsakda

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RIGHT SOLUTIONS RIGHT PARTNER

0239-801044



Analysis / Test Report

TESTING
No.0042

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

Lot ID: 2523755

Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

Page 26 of 28

Sample Number	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	01/04/25 - 02/04/25	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	01/04/25 - 02/04/25	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	01/04/25 - 02/04/25	mg/m3	-	0.002	0.072	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tonghajsakda

Remark :

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- Sampling is not included in scope of accreditation ISO/IEC 17025

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0239-801044



Analysis / Test Report

TESTING
No.0042

Lot ID: 2523755

Date Received : Apr 04, 2025
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Report Number : 3254920-1

Client : Michelin Siam Co., Ltd.
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21120

P/O :
Project Name : Environment : EIA
Project Location :

Page 27 of 28

Sample Number	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
2523755-27	Apr 02, 2025	Air Quality							
Sample Description	Air Quality								
Location	หมู่ที่ ๓ ตำบลบ้านใหม่ (A4) (GPS 47P 0747515, 1419157)								
Date Analysis Commenced	Apr 08, 2025								
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	29.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	02/04/25 - 03/04/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	02/04/25 - 03/04/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	02/04/25 - 03/04/25	mg/m ³	-	0.002	0.035	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakda

Remark :

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

Thanitak.

Approved by

Thanita Kulsriwong
Scientist (4)

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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227-42/THAI



Analysis / Test Report

TESTING
No.0042

Lot ID: 2523755

Date Received : Apr 04, 2025
Date Reported : Apr 18, 2025
Report Number : 3254920-1

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

P/O :
Project Name : Environment : EIA
Project Location :

Page 28 of 28

Sample Number	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
2523755-28	Apr 03, 2025	Air Quality							
Sample Description	Air Quality								
Location	หมู่ที่ ๓ ตำบลบ้านใหม่ (A4) (GPS 47P 0747515, 1419157)								
Date Analysis Commenced	Apr 08, 2025								
Condition of Sample	Drawn into one filter paper placed in plastic cassette and one sorbent tube, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	29.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	03/04/25 - 04/04/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	03/04/25 - 04/04/25	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	03/04/25 - 04/04/25	mg/m ³	-	0.002	0.034	0.33	United States Environmental Protection Agency 40 CFR, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakda

Remark :

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

Approved by

Thanita Kulsriwong
Scientist (4)

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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RIGHT SOLUTIONS INHITAT PRAK THAI

227-42/THAI



Analysis / Test Report

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

Lot ID: 2523756

Date Received : Apr 07, 2025
Date Reported : Apr 11, 2025
Report Number: 3281652-1

Page 1 of 1

Sample Description		Air Quality													
Location		ถนนสุขุมวิท (A1) (GPS 478 0742960, 1419452)													
Parameter		Nitrogen dioxide (ppm)													
Measurement Date		Mar 28, 2025 - Apr 04, 2025													
Measurement by		Anurak Tongkhajonsakda													
Time		2523756-1		2523756-2		2523756-3		2523756-4		2523756-5		2523756-6		2523756-7	
		Mar 28, 2025	Mar 29, 2025	Mar 29, 2025	Mar 30, 2025	Mar 30, 2025	Mar 31, 2025	Mar 31, 2025	Mar 31, 2025	Mar 31, 2025	Mar 31, 2025	Mar 31, 2025	Mar 31, 2025	Mar 31, 2025	Mar 31, 2025
09:00 AM - 10:00 AM		0.0210	0.0106	0.0040	0.0041	0.0021	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017
10:00 AM - 11:00 AM		0.0233	0.0089	0.0038	0.0034	0.0024	0.0015	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0015
11:00 AM - 12:00 PM		0.0045	0.0064	0.0046	0.0026	0.0027	0.0020	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
12:00 PM - 01:00 PM		0.0046	0.0049	0.0037	0.0016	0.0024	0.0015	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014
01:00 PM - 02:00 PM		0.0050	0.0046	0.0028	0.0018	0.0026	0.0015	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024	0.0015
02:00 PM - 03:00 PM		0.0098	0.0053	0.0018	0.0018	0.0018	0.0018	0.0018	0.0018	0.0018	0.0018	0.0018	0.0018	0.0018	0.0012
03:00 PM - 04:00 PM		0.0060	0.0050	0.0017	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
04:00 PM - 05:00 PM		0.0171	0.0107	0.0017	0.0016	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0020
05:00 PM - 06:00 PM		0.0206	0.0139	0.0020	0.0015	0.0024	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0089
06:00 PM - 07:00 PM		0.0220	0.0068	0.0031	0.0018	0.0026	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0127
07:00 PM - 08:00 PM		0.0263	0.0124	0.0051	0.0018	0.0032	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0085
08:00 PM - 09:00 PM		0.0225	0.0195	0.0125	0.0016	0.0027	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0066
09:00 PM - 10:00 PM		0.0169	0.0187	0.0141	0.0021	0.0019	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0054
10:00 PM - 11:00 PM		0.0183	0.0235	0.0141	0.0018	0.0016	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0054
11:00 PM - 12:00 AM		0.0202	0.0231	0.0145	0.0019	0.0015	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0058
12:00 AM - 01:00 AM		0.0198	0.0165	0.0126	0.0023	0.0013	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0051
01:00 AM - 02:00 AM		0.0181	0.0041	0.0125	0.0017	0.0014	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0057
02:00 AM - 03:00 AM		0.0158	0.0104	0.0119	0.0018	0.0012	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0074
03:00 AM - 04:00 AM		0.0224	0.0170	0.0120	0.0023	0.0022	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0100
04:00 AM - 05:00 AM		0.0167	0.0189	0.0133	0.0019	0.0021	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0174
05:00 AM - 06:00 AM		0.0136	0.0202	0.0147	0.0019	0.0017	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0202
06:00 AM - 07:00 AM		0.0152	0.0229	0.0121	0.0054	0.0012	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0230
07:00 AM - 08:00 AM		0.0189	0.0154	0.0089	0.0042	0.0010	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0180
08:00 AM - 09:00 AM		0.0146	0.0089	0.0058	0.0022	0.0015	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0180
Average		0.0164	0.0129	0.0081	0.0023	0.0019	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0079
1hr - Maximum		0.0263	0.0235	0.0147	0.0054	0.0032	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0230
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-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O :
Date Received : Apr 07, 2025
Date Reported : Apr 11, 2025
Report Number : 3254924-1

Lot ID: 2523756

Project Name : Environment : EIA
Project Location :

Page 1 of 1

Sample Description		Air Quality	
Location	สารนิคม (A3) (GPS 47P 0744066, 1420470)	Nitrogen dioxide (ppm)	
Parameter		Mar 29, 2025 - Apr 04, 2025	
Measurement Date		Anurak Tongkhajonsakda	
Measurement by			
Time		2523756-15	2523756-16
11:00 AM - 12:00 PM		0.0031	0.0061
12:00 PM - 01:00 PM		0.0059	0.0058
01:00 PM - 02:00 PM		0.0046	0.0049
02:00 PM - 03:00 PM		0.0107	0.0045
03:00 PM - 04:00 PM		0.0050	0.0079
04:00 PM - 05:00 PM		0.0081	0.0069
05:00 PM - 06:00 PM		0.0103	0.0068
06:00 PM - 07:00 PM		0.0098	0.0046
07:00 PM - 08:00 PM		0.0135	0.0081
08:00 PM - 09:00 PM		0.0168	0.0152
09:00 PM - 10:00 PM		0.0191	0.0126
10:00 PM - 11:00 PM		0.0242	0.0070
11:00 PM - 12:00 AM		0.0231	0.0070
12:00 AM - 01:00 AM		0.0239	0.0063
01:00 AM - 02:00 AM		0.0221	0.0060
02:00 AM - 03:00 AM		0.0182	0.0053
03:00 AM - 04:00 AM		0.0169	0.0045
04:00 AM - 05:00 AM		0.0036	0.0051
05:00 AM - 06:00 AM		0.0043	0.0057
06:00 AM - 07:00 AM		0.0037	0.0102
07:00 AM - 08:00 AM		0.0035	0.0068
08:00 AM - 09:00 AM		0.0031	0.0194
09:00 AM - 10:00 AM		0.0075	0.0245
10:00 AM - 11:00 AM		0.0077	0.0219
Average		0.0114	0.0100
1hr - Maximum		0.0242	0.0464
Standard 1hr - Average		0.170	0.170
Standard		0.170	0.170
Reference Method		: Notification of the National Environment Board No. 33, 2009 (B.E. 2552). : US EPA Method Part 50 App. F (Chemiluminescence)	

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Approved by

Saranya C.
Saranya Chalerthamrong
Scientist (4)

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S: Reports_Air SOINOP.rpt (11:15AM)



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 :
Date Received : Apr 07, 2025
Date Reported : Apr 11, 2025
Report Number : 3254924-1

Lot ID: 2523756

Project Name : Environment : EIA
Project Location :

Page 1 of 1

Sample Description		Air Quality	
Location	สารนิคม (A3) (GPS 47P 0747515, 1419157)	Nitrogen dioxide (ppm)	
Parameter		Mar 28, 2025 - Apr 04, 2025	
Measurement Date		Anurak Tongkhajonsakda	
Measurement by			
Time		2523756-22	2523756-23
12:00 PM - 01:00 PM		0.0087	0.0052
01:00 PM - 02:00 PM		0.0087	0.0086
02:00 PM - 03:00 PM		0.0085	0.0079
03:00 PM - 04:00 PM		0.0114	0.0111
04:00 PM - 05:00 PM		0.0145	0.0079
05:00 PM - 06:00 PM		0.0161	0.0129
06:00 PM - 07:00 PM		0.0197	0.0101
07:00 PM - 08:00 PM		0.0176	0.0109
08:00 PM - 09:00 PM		0.0190	0.0121
09:00 PM - 10:00 PM		0.0161	0.0103
10:00 PM - 11:00 PM		0.0130	0.0082
11:00 PM - 12:00 AM		0.0095	0.0075
12:00 AM - 01:00 AM		0.0078	0.0067
01:00 AM - 02:00 AM		0.0095	0.0061
02:00 AM - 03:00 AM		0.0101	0.0085
03:00 AM - 04:00 AM		0.0081	0.0080
04:00 AM - 05:00 AM		0.0107	0.0091
05:00 AM - 06:00 AM		0.0136	0.0141
06:00 AM - 07:00 AM		0.0157	0.0149
07:00 AM - 08:00 AM		0.0122	0.0119
08:00 AM - 09:00 AM		0.0083	0.0085
09:00 AM - 10:00 AM		0.0098	0.0065
10:00 AM - 11:00 AM		0.0073	0.0069
11:00 AM - 12:00 PM		0.0059	0.0072
Average		0.0117	0.0091
1hr - Maximum		0.0197	0.0149
Standard 1hr - Average		0.170	0.170
Standard		0.170	0.170
Reference Method		: Notification of the National Environment Board No. 33, 2009 (B.E. 2552). : US EPA Method Part 50 App. F (Chemiluminescence)	

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Approved by

Saranya C.
Saranya Chalerthamrong
Scientist (4)

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S: Reports_Air SOINOP.rpt (11:14AM)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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

Lot ID: 2523757

Date Received : Apr 07, 2025

Date Reported : Apr 11, 2025

Report Number : 3254931-1

P/O :

Project Name : Environment : EIA

Project Location :

Sample Number : 2523757-1 to 7

Parameter : Wind Speed / Wind Direction

Location : อำเภอวังจันทร์ (A1) (GPS 47P 0742960, 1419452)

Sampling Date : Mar 28 - Apr 04, 2025

Sampling by : Anurak Tongkhajonsakda

Page 1 of 2

Time	Mar 28 - Mar 29, 2025	Mar 30 - Mar 31, 2025	Mar 31 - Apr 01, 2025	Apr 01 - Apr 02, 2025	Apr 02 - Apr 03, 2025	Apr 03 - Apr 04, 2025
	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)
09:00 AM - 10:00 AM	0.9 156.0 SSE	4.2 168.0 SSE	0.0 -	1.9 168.0 SSE	0.7 150.0 SSE	2.7 148.0 SSE
10:00 AM - 11:00 AM	1.8 172.0 S	1.9 195.0 SSW	1.1 178.0 S	1.5 161.0 SSE	1.2 199.0 SSW	3.3 170.0 S
11:00 AM - 12:00 PM	2.8 165.0 SSE	1.9 165.0 SSE	1.1 158.0 SSE	2.4 195.0 SSW	1.9 160.0 SSE	2.0 189.0 S
12:00 PM - 01:00 PM	0.6 160.0 SSE	2.0 161.0 SSE	2.1 124.0 SE	3.2 177.0 S	0.9 132.0 SE	1.3 171.0 S
01:00 PM - 02:00 PM	2.2 130.0 SE	2.7 165.0 SSE	0.5 183.0 S	2.3 176.0 S	1.2 212.0 SSW	3.0 159.0 SSE
02:00 PM - 03:00 PM	2.6 201.0 SSW	3.5 155.0 SSE	1.3 171.0 S	1.4 171.0 S	1.2 157.0 SSE	1.4 157.0 SSE
03:00 PM - 04:00 PM	1.9 157.0 SSE	2.5 170.0 S	1.9 158.0 SSE	2.4 175.0 S	2.6 191.0 S	2.6 169.0 S
04:00 PM - 05:00 PM	1.7 178.0 S	1.3 178.0 S	1.7 191.0 S	4.0 179.0 S	2.7 175.0 S	2.6 203.0 SSW
05:00 PM - 06:00 PM	1.2 145.0 SE	1.2 148.0 SSE	1.2 165.0 SSE	1.0 150.0 SSE	0.9 198.0 SSE	2.3 146.0 SE
06:00 PM - 07:00 PM	1.1 158.0 SSE	1.3 159.0 SSE	1.0 156.0 SSE	1.9 165.0 SSE	1.1 162.0 SSE	1.2 150.0 SSE
07:00 PM - 08:00 PM	2.0 131.0 SE	0.8 167.0 SSE	1.2 152.0 SSE	1.1 172.0 S	1.3 164.0 SSE	3.2 183.0 S
08:00 PM - 09:00 PM	1.5 170.0 S	1.6 150.0 SSE	1.1 125.0 SE	0.6 162.0 SSE	2.5 167.0 SSE	1.8 181.0 S
09:00 PM - 10:00 PM	3.1 164.0 SSE	2.2 165.0 SSE	0.7 155.0 SSE	1.7 181.0 S	0.0 -	2.7 165.0 SSE
10:00 PM - 11:00 PM	1.6 169.0 S	1.4 165.0 SSE	1.8 167.0 SSE	0.6 158.0 SSE	0.7 199.0 SSW	0.9 191.0 S
11:00 PM - 12:00 AM	1.4 175.0 S	1.3 209.0 SSW	1.6 160.0 SSE	2.8 178.0 S	1.4 311.0 NW	2.3 152.0 SSE
12:00 AM - 01:00 AM	1.8 155.0 SSE	1.0 170.0 S	0.9 177.0 S	1.2 180.0 S	0.8 160.0 SSE	2.8 142.0 SE
01:00 AM - 02:00 AM	1.7 155.0 SSE	1.1 185.0 S	1.4 183.0 S	1.3 166.0 SSE	0.8 175.0 S	0.6 165.0 SSE
02:00 AM - 03:00 AM	1.4 169.0 S	1.1 169.0 S	2.4 173.0 S	1.7 170.0 S	0.9 189.0 S	0.8 206.0 SSW
03:00 AM - 04:00 AM	1.5 166.0 SSE	3.0 157.0 SSE	0.8 172.0 S	2.0 178.0 S	0.7 169.0 S	0.3 187.0 S
04:00 AM - 05:00 AM	1.1 170.0 S	2.5 164.0 SSE	0.8 159.0 SSE	2.3 169.0 S	1.4 176.0 S	0.8 193.0 SSW
05:00 AM - 06:00 AM	2.4 145.0 SE	0.2 -	0.3 163.0 SSE	0.9 156.0 SSE	0.9 173.0 S	1.2 167.0 SSE
06:00 AM - 07:00 AM	0.9 178.0 S	1.3 177.0 S	0.7 160.0 SSE	3.0 177.0 S	2.3 141.0 SE	0.5 167.0 SSE
07:00 AM - 08:00 AM	0.5 142.0 SE	0.5 185.0 S	0.9 175.0 S	2.5 160.0 SSE	2.8 175.0 S	0.4 50.0 NE
08:00 AM - 09:00 AM	0.9 178.0 S	1.0 158.0 SSE	0.7 185.0 S	1.6 179.0 S	2.8 172.0 S	0.0 -

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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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

Lot ID: 2523757

Date Received : Apr 07, 2025

Date Reported : Apr 11, 2025

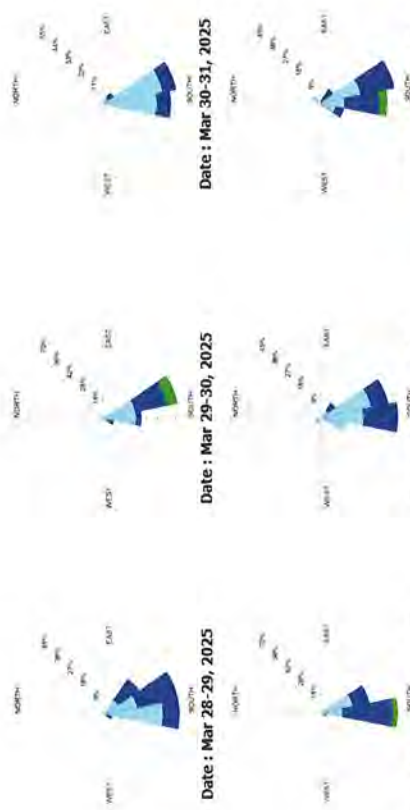
Report Number : 3254931-1

P/O :

Project Name : Environment : EIA

Project Location :

Wind Rose



Date : Mar 28-29, 2025

Date : Mar 29-30, 2025

Date : Mar 30-31, 2025

Date : Apr 01-02, 2025

WS (m/s)	%
> 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	2.38
1.7-3.3	35.71
0.3-1.7	56.55
Calms	5.36

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Sarayuth Jitranont

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Client : Michelin Siam Co., Ltd.

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

P/O :

Project Name : Environment : EIA

Project Location :

Analysis / Test Report

Lot ID: 2523757

Date Received : Apr 07, 2025

Date Reported : Apr 11, 2025

Report Number : 3254931-1

Sample Number : 2523757-8 to 14

Parameter : Wind Speed / Wind Direction

Location : ชุมชนบ้าน (A2) (GPS 47P 0742003, 1417397)

Sampling Date : Mar 28 - Apr 04, 2025

Sampling by : Anurak Tongkajonsakda

Time	Mar 28 - Mar 29, 2025		Mar 29 - Mar 30, 2025		Mar 30 - Mar 31, 2025		Mar 31 - Apr 01, 2025		Apr 01 - Apr 02, 2025		Apr 02 - Apr 03, 2025		Apr 03 - Apr 04, 2025	
	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	0.6	186.0 S	0.0	-	1.0	152.0 SSE	0.4	199.0 SSW	1.4	156.0 SSE	0.8	203.0 SSW	0.4	196.0 SSW
11:00 AM - 12:00 PM	0.6	225.0 SW	0.5	142.0 SE	2.3	131.0 SE	0.7	172.0 S	2.0	183.0 S	0.5	224.0 SW	0.4	175.0 S
12:00 PM - 01:00 PM	0.8	179.0 S	1.3	221.0 SW	2.2	145.0 SE	0.6	222.0 SW	0.0	-	0.4	210.0 SSW	2.4	121.0 ESE
01:00 PM - 02:00 PM	0.4	147.0 SSE	0.8	120.0 ESE	1.0	177.0 S	0.8	226.0 SW	1.5	229.0 SW	0.7	178.0 S	0.9	125.0 SE
02:00 PM - 03:00 PM	0.9	129.0 SE	1.9	174.0 S	0.4	227.0 SW	0.5	240.0 WSW	1.6	215.0 SW	0.2	-	0.5	143.0 SE
03:00 PM - 04:00 PM	0.3	160.0 SSE	1.5	207.0 SSW	0.2	-	0.7	209.0 SSW	2.4	246.0 WSW	0.7	161.0 SSE	0.6	210.0 SSW
04:00 PM - 05:00 PM	0.6	214.0 SW	1.8	189.0 S	0.7	208.0 SSW	3.4	199.0 SSE	0.9	196.0 SSW	0.0	-	0.4	156.0 SSE
05:00 PM - 06:00 PM	0.8	237.0 WSW	0.7	214.0 SW	1.6	171.0 S	3.1	216.0 SW	1.3	239.0 WSW	0.0	-	1.1	219.0 SW
06:00 PM - 07:00 PM	0.6	223.0 SW	0.9	164.0 SSE	0.7	217.0 SW	0.6	234.0 SW	0.7	221.0 SW	0.6	238.0 WSW	1.2	133.0 SE
07:00 PM - 08:00 PM	0.3	219.0 SW	0.6	238.0 WSW	0.9	185.0 S	0.6	170.0 S	1.3	217.0 SW	0.8	186.0 S	2.6	237.0 WSW
08:00 PM - 09:00 PM	0.4	233.0 SW	1.8	220.0 SW	1.6	139.0 SE	1.1	226.0 SW	1.2	235.0 SW	0.0	-	2.4	223.0 SW
09:00 PM - 10:00 PM	0.3	194.0 SSW	0.0	-	0.4	160.0 SSE	1.0	195.0 SSW	1.0	208.0 SSW	0.1	-	3.4	244.0 WSW
10:00 PM - 11:00 PM	1.4	240.0 WSW	0.0	-	0.6	146.0 SE	0.3	209.0 SSW	1.4	158.0 SSE	0.0	-	1.4	198.0 SSW
11:00 PM - 12:00 AM	1.2	184.0 S	0.0	-	0.4	154.0 SSE	0.6	201.0 SSW	2.0	158.0 SSE	0.5	153.0 SSE	1.5	198.0 SSW
12:00 AM - 01:00 AM	1.9	202.0 SSW	0.4	183.0 S	0.8	204.0 SSW	0.2	-	1.0	172.0 S	1.2	207.0 SSW	2.0	180.0 S
01:00 AM - 02:00 AM	0.9	177.0 S	0.0	-	0.0	-	0.3	208.0 SSW	0.6	135.0 SE	0.5	144.0 SE	1.8	223.0 SW
02:00 AM - 03:00 AM	0.7	127.0 SE	1.0	174.0 S	0.4	229.0 SW	0.4	226.0 SW	2.0	181.0 S	1.1	230.0 SW	0.8	173.0 S
03:00 AM - 04:00 AM	0.8	131.0 SE	3.0	242.0 WSW	0.8	225.0 SW	0.2	-	0.9	213.0 SSW	0.6	126.0 SE	0.1	-
04:00 AM - 05:00 AM	1.8	145.0 SE	0.0	-	0.2	-	0.6	176.0 S	0.3	231.0 SW	0.7	176.0 S	0.5	127.0 SE
05:00 AM - 06:00 AM	0.2	-	0.3	137.0 SE	0.6	222.0 SW	0.4	233.0 SW	0.4	118.0 ESE	1.2	221.0 SW	0.9	158.0 SSE
06:00 AM - 07:00 AM	0.2	-	0.4	187.0 S	0.5	236.0 SW	0.0	-	0.6	168.0 SSE	1.3	239.0 WSW	0.4	166.0 SSE
07:00 AM - 08:00 AM	0.3	165.0 SSE	0.0	-	0.7	199.0 SSW	0.0	-	0.7	211.0 SSW	0.6	196.0 SSW	0.6	182.0 S
08:00 AM - 09:00 AM	1.3	151.0 SSE	0.1	-	0.7	245.0 WSW	0.5	210.0 SSW	0.5	93.0 E	0.4	246.0 WSW	1.4	179.0 S
09:00 AM - 10:00 AM	0.9	151.0 SSE	0.0	-	1.0	181.0 S	1.0	174.0 S	0.8	249.0 WSW	0.3	182.0 S	1.1	160.0 SSE

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Client : Michelin Siam Co., Ltd.

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

P/O :

Project Name : Environment : EIA

Project Location :

Analysis / Test Report

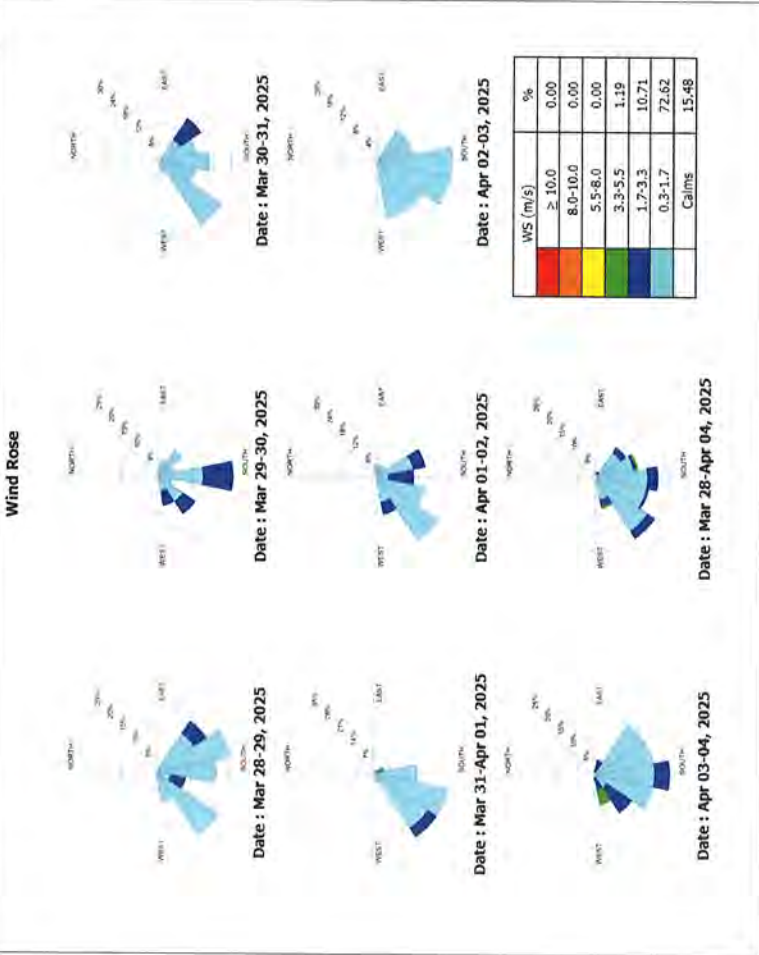
Lot ID: 2523757

Date Received : Apr 07, 2025

Date Reported : Apr 11, 2025

Report Number : 3254931-1

Page 2 of 2



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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

Lot ID: 2523757

Date Received : Apr 07, 2025

Date Reported : Apr 11, 2025

Report Number : 3254931-1

P/O :

Project Name : Environment : EIA

Project Location :

Sample Number 2523757-15 to 21

Parameter Wind Speed / Wind Direction

Location ตำบลบ้านใหม่ (A3) (GPS 47P 0744066, 1420470)

Sampling Date Mar 28 - Apr 04, 2025

Sampling by Anurak Tongkajonsakda

Page 1 of 2

Time	Mar 28 - Mar 29, 2025	Mar 29 - Mar 30, 2025	Mar 30 - Mar 31, 2025	Mar 31 - Apr 01, 2025	Apr 01 - Apr 02, 2025	Apr 02 - Apr 03, 2025	Apr 03 - Apr 04, 2025
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	0.4 188.0 S	3.4 230.0 SW	2.0 5.0 N	0.8 140.0 SE	1.9 127.0 SE	1.4 194.0 SSW	0.3 248.0 WSW
12:00 PM - 01:00 PM	0.8 216.0 SW	1.7 248.0 WSW	1.0 285.0 WNW	0.8 141.0 SE	1.6 197.0 SSW	0.9 177.0 S	1.3 126.0 SE
01:00 PM - 02:00 PM	1.0 177.0 S	0.5 211.0 SSW	0.2 -	0.6 182.0 S	2.4 223.0 SW	1.2 196.0 SSW	1.6 114.0 ESE
02:00 PM - 03:00 PM	0.6 196.0 SSW	1.9 240.0 WSW	3.5 290.0 WNW	0.6 167.0 WNW	1.3 221.0 SW	1.2 183.0 S	1.1 243.0 WSW
03:00 PM - 04:00 PM	1.7 243.0 WSW	1.5 166.0 SSE	1.1 177.0 S	0.2 -	1.4 233.0 SW	1.6 189.0 S	1.2 195.0 SSW
04:00 PM - 05:00 PM	1.0 219.0 SW	1.3 29.0 NNE	2.3 236.0 SW	0.0 -	3.8 227.0 SW	1.2 240.0 WSW	0.6 223.0 SW
05:00 PM - 06:00 PM	0.7 231.0 SW	1.0 147.0 SSE	0.5 197.0 SSW	1.8 208.0 SSW	1.5 229.0 SW	0.9 206.0 SSW	3.3 104.0 ESE
06:00 PM - 07:00 PM	0.6 190.0 S	2.4 180.0 S	1.4 240.0 WSW	1.2 228.0 SW	2.9 229.0 SW	0.9 197.0 SSW	0.5 48.0 NNE
07:00 PM - 08:00 PM	1.5 194.0 SSW	1.8 190.0 S	0.5 192.0 SSW	0.5 193.0 SSW	0.4 201.0 SSW	1.1 219.0 SW	0.8 21.0 NNE
08:00 PM - 09:00 PM	0.2 -	0.6 209.0 SSW	1.5 199.0 SSW	0.3 201.0 SSW	0.9 165.0 SSE	0.8 217.0 SW	0.0 -
09:00 PM - 10:00 PM	0.2 -	0.5 223.0 SW	1.7 219.0 SW	0.0 -	1.8 209.0 SSW	1.2 169.0 S	0.7 141.0 SE
10:00 PM - 11:00 PM	0.1 -	0.9 229.0 SW	1.9 250.0 WSW	0.0 -	0.6 205.0 SSW	0.1 -	0.0 -
11:00 PM - 12:00 AM	1.3 221.0 SW	0.5 177.0 S	1.0 190.0 S	0.0 -	0.8 183.0 S	1.1 191.0 S	0.0 -
12:00 AM - 01:00 AM	0.8 196.0 SSW	0.7 213.0 SSW	0.0 -	0.5 206.0 SSW	0.0 -	0.3 197.0 SSW	0.5 199.0 SSE
01:00 AM - 02:00 AM	0.0 -	2.2 184.0 S	2.6 193.0 SSW	0.1 -	0.6 199.0 SSW	1.4 185.0 S	0.0 -
02:00 AM - 03:00 AM	0.8 204.0 SSW	0.1 -	0.0 -	1.5 159.0 SSE	0.0 -	1.0 212.0 SSW	0.0 -
03:00 AM - 04:00 AM	1.6 195.0 SSW	0.2 -	0.5 183.0 S	0.2 -	0.1 -	0.5 293.0 WNW	0.5 87.0 E
04:00 AM - 05:00 AM	0.3 204.0 SSW	2.4 219.0 SW	0.6 177.0 S	0.5 174.0 S	0.6 183.0 S	0.1 -	0.0 -
05:00 AM - 06:00 AM	0.6 187.0 S	1.3 211.0 SSW	0.2 -	1.8 192.0 SSW	0.0 -	1.3 186.0 S	0.0 -
06:00 AM - 07:00 AM	0.6 284.0 WNW	2.3 188.0 S	0.6 226.0 SW	0.3 204.0 SSW	0.1 -	0.0 -	0.0 -
07:00 AM - 08:00 AM	0.0 -	0.8 229.0 SW	0.0 -	1.0 183.0 S	0.4 212.0 SSW	0.7 113.0 ESE	0.0 -
08:00 AM - 09:00 AM	0.0 -	0.0 -	0.6 124.0 SE	0.0 -	0.9 226.0 SW	0.0 -	0.4 40.0 NE
09:00 AM - 10:00 AM	0.2 -	0.2 -	0.8 104.0 ESE	0.8 189.0 S	0.6 171.0 S	0.7 57.0 ENE	0.2 -
10:00 AM - 11:00 AM	0.5 224.0 SW	1.2 39.0 NE	0.0 -	1.2 238.0 WSW	0.5 191.0 S	0.3 306.0 NW	0.4 101.0 E

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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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

Lot ID: 2523757

Date Received : Apr 07, 2025

Date Reported : Apr 11, 2025

Report Number : 3254931-1

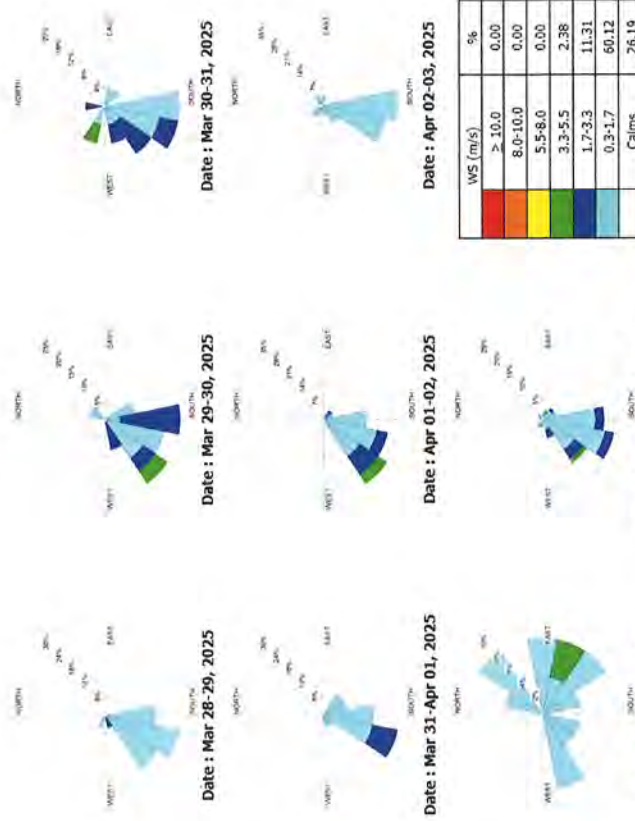
P/O :

Project Name : Environment : EIA

Project Location :

Page 2 of 2

Wind Rose



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

Analysis / Test Report

Date Received : Apr 07, 2025

Project Name : Environment : EIA

Parameter	Wind Speed / Wind Direction
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Mar 28 - Apr 04, 2025

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Time	Mar 28 - Mar 29, 2025		Mar 29 - Mar 30, 2025		Mar 30 - Mar 31, 2025		Mar 31 - Apr 01, 2025		Apr 01 - Apr 02, 2025		Apr 02 - Apr 03, 2025		Apr 03 - Apr 04, 2025		
	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	1.0	293.0 WNW	2.2	157.0 S	1.2	160.0 SSE	0.6	175.0 S	1.4	29.0 NNE	1.1	254.0 WSW	1.2	257.0 WSW	
01:00 PM - 02:00 PM	0.6	395.0 NW	1.7	261.0 W	2.1	193.0 SSW	0.7	234.0 SW	0.4	322.0 NW	2.0	193.0 SSW	1.3	167.0 SSE	
02:00 PM - 03:00 PM	1.5	329.0 NNW	1.5	250.0 WSW	1.9	147.0 SSE	1.8	215.0 SW	1.5	345.0 NNW	2.1	199.0 SSW	1.1	310.0 NW	
03:00 PM - 04:00 PM	1.1	133.0 SE	1.1	246.0 WSW	1.1	355.0 N	2.2	236.0 SW	0.8	283.0 WNW	0.4	350.0 N	1.7	223.0 SW	
04:00 PM - 05:00 PM	1.0	233.0 SW	1.7	302.0 WNW	1.4	157.0 SSE	1.0	269.0 W	1.2	220.0 SW	1.2	0.0 N	1.4	124.0 SE	
05:00 PM - 06:00 PM	1.2	285.0 WNW	1.0	267.0 W	0.6	272.0 W	0.5	234.0 SW	0.4	241.0 WSW	2.2	280.0 W	1.3	333.0 NNW	
06:00 PM - 07:00 PM	1.6	278.0 W	0.6	241.0 WSW	2.1	168.0 SSE	0.2	-	-	2.2	224.0 SW	0.8	304.0 NW	0.4	155.0 SSE
07:00 PM - 08:00 PM	1.6	218.0 SW	0.8	281.0 W	1.2	302.0 WNW	0.4	234.0 SW	1.8	244.0 WSW	1.2	251.0 WNW	0.1	-	
08:00 PM - 09:00 PM	0.3	252.0 WSW	0.0	-	0.4	246.0 WSW	0.3	246.0 WSW	0.9	154.0 SSE	0.6	308.0 NW	0.7	214.0 SW	
09:00 PM - 10:00 PM	1.9	216.0 SW	0.2	-	1.6	251.0 WSW	1.1	217.0 SW	0.4	125.0 SE	1.0	223.0 SW	0.9	175.0 S	
10:00 PM - 11:00 PM	0.4	250.0 WSW	0.2	-	-	2.3	221.0 SW	1.1	237.0 WSW	0.2	-	0.6	284.0 WNW	0.9	208.0 SSW
11:00 PM - 12:00 AM	0.6	243.0 WSW	0.7	215.0 SW	1.4	168.0 SSE	1.0	231.0 SW	1.3	131.0 SE	0.7	253.0 WSW	0.1	-	
12:00 AM - 01:00 AM	1.1	215.0 SW	1.4	210.0 SSW	0.6	271.0 W	0.9	241.0 WSW	1.7	227.0 WSW	0.5	249.0 WSW	0.7	144.0 SE	
01:00 AM - 02:00 AM	0.5	228.0 SW	0.7	282.0 WNW	1.3	214.0 SW	0.5	257.0 WSW	1.4	253.0 WSW	0.8	230.0 SW	0.0	-	
02:00 AM - 03:00 AM	0.7	269.0 W	1.6	186.0 S	0.0	-	1.3	264.0 W	0.3	204.0 SSW	0.6	303.0 WNW	0.3	159.0 SSE	
03:00 AM - 04:00 AM	1.9	178.0 S	1.0	300.0 WNW	0.2	-	2.0	203.0 SSW	0.9	194.0 SSW	0.4	221.0 SW	0.6	173.0 S	
04:00 AM - 05:00 AM	1.2	211.0 SSW	0.8	261.0 W	0.0	-	1.8	161.0 SSE	0.6	265.0 W	0.3	232.0 SW	0.0	-	
05:00 AM - 06:00 AM	0.5	299.0 WNW	1.3	249.0 WSW	0.2	-	1.0	244.0 WSW	0.8	261.0 W	0.2	-	1.1	167.0 SSE	
06:00 AM - 07:00 AM	0.7	237.0 WSW	0.2	-	-	0.4	86.0 E	1.4	255.0 WSW	0.5	335.0 WSW	0.3	188.0 S	0.4	390.0 N
07:00 AM - 08:00 AM	1.7	318.0 NNW	0.4	279.0 W	0.7	68.0 ENE	1.2	245.0 WSW	0.3	323.0 NW	0.6	124.0 SE	1.1	166.0 SSE	
08:00 AM - 09:00 AM	0.1	-	1.3	339.0 NNW	0.6	11.0 N	0.3	301.0 WNW	2.0	211.0 SSW	0.8	272.0 WNW	0.1	-	
09:00 AM - 10:00 AM	0.6	287.0 WNW	0.9	303.0 WNW	0.9	6.0 N	0.5	275.0 W	0.5	209.0 SSW	1.2	261.0 W	0.3	219.0 SW	
10:00 AM - 11:00 AM	2.8	202.0 SSW	1.2	305.0 SW	2.0	203.0 SSW	1.8	275.0 SW	1.5	185.0 SW	1.4	210.0 SSW	0.5	210.0 SSW	
11:00 AM - 12:00 PM	0.8	248.0 WSW	0.9	304.0 NW	2.6	219.0 SW	1.3	291.0 WNW	4.9	181.0 W	3.0	201.0 WSW	0.7	181.0 SE	

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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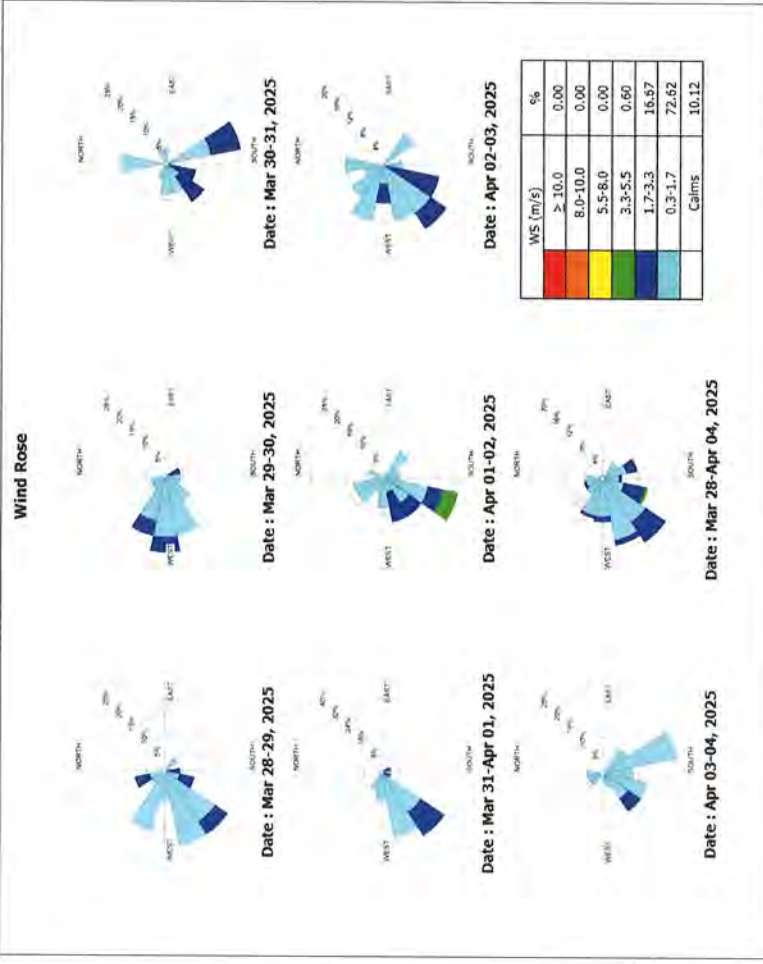

Sarayuth Jitranont
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Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.

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

21120

P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 2548664

Date Received : May 26, 2025

Date Reported : Jun 07, 2025

Report Number : 3312518-1

Page 1 of 4

Sample Number	Sampled Date	Sample Description	Location	Date Analysis Commenced	Condition of Sample	Barometric Pressure	Atmospheric Temperature	Analyte	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
2548664-1	May 23, 2025	Air Quality	พื้นที่อุตสาหกรรม (A1) (GPS 47P 0742960, 1419452)	May 26, 2025	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated	752 mmHg	29.0 °C	Phosphoric acid *	23/05/25 - 24/05/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
								Sulfuric acid *	23/05/25 - 24/05/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
								Total Suspended Particulate	23/05/25 - 24/05/25	mg/m3	0.002	0.024	0.33	U.S. Environmental Protection Agency, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakida

Remark :

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

Result apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be considered correct in full without the written approval of the laboratory.

Approved by

Chontichak

Chonticha Subongklooch

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RIGHT SOLUTIONS FREEDOM OF CHOICE

2277-621 (TH)



Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.

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

21120

P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 2548664

Date Received : May 26, 2025

Date Reported : Jun 07, 2025

Report Number : 3312518-1

Page 2 of 4

Sample Number	Sampled Date	Sample Description	Location	Date Analysis Commenced	Condition of Sample	Barometric Pressure	Atmospheric Temperature	Analyte	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
2548664-2	May 23, 2025	Air Quality	พื้นที่อุตสาหกรรม (A2) (GPS 47P 0742003, 1417397)	May 26, 2025	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated	752 mmHg	29.0 °C	Phosphoric acid *	23/05/25 - 24/05/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
								Sulfuric acid *	23/05/25 - 24/05/25	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
								Total Suspended Particulate	23/05/25 - 24/05/25	mg/m3	0.002	0.031	0.33	U.S. Environmental Protection Agency, method 50, Appendix B, revised as of July 1, 2008	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 : Anurak Tongkhajonsakida

Remark :

- LOD : Limit of Detection
- "e" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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2277-621 (TH)



Analysis / Test Report

TESTING
No.0042

Lot ID: 2548664
Date Received : May 26, 2025
Date Reported : Jun 07, 2025
Report Number : 3312518-1

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 :

Page 3 of 4

Sample Number	2548664-3
Sample Date	May 23, 2025
Sample Description	Air Quality
Location	ท่าเรือ (A3) (GPS 47P 0744066, 1420470)
Date Analysis Commenced	May 26, 2025
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated
Barometric Pressure	752 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing								
Phosphoric acid *	23/05/25 - 24/05/25	mg/m ³	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	23/05/25 - 24/05/25	mg/m ³	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	23/05/25 - 24/05/25	mg/m ³	0.002	0.023	0.33	U.S. Environmental Protection Agency, method 50, Appendix B, revised as of July 1, 2008	NEB No.24 Rayong	

Guideline :

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

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2025-02-19M08



Analysis / Test Report

TESTING
No.0042

Lot ID: 2548664
Date Received : May 26, 2025
Date Reported : Jun 07, 2025
Report Number : 3312518-1

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 :

Page 4 of 4

Sample Number	2548664-4
Sample Date	May 23, 2025
Sample Description	Air Quality
Location	ท่าเรือ (A4) (GPS 47P 0747515, 1419157)
Date Analysis Commenced	May 26, 2025
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated
Barometric Pressure	752 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing								
Phosphoric acid *	23/05/25 - 24/05/25	mg/m ³	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	23/05/25 - 24/05/25	mg/m ³	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	23/05/25 - 24/05/25	mg/m ³	0.002	0.051	0.33	U.S. Environmental Protection Agency, method 50, Appendix B, revised as of July 1, 2008	NEB No.24 Rayong	

Guideline :

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

Remark :

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2025-02-19M08



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 :
Project Name : Environment : EIA
Project Location :

Lot ID: 2548665

Date Received : May 26, 2025
Date Reported : May 30, 2025
Report Number: 3320675-1

Page 1 of 1

Sample Description	Air Quality
Location	ถนนพหลโยธิน (A1) (GPS 47P 0742960, 1419452)
Parameter	Nitrogen dioxide (ppm)
Measurement Date	May 23, 2025 - May 24, 2025
Measurement by	Anurak Tongkajonsakda
Time	2548665-1 May 23, 2025
10:00 AM - 11:00 AM	0.0016
11:00 AM - 12:00 PM	0.0015
12:00 PM - 01:00 PM	0.0016
01:00 PM - 02:00 PM	0.0039
02:00 PM - 03:00 PM	0.0030
03:00 PM - 04:00 PM	0.0019
04:00 PM - 05:00 PM	0.0019
05:00 PM - 06:00 PM	0.0024
06:00 PM - 07:00 PM	0.0031
07:00 PM - 08:00 PM	0.0019
08:00 PM - 09:00 PM	0.0022
09:00 PM - 10:00 PM	0.0019
10:00 PM - 11:00 PM	0.0019
11:00 PM - 12:00 AM	0.0021
12:00 AM - 01:00 AM	0.0020
01:00 AM - 02:00 AM	0.0021
02:00 AM - 03:00 AM	0.0022
03:00 AM - 04:00 AM	0.0019
04:00 AM - 05:00 AM	0.0031
05:00 AM - 06:00 AM	0.0045
06:00 AM - 07:00 AM	0.0117
07:00 AM - 08:00 AM	0.0018
08:00 AM - 09:00 AM	0.0016
09:00 AM - 10:00 AM	0.0014
Average	0.0026
1hr - Maximum	0.0117
Standard 1hr - Average	0.170
Standard	
Reference Method	: Notification of the National Environment Board No. 33, 2009 (B.E. 2552). : U.S. Environmental Protection Agency/Method Part 50 App. F (Chemiluminescence)

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

Approved by
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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 :
Project Name : Environment : EIA
Project Location :

Lot ID: 2548665

Date Received : May 26, 2025
Date Reported : May 30, 2025
Report Number: 3320676-1

Page 1 of 1

Sample Description	Air Quality
Location	ถนนพหลโยธิน (A2) (GPS 47P 0742003, 1417397)
Parameter	Nitrogen dioxide (ppm)
Measurement Date	May 23, 2025 - May 24, 2025
Measurement by	Anurak Tongkajonsakda
Time	2548665-2 May 23, 2025
09:00 AM - 10:00 AM	0.0020
10:00 AM - 11:00 AM	0.0027
11:00 AM - 12:00 PM	0.0097
12:00 PM - 01:00 PM	0.0070
01:00 PM - 02:00 PM	0.0027
02:00 PM - 03:00 PM	0.0025
03:00 PM - 04:00 PM	0.0023
04:00 PM - 05:00 PM	0.0017
05:00 PM - 06:00 PM	0.0027
06:00 PM - 07:00 PM	0.0016
07:00 PM - 08:00 PM	0.0017
08:00 PM - 09:00 PM	0.0016
09:00 PM - 10:00 PM	0.0019
10:00 PM - 11:00 PM	0.0023
11:00 PM - 12:00 AM	0.0021
12:00 AM - 01:00 AM	0.0022
01:00 AM - 02:00 AM	0.0042
02:00 AM - 03:00 AM	0.0034
03:00 AM - 04:00 AM	0.0025
04:00 AM - 05:00 AM	0.0026
05:00 AM - 06:00 AM	0.0023
06:00 AM - 07:00 AM	0.0022
07:00 AM - 08:00 AM	0.0021
08:00 AM - 09:00 AM	0.0020
Average	0.0028
1hr - Maximum	0.0097
Standard 1hr - Average	0.170
Standard	
Reference Method	: Notification of the National Environment Board No. 33, 2009 (B.E. 2552). : U.S. Environmental Protection Agency/Method Part 50 App. F (Chemiluminescence)

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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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 :
Project Name : Environment : EIA
Project Location :
Lot ID: 2548665
Date Received : May 26, 2025
Date Reported : May 30, 2025
Report Number: 3320677-1

Page 1 of 1

Sample Description		Air Quality	
Location	ท่าเรือ (A3) (GPS 47P 0744066, 1420470)	Location	ท่าเรือ (A4) (GPS 47P 0747515, 1419157)
Parameter	Nitrogen dioxide (ppm)	Parameter	Nitrogen dioxide (ppm)
Measurement Date	May 23, 2025 - May 24, 2025	Measurement Date	May 23, 2025 - May 24, 2025
Measurement by	Anurak Tongkajonsakda	Measurement by	Anurak Tongkajonsakda
2548665-3		2548665-4	
May 23, 2025		May 23, 2025	
Time		Time	
10:00 AM - 11:00 AM	0.0094	11:00 AM - 12:00 PM	0.0093
11:00 AM - 12:00 PM	0.0029	12:00 PM - 01:00 PM	0.0040
12:00 PM - 01:00 PM	0.0028	01:00 PM - 02:00 PM	0.0019
01:00 PM - 02:00 PM	0.0028	02:00 PM - 03:00 PM	0.0023
02:00 PM - 03:00 PM	0.0062	03:00 PM - 04:00 PM	0.0060
03:00 PM - 04:00 PM	0.0044	04:00 PM - 05:00 PM	0.0009
04:00 PM - 05:00 PM	0.0042	05:00 PM - 06:00 PM	0.0011
05:00 PM - 06:00 PM	0.0038	06:00 PM - 07:00 PM	0.0011
06:00 PM - 07:00 PM	0.0040	07:00 PM - 08:00 PM	0.0011
07:00 PM - 08:00 PM	0.0056	08:00 PM - 09:00 PM	0.0026
08:00 PM - 09:00 PM	0.0074	09:00 PM - 10:00 PM	0.0017
09:00 PM - 10:00 PM	0.0083	10:00 PM - 11:00 PM	0.0012
10:00 PM - 11:00 PM	0.0084	11:00 PM - 12:00 AM	0.0013
11:00 PM - 12:00 AM	0.0110	12:00 AM - 01:00 AM	0.0014
12:00 AM - 01:00 AM	0.0067	01:00 AM - 02:00 AM	0.0016
01:00 AM - 02:00 AM	0.0076	02:00 AM - 03:00 AM	0.0022
02:00 AM - 03:00 AM	0.0071	03:00 AM - 04:00 AM	0.0052
03:00 AM - 04:00 AM	0.0063	04:00 AM - 05:00 AM	0.0032
04:00 AM - 05:00 AM	0.0063	05:00 AM - 06:00 AM	0.0025
05:00 AM - 06:00 AM	0.0049	06:00 AM - 07:00 AM	0.0018
06:00 AM - 07:00 AM	0.0043	07:00 AM - 08:00 AM	0.0022
07:00 AM - 08:00 AM	0.0050	08:00 AM - 09:00 AM	0.0030
08:00 AM - 09:00 AM	0.0061	09:00 AM - 10:00 AM	0.0063
09:00 AM - 10:00 AM	0.0035	10:00 AM - 11:00 AM	0.0083
Average	0.0058	Average	0.0030
1hr - Maximum	0.0110	1hr - Maximum	0.0093
Standard 1hr - Average	0.170	Standard 1hr - Average	0.170
Standard		Standard	
Reference Method	Notification of the National Environment Board No. 33, 2009 (B.E. 2552).	Reference Method	Notification of the National Environment Board No. 33, 2009 (B.E. 2552).
	U.S. Environmental Protection Agency/Method Part 50 App. F (Chemiluminescence)		U.S. Environmental Protection Agency/Method Part 50 App. F (Chemiluminescence)

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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 :
Project Name : Environment : EIA
Project Location :
Lot ID: 2548665
Date Received : May 26, 2025
Date Reported : May 30, 2025
Report Number: 3320678-1

Page 1 of 1

Sample Description		Air Quality	
Location	ท่าเรือ (A3) (GPS 47P 0747515, 1419157)	Location	ท่าเรือ (A4) (GPS 47P 0747515, 1419157)
Parameter	Nitrogen dioxide (ppm)	Parameter	Nitrogen dioxide (ppm)
Measurement Date	May 23, 2025 - May 24, 2025	Measurement Date	May 23, 2025 - May 24, 2025
Measurement by	Anurak Tongkajonsakda	Measurement by	Anurak Tongkajonsakda
2548665-3		2548665-4	
May 23, 2025		May 23, 2025	
Time		Time	
11:00 AM - 12:00 PM	0.0093	11:00 AM - 12:00 PM	0.0093
12:00 PM - 01:00 PM	0.0040	12:00 PM - 01:00 PM	0.0040
01:00 PM - 02:00 PM	0.0019	01:00 PM - 02:00 PM	0.0019
02:00 PM - 03:00 PM	0.0023	02:00 PM - 03:00 PM	0.0023
03:00 PM - 04:00 PM	0.0060	03:00 PM - 04:00 PM	0.0060
04:00 PM - 05:00 PM	0.0009	04:00 PM - 05:00 PM	0.0009
05:00 PM - 06:00 PM	0.0011	05:00 PM - 06:00 PM	0.0011
06:00 PM - 07:00 PM	0.0011	06:00 PM - 07:00 PM	0.0011
07:00 PM - 08:00 PM	0.0011	07:00 PM - 08:00 PM	0.0011
08:00 PM - 09:00 PM	0.0026	08:00 PM - 09:00 PM	0.0026
09:00 PM - 10:00 PM	0.0017	09:00 PM - 10:00 PM	0.0017
10:00 PM - 11:00 PM	0.0012	10:00 PM - 11:00 PM	0.0012
11:00 PM - 12:00 AM	0.0013	11:00 PM - 12:00 AM	0.0013
12:00 AM - 01:00 AM	0.0014	12:00 AM - 01:00 AM	0.0014
01:00 AM - 02:00 AM	0.0016	01:00 AM - 02:00 AM	0.0016
02:00 AM - 03:00 AM	0.0022	02:00 AM - 03:00 AM	0.0022
03:00 AM - 04:00 AM	0.0052	03:00 AM - 04:00 AM	0.0052
04:00 AM - 05:00 AM	0.0032	04:00 AM - 05:00 AM	0.0032
05:00 AM - 06:00 AM	0.0025	05:00 AM - 06:00 AM	0.0025
06:00 AM - 07:00 AM	0.0018	06:00 AM - 07:00 AM	0.0018
07:00 AM - 08:00 AM	0.0022	07:00 AM - 08:00 AM	0.0022
08:00 AM - 09:00 AM	0.0030	08:00 AM - 09:00 AM	0.0030
09:00 AM - 10:00 AM	0.0063	09:00 AM - 10:00 AM	0.0063
10:00 AM - 11:00 AM	0.0083	10:00 AM - 11:00 AM	0.0083
Average	0.0030	Average	0.0030
1hr - Maximum	0.0093	1hr - Maximum	0.0093
Standard 1hr - Average	0.170	Standard 1hr - Average	0.170
Standard		Standard	
Reference Method	Notification of the National Environment Board No. 33, 2009 (B.E. 2552).	Reference Method	Notification of the National Environment Board No. 33, 2009 (B.E. 2552).
	U.S. Environmental Protection Agency/Method Part 50 App. F (Chemiluminescence)		U.S. Environmental Protection Agency/Method Part 50 App. F (Chemiluminescence)

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Scientist (4)

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2272-621 EMAIL

S:\Report_Air SO\NORup (11:21AM)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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

Lot ID: 2548666

Date Received : May 26, 2025

Date Reported : Jun 02, 2025

Report Number :3312612-1

P/O :

Project Name : Environment : EIA

Project Location :

Sample Number 2548666-1

Parameter Wind Speed / Wind Direction

Location อำเภอวังจันทร์ (A1) (GPS 47P 0742960, 1419452)

Sampling Date May 23 - May 24, 2025

Sampling by Anurak Tongkhajonsakda

Time	May 23 - May 24, 2025															
	WS (m/s)	WD (deg)														
09:00 AM - 10:00 AM	0.4	121.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	1.2	128.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	0.6	156.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	0.4	163.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	0.4	163.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	0.8	126.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	1.0	163.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	0.4	86.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.4	162.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	1.2	299.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	0.3	298.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	0.6	98.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	1.0	102.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	0.8	112.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	1.2	123.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	0.8	99.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	0.9	72.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	1.0	76.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

The above results are valid only for the wind speed and direction (as indicated in this report). No part of this report or its findings may be reproduced or used in any form without written consent from the Laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by

Saranyuth Jitranont
Assistant General Manager

Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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

Lot ID: 2548666

Date Received : May 26, 2025

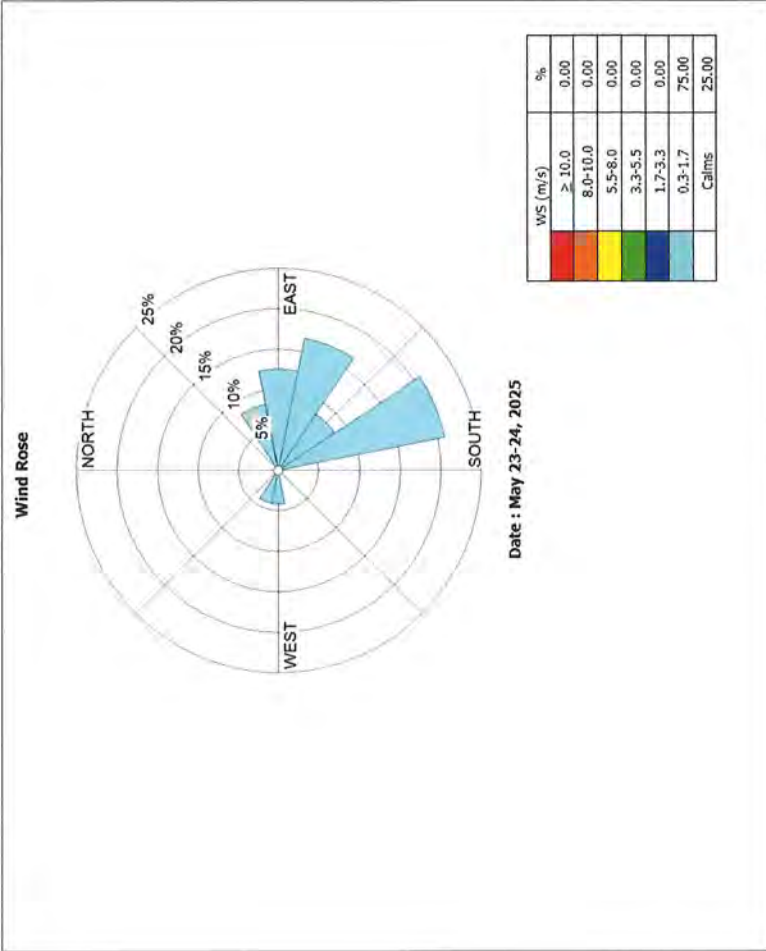
Date Reported : Jun 02, 2025

Report Number :3312612-1

P/O :

Project Name : Environment : EIA

Project Location :



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Saranyuth 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

Lot ID: 2548666

Date Received : May 26, 2025

Date Reported : Jun 02, 2025

Report Number : 3312612-1

P/O :

Project Name : Environment : EIA

Project Location :

Sample Number

Parameter

Location

Sampling Date

Sampling by

2548666-2

Wind Speed / Wind Direction

ถนนรัตน (A2) (GPS 479 0742003, 1417397)

May 23 - May 24, 2025

Aturak Tongkhajonsakda

Time	May 23 - May 24, 2025																			
	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)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)
09:00 AM - 10:00 AM	0.6	110.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	0.8	118.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	0.8	146.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	0.7	157.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	0.7	144.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	0.4	137.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	0.6	153.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	0.6	95.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	1.7	275.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	0.5	301.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	1.2	87.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	0.9	96.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	0.6	98.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	2.3	113.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	0.7	104.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	1.2	67.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	1.2	67.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

The above results are valid only for the wind speed (m/s) as indicated in this report for part of the report. No other results are reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) Ltd. strongly recommends that this report is not reproduced except in full.

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Sarayu 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

Lot ID: 2548666

Date Received : May 26, 2025

Date Reported : Jun 02, 2025

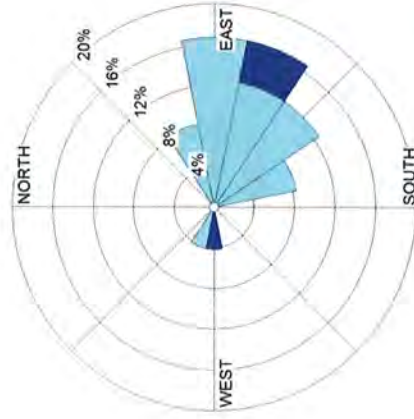
Report Number : 3312612-1

P/O :

Project Name : Environment : EIA

Project Location :

Wind Rose



Date : May 23-24, 2025

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	8.33
0.3-1.7	62.50
Calms	29.17

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Analysis / Test Report

Client : Michelin Sam Co., Ltd.

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

P/O :

Project Name : Environment : EIA

Project Location :

Sample Number 2548666-3

Parameter Wind Speed / Wind Direction

Location ตำบลบ้านใหม่ (A3) (GPS 47P 0744066, 1420470)

Sampling Date May 23 - May 24, 2025

Sampling by Anurak Tongkajonsakda

Lot ID: 2548666

Date Received : May 26, 2025

Date Reported : Jun 02, 2025

Report Number : 3312612-1

Page 1 of 2

Time	May 23 - May 24, 2025											
	WS (m/s)	WD (deg)										
10:00 AM - 11:00 AM	0.8	121.0	ESE	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	1.2	221.0	SW	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	0.6	164.0	SSE	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	0.4	168.0	SSE	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	1.2	154.0	SSE	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	0.6	144.0	SE	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	0.4	150.0	SSE	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	1.2	106.0	ESE	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.8	68.0	ENE	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	0.4	165.0	SSE	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	0.6	154.0	SSE	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	1.0	301.0	WNW	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	0.8	278.0	W	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	0.6	93.0	E	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	1.2	116.0	ESE	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	1.2	118.0	ESE	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	0.3	101.0	E	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	1.0	122.0	ESE	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	0.6	124.0	SE	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	0.8	78.0	ENE	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	0.4	93.0	E	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

The above results are valid only for the wind speed and direction. They are not valid for the wind speed and direction if the wind speed and direction are not measured in any form without written consent from the Laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced in full.

Approved by

Saranyuth Jitranont
Assistant General Manager

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Analysis / Test Report

Client : Michelin Sam Co., Ltd.

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

P/O :

Project Name : Environment : EIA

Project Location :

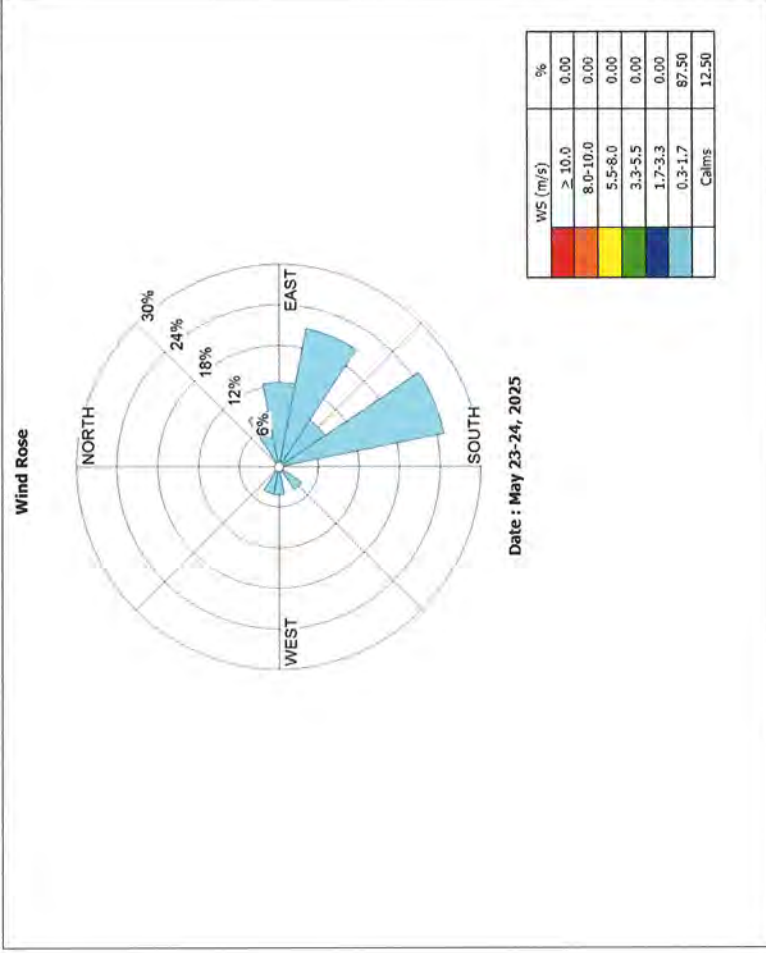
Lot ID: 2548666

Date Received : May 26, 2025

Date Reported : Jun 02, 2025

Report Number : 3312612-1

Page 2 of 2



The above results are valid only for the wind speed and direction. They are not valid for the wind speed and direction if the wind speed and direction are not measured in any form without written consent from the Laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced in full.

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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 :

Project Name : Environment : EIA

Project Location :

Lot ID: 2548666

Date Received : May 26, 2025

Date Reported : Jun 02, 2025

Report Number : 3312612-1

Page 1 of 2

Sample Number

Parameter

Location

Sampling Date

Sampling by

2548666-4

Wind Speed / Wind Direction

บ้านนาสามัคคี (A4) (GPS 47P 0747515, 1419157)

May 23 - May 24, 2025

Anurak Tongkhajonsakda

Time	May 23 - May 24, 2025															
	WS (m/s)	WD (deg)														
11:00 AM - 12:00 PM	1.2	123.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	0.8	129.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	1.2	164.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	0.4	163.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	0.6	137.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	0.8	142.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	0.6	161.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.4	108.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	0.6	42.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	0.4	139.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	1.2	154.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	1.0	249.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	0.6	268.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	0.8	96.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	1.2	106.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	0.4	106.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	0.3	84.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	1.1	123.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	0.9	98.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	0.8	76.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	0.8	76.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

The above result is valid only for the wind speed (m/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 does not warrant the accuracy of the results of the test performed by the laboratory.

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 :

Project Name : Environment : EIA

Project Location :

Lot ID: 2548666

Date Received : May 26, 2025

Date Reported : Jun 02, 2025

Report Number : 3312612-1

Page 2 of 2

Wind Rose



Date : May 23-24, 2025

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	0.00
0.3-1.7	87.50
Calms	12.50

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ภาคผนวก ค-3

ระดับเสียงโดยทั่วไป



Analysis / Test Report

TESTING
No.0042

Lot ID: 2523761

Date Received : Apr 07, 2025
Date Reported : Apr 09, 2025
Report Number: 3279928-1

Page 1 of 1

Sample Number	2523761-2		
Parameter	Noise (Leq 24 hrs.)		
Location	บ้านสวนจันทน์พลาซ่า (GPS 47P 0743667, 14193318)		
Measurement Date	Mar 29 - Mar 30, 2025		
Measurement by	Anurak Tongkhajonsakda		
Sound Level meter	Serial No. 233183		
Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	56.8	79.6	52.6
02:00 PM - 03:00 PM	56.0	74.7	51.7
03:00 PM - 04:00 PM	55.7	72.9	52.8
04:00 PM - 05:00 PM	57.5	75.5	53.5
05:00 PM - 06:00 PM	56.2	73.9	53.2
06:00 PM - 07:00 PM	57.3	69.4	55.8
07:00 PM - 08:00 PM	55.6	77.8	52.2
08:00 PM - 09:00 PM	53.8	75.3	51.5
09:00 PM - 10:00 PM	55.5	78.9	52.8
10:00 PM - 11:00 PM	55.7	75.7	53.6
11:00 PM - 12:00 AM	55.7	80.4	53.6
12:00 AM - 01:00 AM	54.7	71.2	53.6
01:00 AM - 02:00 AM	54.9	79.0	53.6
02:00 AM - 03:00 AM	56.3	68.0	54.2
03:00 AM - 04:00 AM	62.6	71.2	59.7
04:00 AM - 05:00 AM	64.5	71.6	59.4
05:00 AM - 06:00 AM	55.8	78.6	53.3
06:00 AM - 07:00 AM	57.7	83.0	53.6
07:00 AM - 08:00 AM	58.1	77.8	52.0
08:00 AM - 09:00 AM	56.7	77.1	52.4
09:00 AM - 10:00 AM	56.9	84.5	53.3
10:00 AM - 11:00 AM	56.6	79.4	52.1
11:00 AM - 12:00 PM	54.3	74.5	51.6
12:00 PM - 01:00 PM	53.6	75.4	51.6

L _{eq} Average 24 hrs. (dB(A))	57.5
L _{nex} (dB(A))	84.5
L90 (dB(A))	
Ldn (dB(A))	65.2
Standard (dB(A))	70 115
Reference Method : ISO1996-1 and 1996-2 Standard :	
1. ปริมณฑลกรุงเทพมหานครและปริมณฑล ฉบับที่ 15 (พ.ศ. 2540) ข้อกำหนดการควบคุมระดับเสียงโดยทั่วไป	
2. ปริมณฑลจังหวัดสมุทรสาคร ข้อกำหนดการปล่อยมลพิษจากยานพาหนะส่วนบุคคลและการใช้เครื่องจักรกลทางการเกษตร	
มาตรฐาน พ.ร.บ. 2548	
Remark :	The laboratory has been accepted as an accredited laboratory complying with the ISO IEC 17025.

Supt S.

Approved by

Chontschak

Supot Salamteh
Section Head

APPROX 616/10 Moo 5 T. Naenam Khu A. Phukdaeng Rayong 21140 Thailand TEL: +66 9 3304 8555 FAX: +66 9 3304 8556
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2. Reports Air Noise per (4.37PM)



TESTING
No. 0042

Lot ID: 2523761

Date Received : Apr 07, 2025
Date Reported : Apr 09, 2025
Report Number: 3279929-1

Analysis / Test Report

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

Page 1 of 1

Sample Number	2523761-3
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่โครงการพัฒนา (GPS 47P 0743667, 1419318)
Measurement Date	Mar 30 - Mar 31, 2025
Measurement by	Anurak Tongkhaiojsakda
Sound Level meter	Serial No. 233183

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	54.5	79.2	51.7
02:00 PM - 03:00 PM	58.2	77.6	52.5
03:00 PM - 04:00 PM	65.4	97.9	52.9
04:00 PM - 05:00 PM	55.7	80.7	51.1
05:00 PM - 06:00 PM	58.6	88.2	54.1
06:00 PM - 07:00 PM	56.0	80.1	53.6
07:00 PM - 08:00 PM	54.3	68.9	53.1
08:00 PM - 09:00 PM	54.4	78.5	51.6
09:00 PM - 10:00 PM	53.7	72.6	52.1
10:00 PM - 11:00 PM	54.7	80.6	52.3
11:00 PM - 12:00 AM	54.7	69.4	53.3
12:00 AM - 01:00 AM	55.1	77.3	53.6
01:00 AM - 02:00 AM	54.6	70.2	51.6
02:00 AM - 03:00 AM	63.9	78.0	55.1
03:00 AM - 04:00 AM	67.4	72.7	64.3
04:00 AM - 05:00 AM	68.9	73.5	63.5
05:00 AM - 06:00 AM	60.3	80.2	53.9
06:00 AM - 07:00 AM	61.1	81.8	53.0
07:00 AM - 08:00 AM	58.2	74.6	51.8
08:00 AM - 09:00 AM	57.7	78.7	51.9
09:00 AM - 10:00 AM	57.2	77.7	52.5
10:00 AM - 11:00 AM	57.2	77.1	51.8
11:00 AM - 12:00 PM	57.8	77.9	50.8
12:00 PM - 01:00 PM	55.8	73.2	52.3

Leq Average 24 hrs. (dB(A))	60.9
Lmax (dB(A))	97.9
L90 (dB(A))	52.5
Ldn (dB(A))	
Standard (dB(A))	115
Reference Method : ISO1996-1 and 1996-2	
Standard : 1. ใช้มาตรฐานการวัดและประเมินค่าตามข้อกำหนด 15 (พ.ร.บ. 2540) สำหรับการประเมินผลกระทบสิ่งแวดล้อมทั่วไป 2. ใช้มาตรฐานการวัดและประเมินค่าตามข้อกำหนด 15 (พ.ร.บ. 2540) สำหรับการประเมินผลกระทบสิ่งแวดล้อมในโครงการพัฒนา ตาม พ.ร.บ. 2548	
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.	

Technical Management

Chontichak

Chonticha Subonglooch
Scientist (3)

Approved by

Supt S.

Supot Salameeh
Section Head



Analysis / Test Report

TESTING
No. 0042

Lot ID: 2523761

Date Received : Apr 07, 2025
Date Reported : Apr 09, 2025
Report Number: 3279930-1

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

Page 1 of 1

Sample Number	2523761-4
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่โครงการพัฒนา (GPS 47P 0743667, 1419318)
Measurement Date	Mar 31 - Apr 01, 2025
Measurement by	Anurak Tongkhaiojsakda
Sound Level meter	Serial No. 233183

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
01:00 PM - 02:00 PM	60.7	84.6	52.1
02:00 PM - 03:00 PM	58.4	88.9	51.5
03:00 PM - 04:00 PM	60.1	84.1	52.1
04:00 PM - 05:00 PM	57.8	78.4	54.0
05:00 PM - 06:00 PM	56.1	77.7	52.6
06:00 PM - 07:00 PM	57.5	74.7	55.5
07:00 PM - 08:00 PM	57.3	75.8	55.8
08:00 PM - 09:00 PM	56.0	79.8	53.8
09:00 PM - 10:00 PM	54.9	72.2	52.7
10:00 PM - 11:00 PM	55.1	70.7	53.4
11:00 PM - 12:00 AM	55.7	75.8	54.0
12:00 AM - 01:00 AM	57.0	85.0	53.8
01:00 AM - 02:00 AM	58.7	75.7	53.3
02:00 AM - 03:00 AM	66.8	73.0	60.2
03:00 AM - 04:00 AM	69.6	78.4	67.7
04:00 AM - 05:00 AM	69.8	80.4	65.7
05:00 AM - 06:00 AM	58.3	76.7	54.3
06:00 AM - 07:00 AM	61.0	89.0	55.4
07:00 AM - 08:00 AM	56.7	76.7	52.9
08:00 AM - 09:00 AM	56.3	70.9	54.1
09:00 AM - 10:00 AM	56.2	77.3	53.5
10:00 AM - 11:00 AM	55.3	75.6	51.2
11:00 AM - 12:00 PM	55.1	77.4	49.2
12:00 PM - 01:00 PM	55.4	74.6	52.4

Leq Average 24 hrs. (dB(A))	61.7
Lmax (dB(A))	89.0
L90 (dB(A))	53.5
Ldn (dB(A))	
Standard (dB(A))	115
Reference Method : ISO1996-1 and 1996-2	
Standard : 1. ใช้มาตรฐานการวัดและประเมินค่าตามข้อกำหนด 15 (พ.ร.บ. 2540) สำหรับการประเมินผลกระทบสิ่งแวดล้อมทั่วไป 2. ใช้มาตรฐานการวัดและประเมินค่าตามข้อกำหนด 15 (พ.ร.บ. 2540) สำหรับการประเมินผลกระทบสิ่งแวดล้อมในโครงการพัฒนา ตาม พ.ร.บ. 2548	
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.	

Technical Management

Chontichak

Chonticha Subonglooch
Scientist (3)

Approved by

Supt S.

Supot Salameeh
Section Head



Analysis / Test Report

TESTING
No.0042

Lot ID: 2523761

Date Received : Apr 07, 2025
Date Reported : Apr 09, 2025
Report Number: 3279932-1

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

P/O :
Project Name : Environment : EIA

Project Name : Environment ; EIA
Project Location :

Page 1 of 1

Sample Number	Parameter	Location	Measurement Date	Measurement by	Sound Level meter
2523761-6	Noise (Leq 24 hrs.)	จุดวัดที่ 1 ในบริเวณด้านหน้า (GPS 47° 0' 43.667, 141° 9' 31.8)	Apr 02 - Apr 03, 2025	Anurak Tongkajonsakda	Serial No. 233183
Time					
Lmax (dB(A))					
L90 (dB(A))					
01:00 PM - 02:00 PM	53.2	76.0	49.0		
02:00 PM - 03:00 PM	52.4	71.1	48.1		
03:00 PM - 04:00 PM	52.1	69.3	49.2		
04:00 PM - 05:00 PM	53.8	78.8	49.2		
05:00 PM - 06:00 PM	56.7	87.3	52.2		
06:00 PM - 07:00 PM	54.1	78.2	51.7		
07:00 PM - 08:00 PM	52.4	67.0	51.2		
08:00 PM - 09:00 PM	52.5	76.6	49.7		
09:00 PM - 10:00 PM	51.8	70.7	50.2		
10:00 PM - 11:00 PM	52.8	78.7	50.4		
11:00 PM - 12:00 AM	52.8	67.5	51.4		
12:00 AM - 01:00 AM	53.2	75.4	51.7		
01:00 AM - 02:00 AM	52.7	68.3	49.7		
02:00 AM - 03:00 AM	62.0	76.1	53.2		
03:00 AM - 04:00 AM	65.5	70.8	62.4		
04:00 AM - 05:00 AM	67.0	71.6	61.6		
05:00 AM - 06:00 AM	58.4	78.3	52.0		
06:00 AM - 07:00 AM	59.2	79.9	53.1		
07:00 AM - 08:00 AM	56.3	72.7	49.9		
08:00 AM - 09:00 AM	55.8	76.8	50.0		
09:00 AM - 10:00 AM	53.8	74.0	49.4		
10:00 AM - 11:00 AM	53.1	78.3	49.8		
11:00 AM - 12:00 PM	53.4	67.9	49.9		
12:00 PM - 01:00 PM	54.6	69.7	51.6		

Let Average 24 hrs. (dB(A))	58.3	
Lmax (dB(A))		87.3
L90 (dB(A))	67.3	50.2
Ldn (dB(A))		
Standard (dB(A))	70	115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. สถานการณ์การจราจรและสิ่งแวดล้อมตามข้อ 15 (พ.ศ. 2540) สำหรับพื้นที่กรุงเทพมหานครและปริมณฑล
2. สถานการณ์การจราจรและสิ่งแวดล้อมตามข้อ 15 (พ.ศ. 2540) สำหรับพื้นที่กรุงเทพมหานครและปริมณฑล

มาตรฐาน พ.ศ. 2548

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

Technical Management

Approved by

Chonticha Subongkoch
Scientist (3)

Supot Salamteh
Section Head

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TESTING
No. 0042

Lot ID: 2523761
Date Received : Apr 07, 2025
Date Reported : Apr 09, 2025
Report Number: 3279933-1

Project Name : Environment : EIA

Sample Number	2523761-7
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Location
 วิทยาลัยการศึกษานานาชาติ (GPS 47P 0743667, 1419318)

Measurement by

Time

[illegible]

L90 (dB(A))

Standard (dP/L)	70	115
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Reference method : ISO1550-1 and 1990-2
Standard : I. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงวัดทั่วไป

150770 N.A. 2548

Technical Management

Approved by

[Signature]

Scientist (3) Section Head

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ภาคผนวก ค-4

คุณภาพน้ำทิ้ง



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 :
Project Name : Environment : EIA
Project Location :
TESTING
No.0042
Lot ID: 253971
Date Received : Jan 14, 2025
Date Reported : Jan 21, 2025
Report Number : 3212611-1

Page 1 of 2

Sample Number	253971-1
Sample Date	Jan 14, 2025 9:45 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Jan 14, 2025
Condition of Sample	Contained in 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	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	14	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	11	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5520 B	Rayong
pH at 25 degree C	-	-	-	6.8	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500 - H (8)	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500-CI (F)	Rayong
Temperature *	Degree C	-	-	29.1	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1250	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2500 C	Rayong

Technical Management : Photchanas S.
Photchanas Seeda
Scientist (4)
wstduanar@323-3-0028
Approved by : Dej Changchon
Senior Manager
wstduanar@323-3-0001

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

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3239-02 (ENL)

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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 :
Project Name : Environment : EIA
Project Location :
TESTING
No.0042
Lot ID: 253971
Date Received : Jan 14, 2025
Date Reported : Jan 21, 2025
Report Number : 3212611-1

Page 2 of 2

Sample Number	253971-1
Sample Date	Jan 14, 2025 9:45 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Jan 14, 2025
Condition of Sample	Contained in 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	16	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, 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 : Nattawat Athongprommarat wstduanar@323-3-0006, Thanassou Namakunna wstduanar@323-3-0101

Remarks :
- 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 : Photchanas S.
Photchanas Seeda
Scientist (4)
wstduanar@323-3-0028
Approved by : Dej Changchon
Senior Manager
wstduanar@323-3-0001

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

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NIGHT SOLUTIONS HIGH QUALITY

3239-02 (ENL)

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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 :
Project Name : Environment : EIA
Project Location :
TESTING
No.0009
Lot ID: 253971
Date Received : Jan 14, 2025
Date Reported : Feb 04, 2025
Report Number : 3212611-2 Rev. No.1

Page 1 of 1

Sample Number	253971-1
Sample Date	Jan 14, 2025 9:45 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m ³)
Date Analysis Commenced	Jan 15, 2025
Condition of Sample	Contained in 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	0.49	≤2.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, 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).

Note : This Analysis test report is reissued to supersede report No.3212611-2, Date Reported : Jan 21, 2025 due to revise analytical information.

Sampling By : Nitawut Athomprammarat วิธิตวณวิทย์ 323-4-0006, Thanasoun Namakunna วิธิตวณวิทย์ 3204-4-0101

Remark :
• LOD : Limit of Detection
• <LOD : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
• Analytes 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 : Sawitree N. Sawitree Nongnangam Manager วิธิตวณวิทย์ 3204-4-0007
Approved by : Karokorn Anek Assistant General Manager วิธิตวณวิทย์ 3204-4-0004



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
TESTING
No.0009
Lot ID: 253971
Date Received : Jan 14, 2025
Date Reported : Jan 21, 2025
Report Number : 3212611-3

Page 1 of 1

Sample Number	253971-1
Sample Date	Jan 14, 2025 9:45 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m ³)
Date Analysis Commenced	Jan 14, 2025
Condition of Sample	Contained in 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	2.62	No Standard	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, part 3125 B.3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	microhm/cm	-	0.5	1665	No Standard	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	5.7	No Standard	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, part 4500-O (G)	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 : Nitawut Athomprammarat , Thanasoun Namakunna
Remark :
• LOD : Limit of Detection
• <LOD : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
• Analytes 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.

Approved by : Sawitree N. Sawitree Nongnangam Manager วิธิตวณวิทย์ 3204-4-0007



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
Sample Number : 258398-1
Sample Date : Jan 27, 2025 1:40 PM
Sample Description : Wastewater
Location : Effluent (Holding pond 5,000 m3)
Date Analysis Commenced : Jan 29, 2025
Condition of Sample : Contained in one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Page 1 of 1

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/L	0.003	0.005	0.77	≤5.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, 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 : Patrapol Sawangdialam รหัสประจำตัว 7-204-4-0002

Remarks :
- LOD : Limit of Detection
- LOQ : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analytical Method : Eribe 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 Nolsangiam
Manager
รหัสประจำตัว 7-204-4-0007

Approved by

Karokom Anek
Karokom Anek
Assistant General Manager
รหัสประจำตัว 7-204-6-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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2025/01/29/01

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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 :
Project Name : Environment : EIA
Project Location :
Sample Number : 253973-1
Sample Date : Feb 14, 2025 11:35 AM
Sample Description : Wastewater
Location : Effluent (Holding pond 5,000 m3)
Date Analysis Commenced : Feb 14, 2025
Condition of Sample : Contained in one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Page 1 of 2

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	11.2	≤20	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	31	≤120	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	5	≤300	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	5	≤300	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, part 5520 B	Rayong
pH at 25 degree C		-	-	7.7	5.5-9.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, part 4500 - H (B)	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, part 4500-Cl (F)	Rayong
Temperature *	Degree C	-	-	33.0	≤40	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1340	≤3000	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, part 2540 C	Rayong

Technical Management

Photchanas S.
Photchanas Seeda
Scientist (4)
รหัสประจำตัว 7-323-4-0028

Approved by

Dej Changchon
Dej Changchon
Senior Manager
รหัสประจำตัว 7-323-4-0001

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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2025/02/04/01

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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 :
Project Name : Environment : EIA
Project Location :

TESTING
No. 0042
Lot ID: 253973
Date Received : Feb 14, 2025
Date Reported : Feb 21, 2025
Report Number : 3212613-1

Page 2 of 2

Sample Number : 253973-1
Sampled Date : Feb 14, 2025 11:35 AM
Sample Description : Wastewater
Location : Effluent (Holding pond 5,000 m3)
Date Analysis Commenced : Feb 14, 2025
Condition of Sample : Contained in 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	27	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, 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 : Sansoen Khuyokul รหัสประจำตัว 3-323-4-0005 , Thanasoun Namakunna รหัสประจำตัว 3-204-4-0101

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

Technical Management

Photchanas S.

Photchanas Seeda
Scientist (A)
รหัสประจำตัว 3-323-4-0028

Approved by

D. Khun

Dej Changchon
Senior Manager
รหัสประจำตัว 3-323-4-0001

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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รหัสประจำตัว 3-204-4-0101

3212613/01/ENL



Analysis / Test Report

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

TESTING
No. 0009
Lot ID: 253973

Date Received : Feb 14, 2025
Date Reported : Feb 21, 2025
Report Number : 3212613-2

Page 1 of 1

Sample Number : 253973-1
Sampled Date : Feb 14, 2025 11:35 AM
Sample Description : Wastewater
Location : Effluent (Holding pond 5,000 m3)
Date Analysis Commenced : Feb 17, 2025
Condition of Sample : Contained in 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	0.22	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.0003	0.0005	1.25	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, 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 : Sansoen Khuyokul รหัสประจำตัว 3-323-4-0005 , Thanasoun Namakunna รหัสประจำตัว 3-204-4-0101

Remark :
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- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.

Technical Management

Savitree N.

Savitree Naisangiam
Manager
รหัสประจำตัว 3-204-4-0007

Approved by

Kanokorn Anek

Kanokorn Anek
Assistant General Manager
รหัสประจำตัว 3-204-4-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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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 :
Project Name : Environment : EIA
Project Location :
Date Received : Feb 14, 2025
Date Reported : Feb 21, 2025
Report Number : 3212613-3

TESTING
No.0009
Lot ID: 253973

Page 1 of 1

Sample Number 253973-1
Sampled Date Feb 14, 2025 11:35 AM
Sample Description Wastewater
Location Effluent (Holding pond 5,000 m3)
Date Analysis Commenced Feb 14, 2025
Condition of Sample Contained in 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	1.94	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 3125 B, 3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	micromhos/cm	-	0.5	1874	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	4.8	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500-Q (5)	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, BE.2560 (2017).

Sampling By : Sanitsorn Khuyodseu , Thanasoon Namkunina

Remark :
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Approved by

Savitree N.

Savitree Naisianglam
Manager

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0275-6219446



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
Date Received : Mar 14, 2025
Date Reported : Mar 21, 2025
Report Number : 3247251-1

TESTING
No.0042
Lot ID: 2520601

Page 1 of 2

Sample Number 2520601-1
Sampled Date Mar 14, 2025 9:50 AM
Sample Description Wastewater
Location Effluent (Holding pond 5,000 m3)
Date Analysis Commenced Mar 14, 2025
Condition of Sample Contained in 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	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	7	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	7	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5520 B	Rayong
pH at 25 degree C	-	-	-	7.6	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500 - H (8)	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500-Cl (F)	Rayong
Temperature *	Degree C	-	-	33.4	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1240	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2540 C	Rayong

Technical Management

Photchanas.

Photchanas Seeda
Scientist (4)
yestdunawati +323-n-0028

Approved by

D.

Dej Changchon
Senior Manager
yestdunawati +323-n-0001

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0275-6219446



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Luk, Bankhai, Rayong Thailand 21120

P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 2520601

Date Received : Mar 14, 2025

Date Reported : Mar 21, 2025

Report Number : 3247251-1

TESTING
No.0042

Page 2 of 2

Sample Number	2520601-1
Sample Date	Mar 14, 2025 9:50 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Mar 14, 2025
Condition of Sample	Contained in 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	6	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, 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 : Nattawut Ahomprammarat รหัสประจำตัว 3-323-4-0006 , Thanassou Namakunna รหัสประจำตัว 3-204-4-0101

Remark :

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

Technical Management

Photchanas S.

Photchanas Seeda
Scientist (4)
รหัสประจำตัว 3-323-4-0028

Approved by

D. Phum

Dej Changchon
Senior Manager
รหัสประจำตัว 3-323-4-0001

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.

129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Luk, Bankhai, Rayong Thailand 21120

P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 2520601

Date Received : Mar 14, 2025

Date Reported : Mar 21, 2025

Report Number : 3247251-2

TESTING
No.0009

Page 1 of 1

Sample Number	2520601-1
Sample Date	Mar 14, 2025 9:50 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Mar 17, 2025
Condition of Sample	Contained in 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	0.04	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.16	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, 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 : Nattawut Ahomprammarat รหัสประจำตัว 3-323-4-0006 , Thanassou Namakunna รหัสประจำตัว 3-204-4-0101

Remark :

- LOD : Limit of Detection
- <C : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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- Sampling is not included in scope of accreditation ISO/IEC 17025

Technical Management

Savitree N.

Savitree Nisangam
Manager
รหัสประจำตัว 3-204-4-0007

Approved by

Kanokkom Anek

Kanokkom Anek
Assistant General Manager
รหัสประจำตัว 3-204-4-0004

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NIGHT SOLUTIONS

2022/4/27(FRI)

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TESTING
No.0009

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: 2520601
Date Received : Mar 14, 2025
Date Reported : Mar 21, 2025
Report Number : 3247251-3

Page 1 of 1

Sample Number	2520601-1
Sampled Date	Mar 14, 2025 9:50 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Mar 14, 2025
Condition of Sample	Contained in 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	0.22	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 3125 B, 3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	micromhos/cm	-	0.5	1693	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	5.6	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 1900-O (G)	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, BE.2560 (2017).

Sampling By : Nattawut Abhomprommarat , Thansoon Namakuma

Remark :
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* "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
* Analytes marked * is/are not included in scope of Accreditation ISO/IEC 17025.
* Sampling is not included in scope of accreditation ISO/IEC 17025

Approved by
Savitree N
Savitree Naisiangman
Manager

Approved by

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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RIGHT SOLUTIONS RIGHT PARTNER

2272-42 / ENAIL

S:khawit@alsglobal.com



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 :
Project Name : Environment : EIA
Project Location :
Lot ID: 2530749
Date Received : Apr 11, 2025
Date Reported : Apr 22, 2025
Report Number : 3271473-1

Page 1 of 2

Sample Number	2530749-1
Sampled Date	Apr 11, 2025 1:54 PM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Apr 11, 2025
Condition of Sample	Contained in 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	14.6	≤20	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	81	≤120	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMT	-	5	29	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Color (at pH 7.0)	ADMT	-	5	28	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5520 B	Rayong
pH at 25 degree C		-	-	8.1	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, part 4500-Cl (F)	Rayong
Temperature *	Degree C	-	-	34.9	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	960	≤3000	Standard Method for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2540 C	Rayong

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Photchanas Seeda
Scientist (4)
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Approved by

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Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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2272-42 / ENAIL

S:khawit@alsglobal.com

S:khawit@alsglobal.com



TESTING
No.0042

Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2530749
Date Received : Apr 11, 2025
Date Reported : Apr 22, 2025
Report Number : 3271473-1

Page 2 of 2

Sample Number	2530749-1						
Sampled Date	Apr 11, 2025 1:54 PM						
Sample Description	Wastewater						
Location	Effluent (Holding pond 5,000 m3)						
Date Analysis Commenced	Apr 11, 2025						
Condition of Sample	Contained in 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	34	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, 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 : Nattawut Atthomprammarat รหัสประจำตัว 3-323-3-0006 , Pattarapol Sawangjaliam รหัสประจำตัว 3-204-3-0002

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

Technical Management

Photchanas S.

Photchanas Seeda
Scientist (4)
รหัสประจำตัว 3-323-3-0028

Approved by

D. Chuan

Dej Changchon
Senior Manager
รหัสประจำตัว 3-323-3-0001

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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www.alsglobal.com

237-621 (THAILAND)

RIGHT SOLUTIONS บริการวิเคราะห์

S:\Report\Head_ALS_04_04_25



TESTING
No.0009

Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2530749
Date Received : Apr 11, 2025
Date Reported : Apr 22, 2025
Report Number : 3271473-2

Page 1 of 1

Sample Number	2530749-1						
Sampled Date	Apr 11, 2025 1:54 PM						
Sample Description	Wastewater						
Location	Effluent (Holding pond 5,000 m3)						
Date Analysis Commenced	Apr 12, 2025						
Condition of Sample	Contained in 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	0.14	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, 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 : Nattawut Atthomprammarat รหัสประจำตัว 3-323-3-0006 , Pattarapol Sawangjaliam รหัสประจำตัว 3-204-3-0002

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

Technical Management

Savitree N.

Savitree Naisiam
Manager
รหัสประจำตัว 3-204-3-0007

Approved by

Kak-Ank

Kanokorn Anek
Assistant General Manager
รหัสประจำตัว 3-204-3-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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237-621 (THAILAND)

RIGHT SOLUTIONS บริการวิเคราะห์

S:\Report\Head_ALS_04_04_25



Analysis / Test Report

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

Sample Number 2530749-1

Sampled Date Apr 11, 2025 1:54 PM

Sample Description Wastewater

Location Effluent (Holding pond 5,000 m3)

Date Analysis Commenced Apr 11, 2025

Condition of Sample Contained in 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	0.36	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 3125 B.3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	micromhos/cm	-	0.5	1361	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	8.3	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 1900-O (G)	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 : Natsawat Adonprommarat, Pataniopol Sawangsilom

Remark :
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* * : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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Sampling is not included in scope of accreditation ISO/IEC 17025

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Approved by

Savitree N.

Savitree Naisiang
Manager

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RIGHT SOLUTIONS PROUDLY PARTNERING

3272-601 (ENL)

5:00pm-6:00pm (GMT+7)



Analysis / Test Report

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

Sample Number 2536849-1

Sampled Date May 15, 2025 2:30 PM

Sample Description Wastewater

Location Effluent (Holding pond 5,000 m3)

Date Analysis Commenced May 15, 2025

Condition of Sample Contained in 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	4.2	≤20	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMT	-	5	9	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Color (at pH 7.0)	ADMT	-	5	7	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5520 B	Rayong
pH at 25 degree C	-	-	-	8.0	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, part 4500-C (F)	Rayong
Temperature *	Degree C	-	-	35.5	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, part 2540 C	Rayong

Technical Management

Photchanas S.

Photchanas Seeda
Scientist (4)

Approved by

D. Chumma

Dej Changchon
Senior Manager

Wattana 7-323-R-0001

Result apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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RIGHT SOLUTIONS PROUDLY PARTNERING

3272-601 (ENL)

5:00pm-6:00pm (GMT+7)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
TESTING
No.0042
Lot ID: 2536849
Date Received : May 15, 2025
Date Reported : May 22, 2025
Report Number : 3286271-1

Page 2 of 2

Sample Number 2536849-1
Sample Date May 15, 2025 2:30 PM
Sample Description Wastewater
Location Effluent (Holding pond 5,000 m3)
Date Analysis Commenced May 15, 2025
Condition of Sample Contained in 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 105-105 degree C	mg/L	-	5	7	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, 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 : Sansoen Khuyokul วิสณุวานิช 3-323-0-0005, Samart Khumplilee วิสณุวานิช 3-204-0-0084

Remark :
- LOD : Limit of Detection
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- Sampling is not included in scope of accreditation ISO/IEC 17025

Technical Management

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Approved by

D. Chanon

Dej Changchon
Senior Manager
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ALIGHT SOLUTIONS

2023-05-24/01

S:\Report_ML_01.pdf (7/27/24)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
TESTING
No.0009
Lot ID: 2536849
Date Received : May 15, 2025
Date Reported : May 22, 2025
Report Number : 3286271-2

Page 1 of 1

Sample Number 2536849-1
Sample Date May 15, 2025 2:30 PM
Sample Description Wastewater
Location Effluent (Holding pond 5,000 m3)
Date Analysis Commenced May 15, 2025
Condition of Sample Contained in 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	0.07	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 3125 B.3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.15	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, 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 : Sansoen Khuyokul วิสณุวานิช 3-323-0-0005, Samart Khumplilee วิสณุวานิช 3-204-0-0084

Remark :
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- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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- Sampling is not included in scope of accreditation ISO/IEC 17025

Technical Management

Savitree N.

Savitree Nongsinglam
Manager
วิสณุวานิช 3-204-0-0007

Approved by

Kanokkorn Auek

Kanokkorn Auek
Assistant General Manager
วิสณุวานิช 3-204-0-0004

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ALIGHT SOLUTIONS

2023-05-24/01

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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 :
Project Name : Environment : EIA
Project Location :
Date Received : May 15, 2025
Date Reported : May 22, 2025
Report Number : 3286271-3

Page 1 of 1

Sample Number : 2536849-1
Sampled Date : May 15, 2025 2:30 PM
Sample Description : Wastewater
Location : Effluent (Holding pond 5,000 m3)
Date Analysis Commenced : May 15, 2025
Condition of Sample : Contained in 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	0.20	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 3125 B.3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	micromhos/cm	-	0.5	1697	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	5.9	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500-C (G)	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 : Sansoon Khuyeksu, Smart Khumphae

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This report shall not be reproduced except in full without the written approval of the laboratory.

Approved by

Savitree N.

Savitree Naisianglam
Manager

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23746/ENAL

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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 :
Project Name : Environment : EIA
Project Location :
Date Received : Jun 13, 2025
Date Reported : Jun 20, 2025
Report Number : 3309701-1

Page 1 of 2

Sample Number : 2547077-1
Sampled Date : Jun 13, 2025 3:00 PM
Sample Description : Wastewater
Location : Effluent (Holding pond 5,000 m3)
Date Analysis Commenced : Jun 13, 2025
Condition of Sample : Contained in 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	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	11	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	9	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5520 B	Rayong
pH at 25 degree C	-	-	-	7.8	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500 - H (E)	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500-CI (F)	Rayong
Temperature *	Degree C	-	-	32.9	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1076	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2540 C	Rayong

Technical Management

Photchanas.

Photchanas Seeda
Scientist (4)
วิศุกรรม 3-323-9-0028

Approved by

D. Khun

Dej Changchon
Senior Manager
วิศุกรรม 3-323-9-0001

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23746/ENAL

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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 :
Project Name : Environment : EIA
Project Location :

TESTING
No.0009
Lot ID: 2547077
Date Received : Jun 13, 2025
Date Reported : Jun 20, 2025
Report Number : 3309701-3

Page 1 of 1

Sample Number 2547077-1
Sample Date Jun 13, 2025 3:00 PM
Sample Description Wastewater
Location Effluent (Holding pond 5,000 m3)
Date Analysis Commenced Jun 13, 2025
Condition of Sample Contained in 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	0.13	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 3125 B.3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	micromhos/cm	-	0.5	1481	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2510 E	Rayong
Dissolved Oxygen *	mg/L	-	0.1	5.8	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500-O (G)	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.2550 (2017).

Sampling by : Srisoon Khuyosai, Pattarapol Sawangjittum

Remark :

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- LOQ : Limit of Quantitation / LOR (Limit of Reporting)
- * : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analytical marked * is/are not included in scope of Accreditation ISO/IEC 17025
- Sampling is/are not included in scope of Accreditation ISO/IEC 17025

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Approved by

Savitree N.

Savitree Nongsangam
Manager

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2202-02 (PML)

8: Reports_ML_03.pdf (3/27/20)

ภาคผนวก ค-5

คุณภาพดิน



Analysis / Test Report

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

Lot ID: 2520608

Date Received : Mar 15, 2025
Date Reported : Mar 24, 2025
Report Number : 3265265-2

Page 1 of 1

Sample Number	2520608-1
Sampled Date	Mar 14, 2025 10:50 AM
Sample Description	Soil
Location	SI วนอุทยาน ช้างเขาใหญ่ 1
Date Analysis Commenced	Mar 17, 2025
Condition of Sample	Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/kg	-	1.00	585	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	14023	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Physical Parameters							
Moisture	%	-	0.1	11.0	No Standard	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2540 G	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Note : Analysis Results expressed on dry basis

Sampling By : Thanasoun Namakunna

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

Savitree N.

Approved by

Savitree Nongsangiam
Manager

Result apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This report shall not be reproduced except in full without the written approval of the laboratory.

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2579-427 (THAI)

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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 :
Project Name : Environment : EIA
Project Location :

Lot ID: 2520608

Date Received : Mar 15, 2025
Date Reported : Mar 24, 2025
Report Number : 3265267-2

Page 1 of 1

Sample Number	2520608-3
Sampled Date	Mar 14, 2025 11:00 AM
Sample Description	Soil
Location	SI วนอุทยาน ช้างเขาใหญ่ 1
Date Analysis Commenced	Mar 17, 2025
Condition of Sample	Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/kg	-	1.00	326	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	13553	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Physical Parameters							
Moisture	%	-	0.1	10.5	No Standard	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2540 G	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Note : Analysis Results expressed on dry basis

Sampling By : Thanasoun Namakunna

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

Savitree N.

Approved by

Savitree Nongsangiam
Manager

Result apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This report shall not be reproduced except in full without the written approval of the laboratory.

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2579-427 (THAI)

S:\Reports\Water_ML_GL.pdf (8 pages)



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 :

Lot ID: 2520608

Date Received : Mar 15, 2025

Date Reported : Mar 24, 2025

Report Number : 3265269-2

Project Name : Environment : EIA

Project Location :

Page 1 of 1

Sample Number	2520608-5
Sampled Date	Mar 14, 2025 10:30 AM
Sample Description	Soil
Location	S2 บริเวณ 30 เมตรจากทางเข้า 1
Date Analysis Commenced	Mar 17, 2025
Condition of Sample	Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/kg	-	1.00	413	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	11623	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Physical Parameters							
Moisture	%	-	0.1	16.6	No Standard	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2013, part 2540 G	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Note : Analysis Results expressed on dry basis

Sampling By : Thanasoun Namakurina

Remark :

- LOD : Limit of Detection

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

Approved by

Signature

Savitree Nongsangiam

Manager

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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 :

Lot ID: 2520608

Date Received : Mar 15, 2025

Date Reported : Mar 24, 2025

Report Number : 3265271-2

Project Name : Environment : EIA

Project Location :

Page 1 of 1

Sample Number	2520608-7
Sampled Date	Mar 14, 2025 10:40 AM
Sample Description	Soil
Location	S2 บริเวณ 30 เมตรจากทางเข้า 1
Date Analysis Commenced	Mar 17, 2025
Condition of Sample	Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/kg	-	1.00	153	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	6386	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Physical Parameters							
Moisture	%	-	0.1	9.5	No Standard	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2013, part 2540 G	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Note : Analysis Results expressed on dry basis

Sampling By : Thanasoun Namakurina

Remark :

- LOD : Limit of Detection

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

Approved by

Signature

Savitree Nongsangiam

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 :

Project Name : Environment : EIA

Project Location :

Lot ID: 2520608

Date Received : Mar 15, 2025

Date Reported : Mar 24, 2025

Report Number : 3265273-1

Page 1 of 1

Sample Number	2520608-9
Sample Date	Mar 14, 2025 10:10 AM
Sample Description	Soil
Location	S3 วัดใหญ่ อำเภอนายูง 1
Date Analysis Commenced	Mar 17, 2025
Condition of Sample	Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/kg	-	1.00	265	1000	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Note : Analysis Results expressed on dry basis

Sampling By : Thanasorn Namkunthana รหัสประจำตัว 7-204-4-0101

Remark :

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

Technical Management

Savitree N.

Savitree Niamsangiam
Manager
โทรศัพท์มือถือ 7-204-4-0007

Approved by

Kanokorn Anek

Kanokorn Anek
Assistant General Manager
โทรศัพท์มือถือ 7-204-4-0004

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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 :

Project Name : Environment : EIA

Project Location :

Lot ID: 2520608

Date Received : Mar 15, 2025

Date Reported : Mar 24, 2025

Report Number : 3265273-2

Page 1 of 1

Sample Number	2520608-9
Sample Date	Mar 14, 2025 10:10 AM
Sample Description	Soil
Location	S3 วัดใหญ่ อำเภอนายูง 1
Date Analysis Commenced	Mar 17, 2025
Condition of Sample	Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/kg	-	1.00	69.2	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	11444	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Note : Analysis Results expressed on dry basis

Sampling By : Thanasorn Namkunthana

Remark :

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

Approved by

Savitree N.

Savitree Niamsangiam
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 :

Project Name : Environment : EIA

Project Location :

Lot ID: 2520608

Date Received : Mar 15, 2025

Date Reported : Mar 24, 2025

Report Number : 3265275-1

Page 1 of 1

Sample Number	2520608-11
Sample Date	Mar 14, 2025 10:20 AM
Sample Description	Soil
Location	S3 ครบถ้วน 30 เมตรจากอาคารที่ 1
Date Analysis Commenced	Mar 17, 2025
Condition of Sample	Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/kg	-	1.00	120	1000	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Note : Analysis Results expressed on dry basis

Sampling By : Thanassou Namakunna รหัสประจำตัว 7-204-4-0101

Remark :

LOD : Limit of Detection

LOQ : Lower than LOQ (Limit of Quantization) / LOR (Limit of Reporting)

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S: Report/Result/AL Co., Ltd. (4.3796)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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

P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 2520608

Date Received : Mar 15, 2025

Date Reported : Mar 24, 2025

Report Number : 3265275-2

Page 1 of 1

Sample Number	2520608-11
Sample Date	Mar 14, 2025 10:20 AM
Sample Description	Soil
Location	S3 ครบถ้วน 30 เมตรจากอาคารที่ 1
Date Analysis Commenced	Mar 17, 2025
Condition of Sample	Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/kg	-	1.00	45.8	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	13039	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Note : Analysis Results expressed on dry basis

Sampling By : Thanassou Namakunna

Remark :

LOD : Limit of Detection

LOQ : Lower than LOQ (Limit of Quantization) / LOR (Limit of Reporting)

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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S: Report/Result/AL Co., Ltd. (4.3796)

Technical Management: Sawitree N. Sawitree Nosingiam Manager รหัสประจำตัว 7-204-4-0007

Approved by

Kanokkom Anek Assistant General Manager รหัสประจำตัว 7-204-4-0004

Approved by

Sawitree N. Sawitree Nosingiam Manager

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S: Report/Result/AL Co., Ltd. (4.3796)



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 :

Date Received : Apr 25, 2025

Date Reported : May 06, 2025

Report Number : 3298309-1

Project Name : Environment : EIA

Project Location :

Page 1 of 1

Lot ID: 2537781

Date Received : Apr 25, 2025

Date Reported : May 06, 2025

Report Number : 3298309-1

Project Name : Environment : EIA

Project Location :

Page 1 of 1

Sample Number	2537781-1
Sample Date	Apr 25, 2025 3:15 PM
Sample Description	Soil
Location	S1 หน้าห้อง 312 ชั้น 1
Date Analysis Commenced	Apr 28, 2025
Condition of Sample	Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/kg	-	1.00	653	1000	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Sampling By : Patirapol Sawangjittam รหัสประจำตัว 7-204-3-0002

Remark :

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

Technical Management

Savitree N.
Savitree Ningsiam
Manager
รหัสประจำตัว 7-204-3-0007

Approved by

Kanokorn Anek
Kanokorn Anek
Assistant General Manager
รหัสประจำตัว 7-204-9-0004

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3/10/2025, 14:02:41 (000000)



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 :

Date Received : Apr 25, 2025

Date Reported : May 07, 2025

Report Number : 3298309-2

Project Name : Environment : EIA

Project Location :

Page 1 of 1

Lot ID: 2537781

Date Received : Apr 25, 2025

Date Reported : May 07, 2025

Report Number : 3298309-2

Project Name : Environment : EIA

Project Location :

Page 1 of 1

Sample Number	2537781-1
Sample Date	Apr 25, 2025 3:15 PM
Sample Description	Soil
Location	S1 หน้าห้อง 312 ชั้น 1
Date Analysis Commenced	Apr 28, 2025
Condition of Sample	Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Physical Parameters							
Moisture	%	-	0.1	10.0	No Standard	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2540 G	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Sampling By : Patirapol Sawangjittam

Remark :

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

Approved by

Siriluk P.
Siriluk Burmak
Section Head

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3/10/2025, 14:02:41 (000000)



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 :
Date Received : Apr 25, 2025
Date Reported : May 06, 2025
Report Number : 3298311-1
Project Name : Environment : EIA
Project Location :

Lot ID: 2537781

Page 1 of 1

Sample Number : 2537781-3
Sampled Date : Apr 25, 2025 3:30 PM
Sample Description : Soil
Location : SI บริเวณ 30 เมตรจากอาคาร 1
Date Analysis Commenced : Apr 28, 2025
Condition of Sample : Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/kg	-	1.00	796	1000	United States Environmental Protection Agency, EPA Method 3050 B and 8010 G	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Sampling By : Pattarapol Sawangjalarn

Remark :

LOD : Limit of Detection
LOQ : Limit of Quantitation / LOR (Limit of Reporting)

Result : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Technical Management

Savitree N.

Approved by

Savitree Nisangiam

Manager

โทรศัพท์ 0-204-3-0007

Kanokorn Anek

Assistant General Manager

โทรศัพท์ 0-204-3-0004

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S:Report_No_Cert (05090)



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 :
Date Received : Apr 25, 2025
Date Reported : May 07, 2025
Report Number : 3298311-2
Project Name : Environment : EIA
Project Location :

Lot ID: 2537781

Page 1 of 1

Sample Number : 2537781-3
Sampled Date : Apr 25, 2025 3:30 PM
Sample Description : Soil
Location : SI บริเวณ 30 เมตรจากอาคาร 1
Date Analysis Commenced : Apr 28, 2025
Condition of Sample : Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Physical Parameters							
Moisture	%	-	0.1	10.8	No Standard	In-house Method based on Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 24th ed., 2023, part 2540 G	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Sampling By : Pattarapol Sawangjalarn

Remark :

LOD : Limit of Detection
LOQ : Limit of Quantitation / LOR (Limit of Reporting)

Result : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

Approved by

Siriluk P.

Section Head

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207-621 0940

S:Report_No_Cert (05090)



Analysis / Test Report

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

Lot ID: 2537781

Date Received : Apr 25, 2025
Date Reported : May 06, 2025
Report Number : 3298313-1

Page 1 of 1

Sample Number 2537781-5
Sampled Date Apr 25, 2025 2:30 PM
Sample Description Soil
Location S2 วัดใหม่ อำเภอสหัสขันธ์ 1
Date Analysis Commenced Apr 28, 2025
Condition of Sample Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/kg	-	1.00	55.9	1000	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Sampling By : Pattarapol Sawangjittam รหัสพนักงาน 7-204-a-0002

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

Technical Management

Savitree N
Savitree Nisangiam
Manager
รหัสพนักงาน 7-204-a-0007

Approved by

Kanokorn Anek
Kanokorn Anek
Assistant General Manager
รหัสพนักงาน 7-204-a-0004

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207-02 PMH

S. (Savitree)_A. (Kanokorn) (P.02PM)



Analysis / Test Report

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

Lot ID: 2537781

Date Received : Apr 25, 2025
Date Reported : May 07, 2025
Report Number : 3298313-2

Page 1 of 1

Sample Number 2537781-5
Sampled Date Apr 25, 2025 2:30 PM
Sample Description Soil
Location S2 วัดใหม่ อำเภอสหัสขันธ์ 1
Date Analysis Commenced Apr 28, 2025
Condition of Sample Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Physical Parameters							
Moisture	%	-	0.1	8.9	No Standard	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2540 G	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Sampling By : Pattarapol Sawangjittam

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

Approved by

Siriluk P.
Siriluk Bunrak
Section Head

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. The report shall not be reproduced except in full without the written approval of the laboratory.

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S. (Siriluk)_A. (Kanokorn) (P.02PM)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Bankhai, Rayong Thailand 21120
P/O :
Date Received : Apr 25, 2025
Date Reported : May 06, 2025
Report Number : 3298315-1
Project Name : Environment : EIA
Project Location :
Page 1 of 1

Lot ID: 2537781

Sample Number : 2537781-7
Sampled Date : Apr 25, 2025 2:50 PM
Sample Description : Soil
Location : S2 ยานต์ 30 เทปเปอร์ ยานต์ 1
Date Analysis Commenced : Apr 28, 2025
Condition of Sample : Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/kg	-	1.00	21.4	1000	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures
Sampling By : Pattarapol Sawangjaliam รหัสประจำตัว 7-204-4-0002

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

Technical Management : Sawitree N
Sawitree Nongangiam
Manager
รหัสประจำตัว 7-204-4-0007

Approved by : Kanokorn Anek
Assistant General Manager
รหัสประจำตัว 7-204-4-0004



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Bankhai, Rayong Thailand 21120
P/O :
Date Received : Apr 25, 2025
Date Reported : May 07, 2025
Report Number : 3298315-2
Project Name : Environment : EIA
Project Location :
Page 1 of 1

Lot ID: 2537781

Sample Number : 2537781-7
Sampled Date : Apr 25, 2025 2:50 PM
Sample Description : Soil
Location : S2 ยานต์ 30 เทปเปอร์ ยานต์ 1
Date Analysis Commenced : Apr 28, 2025
Condition of Sample : Packed in one plastic bag, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Physical Parameters							
Moisture	%	-	0.1	9.3	No Standard	In-House Method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2540 G	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures
Sampling By : Pattarapol Sawangjaliam

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

Approved by : Siriluk P.
Siriluk Bunhak
Section Head

ภาคผนวก ค-6

ระดับความร้อนในสถานที่ทำงาน



Analysis / Test Report

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

Lot ID: 254668
Date Received : Feb 11, 2025
Date Reported : Feb 18, 2025
Report Number: 3214105-1

P/O :
Project Name : Environment : EIA
Project Location :

Page 1 of 6

Sample Number	254668-1
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Feb 11, 2025
Measurement by	Natthapon Jitngwareevong
Location	บริเวณงาน 1 ชั้น (ด้านหน้า ห้องประชุม) : - นอก : -

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่งานก่อสร้าง (H1)	120	32.9	29.7	40.3	40.3
Average (WBGT)		32.9			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

Supt S.

Supot Salameh
Section Head

Approved by

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
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21120

Lot ID: 254668
Date Received : Feb 11, 2025
Date Reported : Feb 18, 2025
Report Number: 3214105-1

P/O :
Project Name : Environment : EIA
Project Location :

Page 2 of 6

Sample Number	254668-2
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Feb 11, 2025
Measurement by	Natthapon Jitngwareevong
Location	บริเวณงาน 1 ชั้น (ด้านหน้า ห้องประชุม) : - นอก : -

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่งานก่อสร้าง (H2)	120	27.4	25.1	32.7	32.4
Average (WBGT)		27.4			
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 relation to Heat, Light and Noise, B.E.2559

Technical Management

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21120

P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 254668

Date Received : Feb 11, 2025
Date Reported : Feb 18, 2025
Report Number: 3214105-1

Page 3 of 6

Sample Number	254668-3
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Feb 11, 2025
Measurement by	Nathapon Jengwarewong
Location	บริเวณงาน 1 หลัง (ด้านหลังสำนักงาน : - นอก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่จอดรถ (H3)	120	29.0	27.3	32.8	32.8
Average (WBGT)		29.0			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Client : Michelin Siam Co., Ltd.
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21120

P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 254668

Date Received : Feb 11, 2025
Date Reported : Feb 18, 2025
Report Number: 3214105-1

Page 4 of 6

Sample Number	254668-4
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Feb 11, 2025
Measurement by	Nathapon Jengwarewong
Location	บริเวณงาน 1 หลัง (ด้านหลังสำนักงาน : - นอก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่จอดรถ (H4)	120	27.9	25.4	33.8	33.8
Average (WBGT)		27.9			
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 Salameeh
Section Head

Approved by

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Wichan Choonharat
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Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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P/O : 21120

Project Name : Environment : EIA

Project Location :

Lot ID: 254668

Date Received : Feb 11, 2025

Date Reported : Feb 18, 2025

Report Number: 3214105-1

Page 5 of 6

Sample Number	254668-5
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Feb 11, 2025
Measurement by	Natthapon Jitgwarewong
Location	บริเวณงาน 1 หลัง (ด้านหน้าอาคาร) : - แทน : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณงาน 1 หลัง (ด้านหน้าอาคาร) (H5)	120	27.4	25.3	32.3	32.2
Average (WBGT)		27.4			
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 Salamlah
Section Head

Approved by

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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P/O : 21120

Project Name : Environment : EIA

Project Location :

Lot ID: 254668

Date Received : Feb 11, 2025

Date Reported : Feb 18, 2025

Report Number: 3214105-1

Page 6 of 6

Sample Number	254668-6
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Feb 11, 2025
Measurement by	Natthapon Jitgwarewong
Location	บริเวณงาน 1 หลัง (ด้านหน้าอาคาร) : - แทน : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณงาน 1 หลัง (ด้านหน้าอาคาร) (H6)	120	24.3	21.9	29.8	29.7
Average (WBGT)		24.3			
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 Salamlah
Section Head

Approved by

Wichan Choonharat

Wichan Choonharat
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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 :
Project Name : Environment : EIA
Project Location :

Lot ID: 2541040

Date Received : May 09, 2025
Date Reported : May 15, 2025
Report Number: 3295497-1

Page 1 of 6

Sample Number 2541040-1
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date May 08, 2025
Measurement by Natthapon Jengwarewong
Location บึงฉลวย 1 พื้นที่ (ผด-บึงฉลวย) บึงฉลวย : - แผนที่ : -

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บึงฉลวย (บึงฉลวย) (H1) (Boiler #RTCH)	120	31.1	28.6	36.8	36.6
Average (WBGT) Guideline WBGT (°C)		31.1 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 Salameh
Section Head

Approved by

Wichan Chonharat
Wichan Chonharat
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 :
Project Name : Environment : EIA
Project Location :

Lot ID: 2541040

Date Received : May 09, 2025
Date Reported : May 15, 2025
Report Number: 3295497-1

Page 2 of 6

Sample Number 2541040-2
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date May 07, 2025
Measurement by Natthapon Jengwarewong
Location บึงฉลวย 1 พื้นที่ (ผด-บึงฉลวย) บึงฉลวย : - แผนที่ : -

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บึงฉลวย (บึงฉลวย) (H2) (Boiler #RTD)	120	27.0	24.5	32.6	32.3
Average (WBGT) Guideline WBGT (°C)		27.0 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 Salameh
Section Head

Approved by

Wichan Chonharat
Wichan Chonharat
Assistant Manager

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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 :
Project Name : Environment : EIA
Project Location :

Lot ID: 2541040

Date Received : May 09, 2025
Date Reported : May 15, 2025
Report Number: 3295497-1

Page 3 of 6

Sample Number	2541040-3
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	May 07, 2025
Measurement by	Natthapon Jengwarewong
Location	บริเวณงาน 1 หลัง (ด้านหน้าประตูด้าน : - บน : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่งาน (H3) (H32 ฐานรถ #KTD)	120	25.9	23.6	31.1	31.0
Average (WBGT)		25.9			
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 Salantich
Section Head

Approved by

Wichan Choonharat

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2725-62 / Email

S. Reesom, Asst. Head of / 3295497



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 :
Project Name : Environment : EIA
Project Location :

Lot ID: 2541040

Date Received : May 09, 2025
Date Reported : May 15, 2025
Report Number: 3295497-1

Page 4 of 6

Sample Number	2541040-4
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	May 07, 2025
Measurement by	Natthapon Jengwarewong
Location	บริเวณงาน 1 หลัง (ด้านหน้าประตูด้าน : - บน : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่งาน (H4) (Wet Drawing #KCD1)	120	25.9	23.6	31.1	30.9
Average (WBGT)		25.9			
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 Salantich
Section Head

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

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S. Reesom, Asst. Head of / 3295497



Analysis / Test Report

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

P/O :
Project Name : Environment : EIA
Project Location :

Lot ID: 2541040
Date Received : May 09, 2025
Date Reported : May 15, 2025
Report Number: 3295497-1

Page 5 of 6

Sample Number	2541040-5				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	May 07, 2025				
Measurement by	Natthapon Jengwareewong				
Location	บริเวณงาน 1 หลัง (ใต้-อาคาร ฝั่งซ้าย) : - ตาม :-)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณงาน 1 หลัง (ใต้-อาคาร ฝั่งซ้าย) (H5) (Wet Drawing #RCD2)	120	26.7	25.1	30.3	30.0
Average (WBGT)		26.7			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

Supt S.

Supot Salameeh
Section Head

Approved by

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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 :
Project Name : Environment : EIA
Project Location :

Lot ID: 2541040
Date Received : May 09, 2025
Date Reported : May 15, 2025
Report Number: 3295497-1

Page 6 of 6

Sample Number	2541040-6				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	May 07, 2025				
Measurement by	Natthapon Jengwareewong				
Location	บริเวณงาน 1 หลัง (ใต้-อาคาร ฝั่งซ้าย) : - ตาม :-)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณงาน 1 หลัง (ใต้-อาคาร ฝั่งซ้าย) (H6) (Wet Drawing #RCD3)	120	24.1	22.3	28.2	28.0
Average (WBGT)	24.1				
Guideline WBGT (°C)	34.0				

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

Supt S.

Supot Salameeh
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ภาคผนวก ค-7

คุณภาพอากาศในสถานประกอบการ



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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

21120

P/O :

Project Name : Environment : EA

Project Location :

Lot ID: 254670

Date Received : Feb 11, 2025

Date Reported : Feb 19, 2025

Report Number : 3214117-1

Page 1 of 4

Sample Number	254670-1								
Sampled Date	Feb 11, 2025								
Sample Description	Air Quality								
Location	ฟาร์มสุรา (F1)								
Date Analysis Commenced	Feb 13, 2025								
Condition of Sample	Drawn into one sorbent tube, refrigerated								
Barometric Pressure	754 mmHg								
Atmospheric Temperature	28.9 °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 : Natthapon Jengwaerewong

Remark :

- LOD : Limit of Detection

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

Please apply to the sample(s) in advance, unless the sampling was conducted by ALS. This report shall not be reproduced except in full without the written approval of the laboratory.

Approved by

Orawan R.

Orawan Rakyong

Scientist (3)

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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

21120

P/O :

Project Name : Environment : EA

Project Location :

Lot ID: 254670

Date Received : Feb 11, 2025

Date Reported : Feb 19, 2025

Report Number : 3214117-1

Page 2 of 4

Sample Number	254670-2										
Sampled Date	Feb 11, 2025										
Sample Description	Air Quality										
Location	พื้นที่สวน (F2)										
Date Analysis Commenced	Feb 13, 2025										
Condition of Sample	Drawn into one sorbent tube, refrigerated										
Barometric Pressure	754 mmHg										
Atmospheric Temperature	28.9 °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	MQL	Bangkok		
Sulfuric acid	09:00 AM - 05:00 PM	mg/m3	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MQL	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 Jengwaerewong

Remark :

- LOD : Limit of Detection

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

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Approved by

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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21120

P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 254670

Date Received : Feb 11, 2025
Date Reported : Feb 19, 2025
Report Number : 321417-1

Page 3 of 4

Sample Number	254670-3
Sample Date	Feb 11, 2025
Sample Description	Air Quality
Location	พื้นที่ก่อสร้าง (D1)
Date Analysis Commenced	Feb 13, 2025
Condition of Sample	Drawn into two filter papers placed in each cassette
Barometric Pressure	754 mmHg
Atmospheric Temperature	28.9 °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/m ³	-	0.15	<0.15	5	In-house method : STM 02-023 based on NIOSH Manual of Analytical Method, 4th ed., NIOSH, method 0600, Issue 3, 1998.	OSHA	Rayong

Total Dust	09:00 AM - 05:00 PM	mg/m ³	-	0.15	0.28	15	In-house method : STM 02-022 based on NIOSH Manual of Analytical Method, 4th ed., NIOSH, method 0500, Issue 2, 1994.	OSHA	Rayong
------------	---------------------	-------------------	---	------	------	----	--	------	--------

Guideline :

OSHA : Occupational Safety and Health Administration

Sampled By : Natthapon Jengwareewong

Remark :

- LOD : Limit of Detection

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

Orawan R.

Approved by

Orawan Rakyong
Scientist (3)

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272-62 (ENGL)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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21120

P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 254670

Date Received : Feb 11, 2025
Date Reported : Feb 19, 2025
Report Number : 321417-1

Page 4 of 4

Sample Number	254670-4
Sample Date	Feb 11, 2025
Sample Description	Air Quality
Location	พื้นที่ก่อสร้าง (D2)
Date Analysis Commenced	Feb 13, 2025
Condition of Sample	Drawn into two filter papers placed in each cassette
Barometric Pressure	754 mmHg
Atmospheric Temperature	28.9 °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/m ³	-	0.15	<0.15	5	In-house method : STM 02-023 based on NIOSH Manual of Analytical Method, 4th ed., NIOSH, method 0600, Issue 3, 1998.	OSHA	Rayong

Total Dust	09:00 AM - 05:00 PM	mg/m ³	-	0.15	<0.15	15	In-house method : STM 02-022 based on NIOSH Manual of Analytical Method, 4th ed., NIOSH, method 0500, Issue 2, 1994.	OSHA	Rayong
------------	---------------------	-------------------	---	------	-------	----	--	------	--------

Guideline :

OSHA : Occupational Safety and Health Administration

Sampled By : Natthapon Jengwareewong

Remark :

- LOD : Limit of Detection

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

Orawan R.

Approved by

Orawan Rakyong
Scientist (3)

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272-62 (ENGL)



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 :

Project Name : Environment : EIA

Project Location :

Lot ID: 2541042

Date Received : May 09, 2025
Date Reported : May 19, 2025

Report Number: 3295499-1

Page 1 of 4

Sample Number	2541042-1							
Sample Date	May 09, 2025							
Sample Description	Air Quality							
Location	ฟาร์มสุรนา (F1)							
Date Analysis Commenced	May 10, 2025							
Condition of Sample	Drawn into one sorbent tube, refrigerated							
Barometric Pressure	756 mmHg							
Atmospheric Temperature	32.8 °C							
Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid	08:00 AM - 04:00 PM	mg/m3	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL Bangkok
Sulfuric acid	08:00 AM - 04:00 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 : Charon Booncheun

Remark :

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

Savanya C.

Approved by

Saranya Chalermthamrong
Scientist (4)

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2776-01 (MNL)



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 :

Project Name : Environment : EIA

Project Location :

Lot ID: 2541042

Date Received : May 09, 2025
Date Reported : May 19, 2025

Report Number: 3295499-1

Page 2 of 4

Sample Number	2541042-2							
Sample Date	May 09, 2025							
Sample Description	Air Quality							
Location	ฟาร์มสุรนา (F2)							
Date Analysis Commenced	May 10, 2025							
Condition of Sample	Drawn into one sorbent tube, refrigerated							
Barometric Pressure	756 mmHg							
Atmospheric Temperature	32.8 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid	08:00 AM - 04:00 PM	mg/m3	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL Bangkok
Sulfuric acid	08:00 AM - 04:00 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 : Charon Booncheun

Remark :

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

Savanya C.

Approved by

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2776-01 (MNL)



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 :

Project Name : Environment : EIA

Project Location :

Lot ID: 2541042

Date Received : May 09, 2025
Date Reported : May 19, 2025
Report Number : 3295499-1

Page 3 of 4

Sample Number	2541042-3
Sample Date	May 09, 2025
Sample Description	Air Quality
Location	สุวิทย์ธานี (D1)
Date Analysis Commenced	May 13, 2025
Condition of Sample	Drawn into two filter papers placed in plastic cassette
Barometric Pressure	756 mmHg
Atmospheric Temperature	32.8 °C

Analyte	Sampled Date/Time	Unit	LOD (LOQ)	Result	Guideline Limit	Method	Guideline	Testing Location
---------	-------------------	------	-----------	--------	-----------------	--------	-----------	------------------

Air Testing								
Respirable Dust	08:00 AM - 04:00 PM	mg/m ³	-	0.15	<0.15	5	In-house method : STM 02-023 based on NIOSH Manual of Analytical Method, 4th ed., NIOSH, method 0500, Issue 3, 1998	OSHA Rayong

Total Dust	08:00 AM - 04:00 PM	mg/m ³	-	0.15	0.25	15	In-house method : STM 02-022 based on NIOSH Manual of Analytical Method, 4th ed., NIOSH, method 0500, Issue 2, 1994	OSHA Rayong
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Guideline :

OSHA : Occupational Safety and Health Administration

Sampled By : Chanon Booncheun

Remark :

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

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NIGHT SOLUTIONS

2025-02-19-08



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 :

Project Name : Environment : EIA

Project Location :

Lot ID: 2541042

Date Received : May 09, 2025
Date Reported : May 19, 2025
Report Number : 3295499-1

Page 4 of 4

Sample Number	2541042-4
Sample Date	May 09, 2025
Sample Description	Air Quality
Location	สุวิทย์ธานี (D2)
Date Analysis Commenced	May 13, 2025
Condition of Sample	Drawn into two filter papers placed in plastic cassette
Barometric Pressure	756 mmHg
Atmospheric Temperature	32.8 °C

Analyte	Sampled Date/Time	Unit	LOD (LOQ)	Result	Guideline Limit	Method	Guideline	Testing Location
---------	-------------------	------	-----------	--------	-----------------	--------	-----------	------------------

Air Testing								
Respirable Dust	08:00 AM - 04:00 PM	mg/m ³	-	0.15	<0.15	5	In-house method : STM 02-023 based on NIOSH Manual of Analytical Method, 4th ed., NIOSH, method 0500, Issue 3, 1998	OSHA Rayong

Total Dust	08:00 AM - 04:00 PM	mg/m ³	-	0.15	0.48	15	In-house method : STM 02-022 based on NIOSH Manual of Analytical Method, 4th ed., NIOSH, method 0500, Issue 2, 1994	OSHA Rayong
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Guideline :

OSHA : Occupational Safety and Health Administration

Sampled By : Chanon Booncheun

Remark :

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This report shall not be reproduced except in full without the written approval of the laboratory.

Approved by

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NIGHT SOLUTIONS

2025-02-19-08

ภาคผนวก ค-8

ระดับเสียงในสถานที่ทำงาน



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 : Date Received : Feb 11, 2025

Project Name : Environment : EIA Date Reported : Feb 18, 2025

Project Location : Report Number: 3237214-1

Page 1 of 1

Lot ID: 254678

Sample Number	254678-1		
Parameter	Noise (Leq 8 hrs.)		
Location	บริเวณเครื่องจักรและถนน (N3)		
Measurement Date	Feb 11, 2025		
Measurement by	Nathapon Jengwareewong		
Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:05 AM - 10:05 AM	84.1	90.1	72.0
10:05 AM - 11:05 AM	84.5	87.8	76.5
11:05 AM - 12:05 PM	83.4	93.4	76.5
12:05 PM - 01:05 PM	85.2	89.0	77.2
01:05 PM - 02:05 PM	84.1	90.0	76.4
02:05 PM - 03:05 PM	84.9	88.7	76.9
03:05 PM - 04:05 PM	84.7	88.0	76.7
04:05 PM - 05:05 PM	84.5	90.4	76.8

Reference Method : ISO1996-1 and 1996-2

Standard : มาตรฐานการวัดและประเมินผลกระทบสิ่งแวดล้อม (ม.ป.ร.)
Turn the noise measurement into sound pressure level in dB(A)

Technical Management

Chonticha

Chonticha Subongkloch
Scientist (3)

Approved by

Supt S.

Supot Salameeh
Section Head

ADDRESS: 616/10 Moo 5 T. Maenam Khu A. Phakdaeng Rayong 21140 Thailand PHONE: +66 0 3304 8555 FAX: +66 0 3304 8556

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2272-63/ EMAIL

S:\Reports_Air Noise\pt (11-42AM)



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 :

Page 1 of 1

Lot ID: 254678

Date Received : Feb 11, 2025

Date Reported : Feb 18, 2025

Report Number: 3237215-1

Sample Number	254678-2			
Parameter	Noise (Leq 8 hrs.)			
Location	บริเวณเครื่องจักรและถนนด้าน (N4)			
Measurement Date	Feb 11, 2025			
Measurement by	Nathapon Jiangwareewong			
Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))	
09:00 AM - 10:00 AM	82.1	92.8	78.9	
10:00 AM - 11:00 AM	83.5	92.3	80.6	
11:00 AM - 12:00 PM	82.4	95.3	79.8	
12:00 PM - 01:00 PM	82.2	94.3	80.0	
01:00 PM - 02:00 PM	82.9	90.3	80.8	
02:00 PM - 03:00 PM	83.3	90.3	80.4	
03:00 PM - 04:00 PM	83.1	90.5	81.0	
04:00 PM - 05:00 PM	82.6	94.7	80.4	

Reference Method : ISO1996-1 and 1996-2

Standard : มาตรฐานการวัดและประเมินผลกระทบสิ่งแวดล้อม (ม.ป.ร.)
Turn the noise measurement into sound pressure level in dB(A)

Technical Management

Chonticha

Chonticha Subongkloch
Scientist (3)

Approved by

Supt S.

Supot Salameeh
Section Head

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S:\Reports_Air Noise\pt (11-42AM)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhal Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2541043
Date Received : May 09, 2025
Date Reported : May 15, 2025
Report Number: 3306552-1

Page 1 of 1

Sample Number	2541043-1
Parameter	Noise (Leq 8 hrs.)
Location	บริเวณพื้นที่ก่อสร้างถนน (N3)
Measurement Date	May 09, 2025
Measurement by	Pipat Nipaised
Time	
08:21 AM - 09:21 AM	81.3
09:21 AM - 10:21 AM	80.7
10:21 AM - 11:21 AM	79.9
11:21 AM - 12:21 PM	80.3
12:21 PM - 01:21 PM	81.2
01:21 PM - 02:21 PM	80.7
02:21 PM - 03:21 PM	80.6
03:21 PM - 04:21 PM	81.4
Leq Average 8 hrs. (dB(A))	80.8
Lmax (dB(A))	107.2
Standard (dB(A))	90
Reference Method : ISO1996-1 and 1996-2	
Standard : กรมควบคุมมลพิษ (ฉบับแก้ไขเพิ่มเติม) พ.ศ. ๒๕๖๑	

กรมควบคุมมลพิษ (ฉบับแก้ไขเพิ่มเติม) พ.ศ. ๒๕๖๑

Technical Management

Chontichak

Chonticha Subongkloch
Scientist (3)

Approved by

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S:\Reports_Air Noise rpt (3.13PM)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhal Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2541043
Date Received : May 09, 2025
Date Reported : May 15, 2025
Report Number: 3306553-1

Page 1 of 1

Sample Number	2541043-2
Parameter	Noise (Leq 8 hrs.)
Location	บริเวณพื้นที่ก่อสร้างถนน (N4)
Measurement Date	May 09, 2025
Measurement by	Pipat Nipaised
Time	
08:28 AM - 09:28 AM	83.2
09:28 AM - 10:28 AM	82.8
10:28 AM - 11:28 AM	83.1
11:28 AM - 12:28 PM	83.1
12:28 PM - 01:28 PM	82.0
01:28 PM - 02:28 PM	81.9
02:28 PM - 03:28 PM	81.9
03:28 PM - 04:28 PM	81.9
Leq Average 8 hrs. (dB(A))	82.5
Lmax (dB(A))	100.0
Standard (dB(A))	90
Reference Method : ISO1996-1 and 1996-2	
Standard : กรมควบคุมมลพิษ (ฉบับแก้ไขเพิ่มเติม) พ.ศ. ๒๕๖๑	

กรมควบคุมมลพิษ (ฉบับแก้ไขเพิ่มเติม) พ.ศ. ๒๕๖๑

Technical Management

Chontichak

Chonticha Subongkloch
Scientist (3)

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S:\Reports_Air Noise rpt (3.13PM)

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_F50556	10-Jan-25	10-Jul-25	6
Stack	Oxides of Nitrogen	Pilot Tube	BKK_F50560	10-Jan-25	10-Jul-25	6
Stack	Oxides of Nitrogen	Flue gas Analyzer	RVG_F50711	16-Jul-24	16-Jul-25	12
Stack	Oxides of Nitrogen	Vacuum Gauge	RVG_F50333	3-Oct-24	2-Apr-26	18
Stack	Oxides of Nitrogen	SPECTROPHOTOMETER	RVG_EN0037	18-Mar-25	18-Sep-26	12
Stack	Phosphoric acid	Console Control Unit	BKK_F50556	10-Jan-25	10-Jul-25	6
Stack	Phosphoric acid	Pilot Tube	BKK_F50560	10-Jan-25	10-Jul-25	6
Stack	Phosphoric acid	Flue gas Analyzer	RVG_F50555	7-Nov-24	7-Nov-25	12
Stack	Phosphoric acid	Dry Gas	BKK_F50563	10-Jan-25	10-Jul-25	6
Stack	Phosphoric acid	Ion Chromatography	BKK_EN0069	12-Jan-24	12-Jul-25	18
Stack	Sulfuric Acid	Console Control Unit	BKK_F50556	10-Jan-25	10-Jul-25	6
Stack	Sulfuric Acid	Pilot Tube	BKK_F50560	10-Jan-25	10-Jul-25	6
Stack	Sulfuric Acid	Flue gas Analyzer	RVG_F50555	7-Nov-24	7-Nov-25	12
Stack	Total Suspended Particulate	Console Control Unit	RVG_F50315	6-Feb-25	6-Aug-25	6
Stack	Total Suspended Particulate	Pilot Tube	BKK_F50556	10-Jan-25	10-Jul-25	6
Stack	Total Suspended Particulate	Pilot Tube	RVG_F50320	6-Feb-25	9-Aug-25	6
Stack	Total Suspended Particulate	Flue gas Analyzer	BKK_F50560	10-Jan-25	10-Jul-25	6
Stack	Total Suspended Particulate	Digital Balance	RVG_F50711	16-Jul-24	16-Jul-25	12
Ambient	Total Suspended Particulate	High Volume	RVG_F50393	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RVG_F50394	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RVG_F50395	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RVG_F50396	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RVG_F50177	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RVG_F50180	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RVG_F50396	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RVG_F50661	-	-	On site Calibration
Ambient	Total Suspended Particulate	Digital Balance	RVG_EN0001	20-Feb-25	20-Feb-26	12
Ambient	Nitrogen Dioxide	NO Analyzer	RVG_F50252	4-Jan-25	4-Jul-25	6
Ambient	Nitrogen Dioxide	NO Analyzer	RVG_F50457	4-Jan-25	4-Jul-25	6
Ambient	Nitrogen Dioxide	NO Analyzer	RVG_F50461	4-Jan-25	4-Jul-25	6
Ambient	Nitrogen Dioxide	NO Analyzer	RVG_F50463	4-Jan-25	4-Jul-25	6
Ambient	Nitrogen Dioxide	NO Analyzer	BKK_F51086	3-Jan-25	3-Jul-25	6
Ambient	Nitrogen Dioxide	NO Analyzer	BKK_F51088	3-Jan-25	3-Jul-25	6
Ambient	Nitrogen Dioxide	NO Analyzer	RVG_F50255	4-Jan-25	4-Jul-25	6
Ambient	Nitrogen Dioxide	NO Analyzer	RVG_F50731	4-Jan-25	4-Jul-25	6
Ambient	Sulfuric Acid	DRICAL FLOWMETER	RVG_F50208	13-Feb-24	13-Aug-25	18
Ambient	Sulfuric Acid	DRICAL FLOWMETER	BKK_F50614	27-Jan-25	26-Jan-26	12
Ambient	Sulfuric Acid	DRICAL FLOWMETER	BKK_F50614	9-Sep-24	9-Sep-25	12
Ambient	Sulfuric Acid	Air Sampling Pump	BKK_F50619	6-Jan-25	6-Apr-25	3
Ambient	Sulfuric Acid	Air Sampling Pump	RVG_F50124	6-Jan-25	6-Apr-25	3
Ambient	Sulfuric Acid	Air Sampling Pump	RVG_F50127	28-Feb-25	28-May-25	3
Ambient	Sulfuric Acid	Air Sampling Pump	RVG_F50127	28-Feb-25	28-May-25	3
Ambient	Sulfuric Acid	Air Sampling Pump	RVG_F50504	3-Apr-25	6-Jul-25	3
Ambient	Sulfuric Acid	Air Sampling Pump	RVG_F50506	3-Apr-25	3-Jul-25	3
Ambient	Sulfuric Acid	Air Sampling Pump	RVG_F50508	3-Apr-25	3-Jul-25	3
Ambient	Sulfuric Acid	Air Sampling Pump	RVG_F50505	6-Apr-25	6-Jul-25	3
Ambient	Sulfuric Acid	Ion Chromatography	BKK_EN0069	12-Jan-24	12-Jul-25	18



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Ambient	Phosphoric acid	DRICAL FLOWMETER	RVG_F50208	13-Feb-24	13-Aug-25	18
Ambient	Phosphoric acid	DRICAL FLOWMETER	RVG_F50208	27-Jan-25	26-Jan-26	12
Ambient	Phosphoric acid	DRICAL FLOWMETER	BKK_F50614	21-May-24	21-May-25	12
Ambient	Phosphoric acid	DRICAL FLOWMETER	BKK_F50614	9-Sep-24	9-Sep-25	12
Ambient	Phosphoric acid	DRICAL FLOWMETER	BKK_F50619	6-Jan-25	6-Apr-25	3
Ambient	Phosphoric acid	Air Sampling Pump	RVG_F50124	6-Jan-25	6-Apr-25	3
Ambient	Phosphoric acid	Air Sampling Pump	RVG_F50127	28-Feb-25	28-May-25	3
Ambient	Phosphoric acid	Air Sampling Pump	RVG_F50127	28-Feb-25	28-May-25	3
Ambient	Phosphoric acid	Air Sampling Pump	RVG_F50504	3-Apr-25	6-Jul-25	3
Ambient	Phosphoric acid	Air Sampling Pump	RVG_F50506	3-Apr-25	3-Jul-25	3
Ambient	Phosphoric acid	Air Sampling Pump	RVG_F50508	3-Apr-25	3-Jul-25	3
Ambient	Phosphoric acid	Air Sampling Pump	RVG_F50505	6-Apr-25	6-Jul-25	3
Ambient	Phosphoric acid	Ion Chromatography	BKK_EN0069	12-Jan-24	12-Jul-25	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG_F50330	21-Aug-24	21-Feb-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG_F50331	28-Aug-24	28-Feb-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG_F50611	26-Jun-24	26-Dec-25	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_F51370	27-May-24	27-May-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_F50143	20-Aug-24	20-Feb-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG_F50412	29-Oct-24	29-Apr-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG_F50609	18-Jul-24	18-Jan-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG_F50610	26-Dec-25	26-Dec-25	18
Noise	Leq 24 hrs	Sound Calibrator	RVG_F50213	16-Jan-25	16-Jan-26	12
Noise	Leq 24 hrs	Sound Level Meter	RVG_F50024	21-Jan-24	21-Jan-26	12
Workplace	Total Dust	DRICAL FLOWMETER	RVG_F50208	13-Feb-24	13-Aug-25	18
Workplace	Total Dust	DRICAL FLOWMETER	BKK_F50614	21-May-25	21-May-26	12
Workplace	Total Dust	DRICAL FLOWMETER	BKK_F50614	9-Sep-25	9-Sep-26	12
Workplace	Total Dust	DRICAL FLOWMETER	BKK_F50619	9-Sep-24	9-Sep-25	12
Workplace	Total Dust	Air Sampling Pump	RVG_F50135	7-Jan-25	7-Apr-25	3
Workplace	Total Dust	Air Sampling Pump	RVG_F50144	7-Jan-25	7-Apr-25	3
Workplace	Total Dust	Air Sampling Pump	BKK_F50315	18-Feb-25	18-May-25	3
Workplace	Total Dust	Air Sampling Pump	BKK_F50317	18-Feb-25	18-May-25	3
Workplace	Total Dust	Digital Balance	RVG_EN0004	22-Feb-24	22-Feb-25	12
Workplace	Total Dust	Digital Balance	RVG_EN0004	20-Feb-24	20-Feb-26	12
Workplace	Respirable Dust	DRICAL FLOWMETER	RVG_F50208	13-Feb-24	13-Aug-25	18
Workplace	Respirable Dust	DRICAL FLOWMETER	BKK_F50614	21-May-25	21-May-26	12
Workplace	Respirable Dust	DRICAL FLOWMETER	BKK_F50614	9-Sep-25	9-Sep-26	12
Workplace	Respirable Dust	DRICAL FLOWMETER	BKK_F50619	9-Sep-24	9-Sep-25	12
Workplace	Respirable Dust	Air Sampling Pump	RVG_F50124	6-Jan-25	6-Apr-25	3
Workplace	Respirable Dust	Air Sampling Pump	RVG_F50146	6-Jan-25	6-Apr-25	3
Workplace	Respirable Dust	Air Sampling Pump	BKK_F50314	19-Feb-25	19-May-25	3
Workplace	Respirable Dust	Air Sampling Pump	BKK_F50318	21-Feb-25	21-May-25	3
Workplace	Respirable Dust	Digital Balance	RVG_EN0004	22-Feb-24	22-Feb-25	12
Workplace	Respirable Dust	Digital Balance	RVG_EN0004	20-Feb-24	20-Feb-26	12
Workplace	Phosphoric Acid	DRICAL FLOWMETER	RVG_F50208	13-Feb-24	13-Aug-25	18
Workplace	Phosphoric Acid	DRICAL FLOWMETER	BKK_F50614	21-May-25	21-May-26	12
Workplace	Phosphoric Acid	DRICAL FLOWMETER	BKK_F50614	9-Sep-25	9-Sep-26	12
Workplace	Phosphoric Acid	DRICAL FLOWMETER	BKK_F50619	9-Sep-24	9-Sep-25	12
Workplace	Phosphoric Acid	Air Sampling Pump	RVG_F50136	7-Jan-25	7-Apr-25	3
Workplace	Phosphoric Acid	Air Sampling Pump	RVG_F50111	7-Jan-25	7-Apr-25	3
Workplace	Phosphoric Acid	Air Sampling Pump	BKK_F50313	18-Feb-25	18-May-25	3
Workplace	Phosphoric Acid	Air Sampling Pump	BKK_F50312	18-Feb-25	18-May-25	3
Workplace	Phosphoric Acid	Ion Chromatography	BKK_EN0069	12-Jan-24	12-Jul-25	18



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Workplace Sulfuric Acid		DRYCAL FLOWMETER	RYG_F50208	13-Feb-24	13-Aug-25	18
Workplace Sulfuric Acid		BKX_F50614		21-May-24	21-May-25	12
Workplace Sulfuric Acid		DRYCAL FLOWMETER	BKX_F50614	9-Sep-24	9-Sep-25	12
Workplace Sulfuric Acid		DRYCAL FLOWMETER	BKX_F50619	9-Sep-24	9-Sep-25	12
Workplace Sulfuric Acid		RYG_F50136		7-Jan-25	7-Apr-25	3
Workplace Sulfuric Acid		RYG_F50111		7-Jan-25	7-Apr-25	3
Workplace Sulfuric Acid		RYG_F50313		18-Feb-25	18-May-25	3
Workplace Sulfuric Acid		BKX_F50312		18-Feb-25	18-May-25	3
Workplace Sulfuric Acid		BKX_EN0069		12-Jul-25	12-Jul-25	18
Noise	Leq 8 hrs	Sound Calibrator	RYG_F50216	22-Oct-24	22-Oct-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_F50027	21-Jan-25	21-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_F50029	11-Jul-24	11-Jul-25	12
Noise	Leq 8 hrs	Sound Calibrator	RYG_F50213	16-Jan-25	16-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_F50628	21-Jan-25	21-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_F50629	21-Jan-25	21-Jan-26	12
Heat	Heat Stress	Heat Stress Monitor	RYG_F50217	20-Dec-24	20-Dec-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_F50218	27-Jan-25	26-Jan-26	12
Heat	Heat Stress	Heat Stress Monitor	RYG_F50220	20-Dec-24	20-Dec-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_F50224	27-Jan-25	26-Jan-26	12
Heat	Heat Stress	Heat Stress Monitor	RYG_F50226	27-Jan-25	26-Jan-26	12
Heat	Heat Stress	Heat Stress Monitor	RYG_F50219	9-Apr-25	8-Apr-26	12
Heat	Heat Stress	Heat Stress Monitor	RYG_F50220	20-Dec-24	20-Dec-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_F50224	27-Jan-25	26-Jan-26	12
Heat	Heat Stress	Heat Stress Monitor	RYG_F50231	23-Dec-24	23-Dec-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_F50232	9-Apr-25	8-Apr-26	12
Heat	Heat Stress	Heat Stress Monitor	RYG_F50323	18-Mar-25	16-Mar-26	12
Soil	Copper	ICP-OES	BKX_E00037	22-Sep-24	23-Mar-26	18
Soil	Copper	Hot Block Chamber (Cooling Room)	BKX_E00054	4-Mar-25	4-Sep-26	18
Soil	Copper	Chamber	BKX_EN0167	4-Jun-25	4-Dec-26	18
Soil	Iron	ICP-OES	BKX_E00037	22-Sep-24	23-Mar-26	18
Soil	Iron	Hot Block Chamber (Cooling Room)	BKX_E00054	4-Jun-25	4-Sep-26	18
Soil	Iron	Chamber	BKX_EN0167	4-Jun-25	4-Dec-26	18
Soil	Zinc	ICP-OES	BKX_E00037	22-Sep-24	23-Mar-26	18
Soil	Zinc	Hot Block Chamber (Cooling Room)	BKX_E00054	4-Mar-25	4-Sep-26	18
Soil	Zinc	Chamber	BKX_EN0167	4-Jun-25	4-Dec-26	18
Rayong Lab	Temperature	pH meter	RYG_F50714	30-Aug-24	30-Aug-25	12
Rayong Lab	pH at 25 °C	pH Meter	RYG_EN0152	14-Dec-23	14-Jun-25	18
Rayong Lab	BOD	DO meter with Sensor	RYG_EN0032	20-Jan-25	20-Jul-26	18
Rayong Lab	BOD	Incubator	RYG_EN0154	1-Nov-24	1-May-26	18
Rayong Lab	BOD	Burette	RYG_EN0216	24-Sep-24	24-Sep-25	12
Rayong Lab	CO2	Spectrophotometer	RYG_EN0037	18-Mar-25	18-Sep-26	18
Rayong Lab	Total Suspended Solids	Electronic Balance	RYG_EN0002	20-Feb-25	20-Feb-26	12
Rayong Lab	Total Suspended Solids	Hot Air Oven	RYG_EN0010	21-Mar-24	21-Sep-25	18
Rayong Lab	Total Dissolved Solids 180°C	Electronic Balance	RYG_EN0002	20-Feb-25	20-Feb-26	12
Rayong Lab	Total Dissolved Solids 180°C	Hot Air Oven	RYG_EN0010	21-Mar-24	21-Sep-25	18
Rayong Lab	Oil & Grease	Electronic Balance	RYG_EN0002	20-Feb-25	20-Feb-26	12
Rayong Lab	Oil & Grease	Hot Air Oven	RYG_EN0213	19-Mar-25	19-Mar-26	12
Rayong Lab	Oil & Grease	Water Bath	RYG_EN0061	21-Mar-24	21-Sep-25	18
Water Lab	Iron	ICP-AES	BKX_E00043	4-Oct-24	3-Apr-26	18
Water Lab	Iron	Hot Block Chamber (Cooling Room)	BKX_E00054	4-Mar-25	4-Sep-26	18
Water Lab	Iron	Chamber	BKX_EN0167	4-Jun-25	4-Dec-26	18
Water Lab	Copper	ICP-AES	BKX_E00043	4-Oct-24	3-Apr-26	18
Water Lab	Copper	Hot Block Chamber (Cooling Room)	BKX_E00054	4-Mar-25	4-Sep-26	18
Water Lab	Copper	Chamber	BKX_EN0167	4-Jun-25	4-Dec-26	18
Water Lab	Zinc	ICP-AES	BKX_E00043	4-Oct-24	3-Apr-26	18
Water Lab	Zinc	Hot Block Chamber (Cooling Room)	BKX_E00054	4-Mar-25	4-Sep-26	18
Water Lab	Zinc	Chamber	BKX_EN0167	4-Jun-25	4-Dec-26	18
Rayong Lab	Conductivity	Conductivity meter	RYG_EN0200	21-Mar-25	21-Mar-26	12



CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Calibration of Date : 10-Jan-25
 Next Cal. Date : 19-Jul-25
 Barometric Pressure (mmHg) : 756.2
 Relative Humidity (%) : 37.9
 Temperature (°C) : 28.1
 Reference Dry Gas Meter Data
 Calibration No. : C-100725-BKK_FS0556
 Dry Gas Meter ID : BKK_FS0556
 Serial No. : 180641
 Model No. : XC-572-V
 Reference Dry Gas Meter ID : BKK_FS1122
 Serial No. : A2003240
 Correction Factor (Y) : 1.0000
 Next Calibration Date : 25-Feb-26

V	ΔH (mm H ₂ O)	θ Minutes	Reference Dry Gas Meter Calibration			Console Control Dry Gas Meter			Dry Gas Meter Correction Factor (Y)	Dry Gas Meter Calibration Factor	ΔAvg
			Initial	Final	Total	Initial	Final	Total			
15	11.41	0.00	150.00	0.00	150.00	31.0	664531.0	143.00	31.0	1.0030	40.1599
25	8.87	0.00	150.00	0.00	150.00	31.0	664500.0	143.00	31.0	1.0030	41.4499
50	6.42	0.00	150.00	0.00	150.00	31.0	664531.0	143.00	31.0	1.0030	42.8801
80	5.05	0.00	150.00	0.00	150.00	31.0	664531.0	143.00	31.0	1.0030	42.2333
120	4.08	0.00	150.00	0.00	150.00	31.0	664531.0	143.00	31.0	1.0030	41.3708

V : Rate of rising of reference to dry gas meter : tabulated for individual values ± 0.02 from average

ΔAvg : Orifice pressure differential that equates to 21.24 mm of H₂O @ 25°C and 760 mm of mercury, mmH₂O : denotes for individual values ± 0.08 from average

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

Calibrated by :

(Mr. Warawut Pubpa)

RYG Field Service Scientist (3)

Approved by :

(Mr. Natthapol Jengwarewong)

RYG Field Service Specialist (1)

Form No. F-08-027 Revision No. 2 Issue Date: 25-Feb-21



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date :	10 Jan 25	Ambient Temperature (°C)	28.1		
Calibration sheet No. :	C-100125-BKK_FS0557	Relative Humidity (%) :	37.9		
Digital Temperature ID :	BKK_FS0557	Reference Temperature ID	RYG_FS0681		
Serial No. :	1606041	Serial No. :	201050014918		
Model :	XC-572-V	Model :	Digicon-CC-VT-M5		
		Next Calibrate :	13 May 25		
Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	±3	Pass
	25	24	-1	±3	Pass
	50	48	-1	±3	Pass
	100	99	-1	±3	Pass
	150	149	-1	±3	Pass
	200	199	-1	±3	Pass
	250	249	-1	±3	Pass
	300	299	-1	±3	Pass
	500	499	-1	±3	Pass
	1000	999	-1	±3	Pass
Probe	120	119	-1	±3	Pass
	140	139	-1	±3	Pass
	160	159	-1	±3	Pass
Oven	100	99	-1	±3	Pass
	120	119	-1	±3	Pass
	140	139	-1	±3	Pass
Fiber	100	100	0	±3	Pass
	120	120	0	±3	Pass
	140	141	1	±3	Pass
Exst	0	0	0	±3	Pass
	10	10	0	±3	Pass
	20	20	0	±3	Pass
Meter	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass
AUX	0	0	0	±3	Pass
	25	24	-1	±3	Pass
	50	49	-1	±3	Pass

MPE : (Maximum permissible error of measurement) ค่าความคลาดเคลื่อนที่อนุญาต

Calibrated by :

(Mr. Warawut Pubpa)

RYG Field Service Scientist (3)

Approved by :

(Mr. Natthapol Jengwarewong)

RYG Field Service Specialist (1)

Form No. F-08-027 Revision No. 2 Issue Date: 25-Feb-21



PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

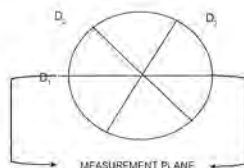
Calibration Date :	10 Jan 25	Nozzle Set ID :	BKK_FS0562		
Calibration Sheet No. :	C-100125-BKK_FS0562	Vernier Caliper ID :	BKK_FS1123		
Nozzle ID #	Nozzle Diameter (cm.)			H ₀ - L ₀ ΔD	(D ₁ + D ₂ + D ₃) / 3 D _{avg}
	D ₁	D ₂	D ₃		
1	0.300	0.300	0.305	0.005	0.302
2	0.485	0.475	0.485	0.010	0.482
3	0.530	0.535	0.530	0.005	0.532
4	0.625	0.630	0.630	0.005	0.626
5	0.760	0.760	0.765	0.005	0.762
6	0.975	0.980	0.980	0.005	0.978
7	1.085	1.085	1.081	0.004	1.084
8	1.275	1.275	1.275	0.000	1.275
9	1.605	1.610	1.615	0.010	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.

D_{avg} = (D₁ + D₂ + D₃) / 3



Calibrated by :

(Mr. Warawut Pubpa)

RYG Field Service Scientist (3)

Approved by :

(Mr. Natthapol Jengwarewong)

RYG Field Service Specialist (1)



Type 5 Pitot Tube Calibration

Date Calibration : 10-Jan-25
 Pitot ID : BKK_FS0560
 Pitot SN : -

Due Date : 10-Jul-25
 Inclinator ID : BKK_FS1131
 Vernier ID : RYG_FS0539



Parameter	Value	Allowable Range	Check
α1	0.6	-10° < α1 < +10°	OK
α2	1.4	-10° < α2 < +10°	OK
β1	-2.3	-5° < β1 < +5°	OK
β2	-0.5	-5° < β2 < +5°	OK
γ	-1.1	-	-
θ	1.3	-	-
Z = A tan γ	-0.017	Z ≤ 0.125"	OK
W = A tan θ	0.020	W ≤ 0.031"	OK
D	0.311	0.188" to 0.375"	OK
A/2D	1.415	1.05 ≤ PA/D ≤ 1.5	OK
A	0.88	2.1Dt ≤ A ≤ 3Dt	OK

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

Calibrated by :

(Mr. Warawut Pubpa)

RYG Field Services Scientist (3)

Approved by :

(Mr. Natthapol Jengwarewong)

RYG Field Services Specialist (1)

Form No. F-08-124 Revision No. 0 Issue Date: 25-Feb-21

Calibration certificate Kalibrier-Zertifikat

5753561

Object Gegenstand: Control Unit 1350
 Manufacturer Hersteller: TESTO SE & Co. KGaA
 Type description Typ: 0632 3511
 Serial no. Serien Nr.: 64554897
 Inventory no. Inventar Nr.: ---
 Test equipment no. Prüfmittel Nr.: ---
 Equipment no. Equipment Nr.: 15862485
 Location Standort: ---
 Customer Auftraggeber: ALS Laboratory Group (Thailand) Co., Ltd
 104 Phatthanakan 40, Phatthanakan Rd.
 Khwaeng Phatthanakan, Khet Suan Luang
 TH Bangkok 10250 Thailand
 Customer ID no. Kunden Nr.: 1051994
 Order no. Auftrags Nr.: 12459724 / 0520 0055

Hereby we confirm that the performing calibration laboratory is working with a management system according to ISO 9001:2015 and DIN EN ISO/IEC 17025:2018. Accreditation certificates can be found under www.testo.de. The measuring installations used for calibration are regularly calibrated and traceable to the national standards of the German Federal Physical Technical Institute (PTB) or other national standards. Should no national standard exist, the measuring procedure corresponds with the technical regulations and norms valid at the time of the measurement. The documents established for this procedure are available for viewing. All the necessary measured data can be found on this calibration certificate.

Hiermit bestätigen wir, dass das durchführende Kalibrierlabor mit einem Managementsystem nach ISO 9001:2015, sowie DIN EN ISO/IEC 17025:2018 eingeführt hat. Die Urkunden finden Sie auf www.testo.de. Die für die Kalibrierung verwendeten Messanordnungen werden regelmäßig kalibriert und sind rückführbar auf die nationalen Normale der Physikalisch-Technischen Bundesanstalt (PTB), Deutschlands oder auf andere nationale Normale. Wo keine nationalen Normale existieren, erfolgt die Kalibrierung nach den geltenden technischen Regeln und Normen. Die für diesen Vorgang angefertigten Dokumentationen sind eingesehen werden. Alle erforderlichen Messdaten sind in diesem Kalibrier-Zertifikat aufgeführt.

REVIEW BY: *[Signature]*
 APPROVED BY: *[Signature]*
 NEXT CAL DATE: 11/19

Date of calibration Datum der Kalibrierung: 16.07.2024

Date of the recommended re-calibration Datum der empfohlenen Rekalibrierung: 16.07.2025

Conformity statement Konformitätsaussage: Pass

The expanded uncertainty of measurement was calculated according to EA-402 M:2017 with a coverage probability of about 95% and contains the uncertainty of the reference, the uncertainty of the method and the uncertainty of the test specimen. The conformity statement is made according to the Decision rule "confidence level 95%".
 Die erweiterte Messunsicherheit wurde nach EA-402 M:2017 mit einer Deckungsgradwahrscheinlichkeit von etwa 95% berechnet und enthält die Unsicherheit der Referenz, die Unsicherheit der Methode sowie die Unsicherheit des Prüflings. Die Konformitätsaussage erfolgt nach der Entscheidungsregel "Vertrauensniveau 95%".
 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 are not valid.
 Dieses Kalibrierzertifikat darf nicht vollständig wiedergegeben werden, Auszüge oder Änderungen bedürfen der Genehmigung des ausstellenden Kalibrierlaboratoriums. Links: Konformitätsaussage ohne Unterschrift und Siegel haben keine Gültigkeit.



Supervisor Fachverantwortlicher:

[Signature]
 Martin Fördorfer

Technician Fachkraft:

[Signature]
 Samuel Garcia Zodi

Testo Industrial Services GmbH

Ottenslocherstraße 3
79169 KirchzartenTel: +49 781 50901-8000
Fax: ---www.testo.de
info@testo.de

Page 1/2

Calibration certificate Kalibrier-Zertifikat

5753561

Measuring equipment Messschrühungen

Ref. no. Referenz	Traceability Rückführung	Next cal. Fällig	Certificate no. Zertifikat-Nr.	Eq. no. Eq.-Nr.
1. Test gas medium 1 Prüfgas Medium 1	SCS-6050008 2024-09	2025-02	55141/2	1189915
2. Test gas medium 3 Prüfgas Medium 3	SCS-6050008 2024-09	2025-02	55141/2	1189915
3. Test gas medium 5 Prüfgas Medium 5	SCS-6050008 2024-09	2025-02	55141/2	1189915
4. Test gas medium 8 Prüfgas Medium 8	SCS-6050008 2024-09	2025-02	55141/2	1189915
5. Test gas medium 7 Prüfgas Medium 7	SCS-6050008 2024-09	2025-02	55141/2	1189915
6. Test gas medium 11 Prüfgas Medium 11	SCS-6050008 2024-09	2025-02	55141/2	1189915

Reference certificates are available at www.primasone.com. Referenzzertifikate sind auf www.primasone.com abrufbar.

Ambient conditions Umgebungsbedingungen

Temperature Temperatur: (20...26) °C Humidity Feuchte: (20...60) % RH \pm 1

Measuring procedure Messverfahren

The calibration was carried out by comparison measurement with calibrated test gases. Die Kalibrierung erfolgte durch Vergleichsmessung mit kalibrierten Prüfgasen.

Measuring results Messergebnisse

Channel Kanal: ---

Reference value Bezugswert	Indicated measured value Angezeigter Messwert Kalibriergegenstand	Deviation Abweichung	Allowed deviation ¹⁾ Zulässige Abweichung ²⁾	Measurement uncertainty (k=2) Messunsicherheit (k=2)	Conformity Conforming
ppm Vol.-%	ppm Vol.-%	ppm Vol.-%	ppm Vol.-%	ppm Vol.-%	
CO					
100.0 ³⁾	100	-0.6	± 1.1	3.3	pass
400.0 ³⁾	403	2.6	± 2.1	8.4	pass
700.0 ³⁾	702	2.0	± 3.6	14.4	pass
NO					
150.2 ³⁾	151	0.8	± 9	4.0	pass
300 ³⁾	302	2	± 1.6	9.8	pass
NO ₂					
100.0 ³⁾	102.3	1.9	± 5.1	3.20	pass
SO ₂					
97.9 ³⁾	96	-1.9	± 6	3.6	pass
O ₂					
0.00 ³⁾	0.00	0.00	± 0.21	0.027	pass
2.52 ³⁾	2.57	0.05	± 0.21	0.055	pass
5.01 ³⁾	5.17	0.16	± 0.21	0.107	pass

²⁾ In accordance with the manufacturer's permit (Hersteller).

Remarks Bemerkungen:

Testo Industrial Services GmbH

Ottenslocherstraße 3
79169 KirchzartenTel: +49 781 50901-8000
Fax: ---www.testo.de
info@testo.de

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CALIBRATION LABORATORY CO., LTD.

2115-11-14 55,55 Praset Mankul 29 Yank 4, Praset Mankul Rd., Ladphran, Bangkok 10230
 Tel: 02-578-0553-4 Fax: 02-578-2672 www.clc-lab.com E-mail: info@clc-lab.com



CALIBRATION LABORATORY CO., LTD.

2115-11-14 55,55 Praset Mankul 29 Yank 4, Praset Mankul Rd., Ladphran, Bangkok 10230
 Tel: 02-578-0553-4 Fax: 02-578-2672 www.clc-lab.com E-mail: info@clc-lab.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : VACUUM GAUGE
 MANUFACTURER : QUALITYWELL
 MODEL / TYPE : N/A
 SERIAL NO. : VG02[RYG_FS0333]
 CLID. NO. : 212300696
 JOB CONTROL NO. : 241002105107
 CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

REVIEW BY: *[Signature]*
 APPROVED BY: *[Signature]*
 NEXT CAL DATE: 02/04/26

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

DATE OF RECEIVED : 02 October 2024 DATE OF ISSUED : 04 October 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By: Sitipong Pimdee
 Calibration Engineer

Approved By: Mongkol Yotsontorn
 Authorized Signatory
 04 October 2024



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

Certificate No. Q24105107

F3-011-05/12-23

page 1 of 3



REPORT OF CALIBRATION

FOR

NOMENCLATURE : VACUUM GAUGE
 MANUFACTURER : QUALITYWELL
 MODEL / TYPE : N/A
 SERIAL NO. : VG02[RYG_FS0333]
 DATE OF CALIBRATION : 03 October 2024

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 700PDS S/N. 89404505.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).
 Certificate No. MP-0040-24, Due Date 08 February 2025.

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. Q24105107

F3-011-05/12-23

page 2 of 3





CALIBRATION LABORATORY CO., LTD.

210-11, 14-55 So Phrasit Mankul 29 Year 4, Phrasit Manivud Rd. Latphrasit Bangkok 10230
Tel: 02-578-03334 Fax: 02-578-20722 www.ccl-lab.com E-mail: info@calibrationlab.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

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 mean value were reported in the table below.

CALIBRATION DATA

CORRECTION OF PRESSURE

DUC Test point (inHg)	STD Reading (kPa)		Conversion to inHg		Correction (inHg)	
	Up	Down	Up	Down	Up	Down
-10.0	-33.62	-33.66	-9.93	-9.94	+0.07	+0.06
-20.0	-67.79	-67.82	-20.02	-20.03	+0.02	+0.03
-26.0	-88.41	-88.41	-26.11	-26.11	+0.11	+0.11
-27.0	-91.86	-91.90	-27.13	-27.14	+0.13	+0.14
-28.0	-95.35	-95.35	-28.16	-28.16	+0.16	+0.16

Uncertainty of measurement ± 0.05 inHg

Transmitting fluid : Air

Technical Note, Conversion factor 1 kPa : 0.2953003 inHg

Note: The Scope of Accredited ANAB Certificate No. ACDM-2014 Version 013 Page #3 of 67

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

*** End of Certificate ***

Certificate No. Q24105107

F3-011-05/12-23

page 3 of 3



calibration



Certificate No. C06250108

Page 2 of 3

Calibration Results:

Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 2 nm and UUC at 2 nm				
Standard Wavelength	Unit Under Calibration	Correction	Uncertainty	
418.01	418.5	0.11	0.13	
536.66	536.7	-0.04	0.13	
637.98	638.3	0.32	0.13	
748.48	748.8	0.32	0.13	
807.03	807.5	-0.47	0.13	
Photometric Accuracy (Absorbance)				
Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.2930	0.291	0.0020	0.0045
	0.5168	0.516	-0.0012	0.0045
	1.0298	1.031	-0.0012	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.2867	0.285	0.0017	0.0045
	0.5073	0.508	-0.0007	0.0045
	1.0683	1.069	-0.0007	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.2516	0.250	0.0016	0.0045
	0.5595	0.561	-0.0015	0.0045
	0.9334	0.935	-0.0016	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.2481	0.246	0.0001	0.0045
	0.4652	0.466	-0.0008	0.0045
	0.9408	0.940	-0.0012	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.2594	0.258	0.0004	0.0045
	0.5040	0.505	-0.0010	0.0045
	1.0032	1.004	-0.0008	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.2579	0.258	-0.0001	0.0045
	0.4971	0.497	0.0001	0.0045
	0.9720	0.973	-0.0010	0.0045

Unit Absorbance (m) 418.01 nm
DKSH Technology Limited
2533 Sukhumvit Road Bangkok, Phrasit Manivud 10230
Phone: 02-2539-7100 Email: info@dksh.com www.dksh.com

Delivering Growth - in Asia and Beyond

CAL-FM-C06-16 11 Mar 2024



Certificate of Calibration

Equipment: SPECTROPHOTOMETER
Model: DR6000
Serial No. (or ID.): 1627845 (RYG_EN0037)
Manufacturer: HACH
Condition: In Condition
Certificate No.: C06250108
Issued Date: 16 March 2025
Job No.: WO-00064379
Page: 1 of 3

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

Environment Condition: Temperature 24.4 °C ± 0.3 °C
Humidity 60.8 %RH ± 3.5 %RH

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

Calibration By: Mr. Preecha Phooaisai
Calibration Date: 18 March 2025
The Method used: In house method, CAL-WI-24, base on ASTM E 275-08 and ASTM E 387-04
Traceability: This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Starna Scientific Limited.

The standard for Wavelength Certificate No. 111583 and 111584
The standard for Photometric Certificate No. 9114984 and 111588
The standard for Stray light Certificate No. 111586 and 111585
The standard for Spectral resolution Certificate No. 111587

(Mr. Preecha Phooaisai)

Person in charge

(Miss Kaewwan Suradech)

Authorized signatory

This certificate is issued for the sole 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 expressed 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. This report shall not be reproduced except in full without approval of DKSH Technology Limited.
2533 Sukhumvit Road Bangkok, Phrasit Manivud 10230
Phone: 02-2539-7100 Email: info@dksh.com www.dksh.com

Delivering Growth - in Asia and Beyond.

CAL-FM-C06-16 11 Mar 2024



Certificate No. C06250108

Page 3 of 3

Calibration Results:

Without Adjustment

Photometric Accuracy (Absorbance)				
Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0080
	0.7355	0.738	-0.0025	0.0080
257 nm	0.0000	0.000	0.0000	0.0080
	0.8574	0.857	0.0004	0.0080
313 nm	0.0000	0.000	0.0000	0.0080
	0.2864	0.286	-0.0036	0.0080
350 nm	0.0000	0.000	0.0000	0.0080
	0.8374	0.837	0.0004	0.0080
Stray light *				
Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%T)	Absorbance (A)	
280.62 +/- 0.11 nm	280.6	1.7	1.770	
391.44 +/- 0.11 nm	391.4	1.4	1.854	
Spectral Resolution *				
Nominal Concentration 0.02 % v/v	Peak	Trough	Ratio	StW
Standard Wavelength (nm)	268.68	268.69	1.38	2.00
UUC: Wavelength (nm)	268.2	266.2		
Std Absorbance (A)	0.4586	0.2780		
UUC: Absorbance (A)	0.413	0.299		

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

The End of Certificate

Unit Absorbance (m) 418.01 nm
DKSH Technology Limited
2533 Sukhumvit Road Bangkok, Phrasit Manivud 10230
Phone: 02-2539-7100 Email: info@dksh.com www.dksh.com

Delivering Growth - in Asia and Beyond.

CAL-FM-C06-16 11 Mar 2024

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: WO-00064379

ชนิดเครื่องวัด: SPECTROPHOTOMETER รุ่น: DR6000

หมายเลขเครื่อง: 1627845

ตรวจสอบ (วัน)		รายการตรวจเช็ค	ตรวจสอบ (ปี)		หมายเหตุ
18 Mar 2025			18 Mar 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
General					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด - เปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Spectrophotometer					
<input type="checkbox"/>	<input type="checkbox"/>	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวควบคุมความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	*
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	13.5 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	593.0 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. หม้อวัดหลายตัวรวม (Carousel Module)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
pH Meter and Conductivity Meter					
<input type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันฝุ่น Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาตั้งอิเล็กโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
Turbidimeter					
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ว่าง (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระบบการล้างของแข็ง (>= 2.5 ลิตร/ชม 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
Automatic titrator					
<input type="checkbox"/>	<input type="checkbox"/>	18. สภากร Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

เพิ่มเป็นขั้วต่อหน้า: * 656.1nm = 656.1nm

* 486.0nm = 486.7nm

Mr. Proechia Phooersai
Service Engineer

Instrument description : Fluor Gas Analyzer
Instrument model : Teso 340
Instrument serial no. : 63139208
Control unit serial no. : -
ID no. or control no. : RYG_F50505
Manufacturer : Teso SE & Co. KGaA
Probe description : -
Probe model : -
Probe serial no. : -
Customer name : ALS LABORATORY GROUP (THAILAND) CO., LTD.
Customer address : 104 Phatthanasak 40, Phatthanasak Road, Khwaeng Phatthanasak, Khet Suan Luang, Bangkok, 10250 Thailand

Total pages of certificate : 3 Pages
Receiving no. : L-244321
Receiving date : 05-Nov-24
Parameter of calibration : Gas Calibration (Oxygen 2.50, 9.984, 21.02 %vol, Carbon monoxide 80.18, 302, 1007 ppm, Nitric Oxide 30.0, 151.5, 322.5 ppm, Sulphur Dioxide 50.36, 100.8, 600.8 ppm)
Condition of UUC : Used
Ambient condition : All of the Measurements were carried out the stabilized laboratory
Temperature : $\pm 23 \pm 5$ °C
Humidity : $\pm 55 \pm 15$ %RH
Calibration place : 17/121 Soi Higamwongwan 47 Yaek 4B, Toongsonghong, Lakki, Bangkok 10210 THAILAND
Calibration procedure no. : This instrument was calibrated by comparison with Standard gas mixture according to calibration Work Instruction no. WI CL 28-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.
This certificate is issued 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 are void and the results relate only to the items tested/calibrated.
This calibration certificate documents are traceability to national standards, which realize measurement according to the International System of Units (SI).
Date of calibration : 07-Nov-24

K. Khamthong
Mr. Kwanchai Khamthong
Calibration TechnicianO. Wuttu
Mrs. Nongluck Wongtee
Technical Manager

FM-CL-05-C Rev.B

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Issued Date 26/02/26

ENTECH INDUSTRIAL SOLUTION CO., LTD.

17/121 Soi Higamwongwan 47 Yaek 4B, Toongsonghong, Lakki, Bangkok 10210 THAILAND Tel: 0-2779-8888 Fax: 0-2779-8889 Email: info@entech.co.th
Tel: 02-0305088888 www.entech.co.th

ENTECH Industrial Solution Co., Ltd.
2533 Phatthanasak Road, Bangkok, Thailand 10250
Phone: +66-2533-8888 Email: info@entech.co.th Website: www.entech.co.th

Delivering Globally in Asia and Beyond

CAL-FM-R31-02-20 Jul 2022

Certificate No.: G 670781

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.50 % Vol	2912/23	Linde	27-Aug-27
Oxygen (O ₂) 9.984 % Vol	CG-0113-24	Nimet	01-Aug-29
Oxygen (O ₂) 21.02 % Vol	CG-0041-22	Nimet	10-Feb-27
Carbon monoxide (CO) 80.18 ppm	CG-0002-24	Nimet	11-Jan-29
Carbon monoxide (CO) 302 ppm	1915/23	Linde	16-Jan-25
Carbon monoxide (CO) 1007 ppm	1870/24	Linde	17-Jan-26
Nitric Oxide (NO) 30.0 ppm	CG-0065-24	Nimet	06-May-26
Nitric Oxide (NO) 151.5 ppm	0161/23	Linde	22-Jan-25
Nitric Oxide (NO) 322.5 ppm	1974/23	Linde	17-Jul-25
Sulphur Dioxide (SO ₂) 50.36 ppm	2004/23	Linde	17-Jul-25
Sulphur Dioxide (SO ₂) 100.8 ppm	3307/22	Linde	09-Nov-24
Sulphur Dioxide (SO ₂) 600.8 ppm	2003/23	Linde	17-Jul-25

Measured room conditions

Temperature : 23.8 °C Humidity : 59.7 %RH Pressure : 1010.1 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 600 ml/min Gas pressure : 1012.4 mbar

Calibration Results (Before adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty
O ₂ (%Vol)	2.50	2.47	-0.03	0.15
O ₂ (%Vol)	9.984	9.92	-0.064	0.20
O ₂ (%Vol)	21.02	21.14	0.09	0.30
CO (ppm)	80.18	77	-3.18	3.0
CO (ppm)	302	295	-7	6.0
CO (ppm)	1007	986	-21	12
NO (ppm)	30.0	27	-3.0	6.0
NO (ppm)	151.5	147	-4.5	6.0
NO (ppm)	322.5	311	-11.5	12
SO ₂ (ppm)	50.36	51	0.64	6.0
SO ₂ (ppm)	100.8	102	1.2	6.0
SO ₂ (ppm)	600.8	601	2.2	13

Calibration Results (After adjustment) (Table 3)

Parameter of Standard	Standard	Mean of	Error	Uncertainty
	Values	UUC		
O2 (%Vol)	2.50	2.47	-0.03	0.15
O2 (%Vol)	9.984	9.92	-0.064	0.20
O2 (%Vol)	21.02	21.11	0.09	0.30
CO (ppm)	80.18	80	-0.18	3.0
CO (ppm)	302	302	0	6.0
CO (ppm)	1007	1004	-3	12
NO (ppm)	30.0	31	1.0	6.0
NO (ppm)	151.5	153	1.5	6.0
NO (ppm)	322.5	323	0.5	12
SO2 (ppm)	50.36	51	0.64	6.0
SO2 (ppm)	100.8	102	1.2	6.0
SO2 (ppm)	600.8	603	2.2	13

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

End of Report

FM-CL-05-C Rev.B

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Issued Date 26/02/26



DRY GAS METER CALIBRATION TEST REPORT

Calibration Date : 10-Jan-25
Next Calibration Date : 10-Jul-25
Barometric Pressure (mmHg) : 756.2
Relative Humidity (%) : 37.8
Temperature (°C) : 28.1
Dry Gas Meter Data :
Calibration sheet No. : C-100125-BKK_F50563
Dry Gas Meter ID : BKK_F50563
Serial No. : 1806011
Model No. : XC-62-CV
Reference Dry Gas Meter Data :
Reference Dry Gas Meter ID : BKK_F51122
Serial No. : A2003240
Correction Factor (Y) : 1.0000
Next Calibration Date : 25-Feb-26

Reference Dry Gas Meter Calibration			Dry Gas Meter						Dry Gas Meter Correction	
Vn (Liters)			Tn (°C)		Vn (Liters)		Tn (°C)		Avg. Tm (°C)	
Final	Initial	Total	Final	Initial	Final	Initial	Final	Initial	Factor (Y)	
30.00	0.00	30.00	29.0	29.90	0.00	29.90	30.0	30.0	1.0067	
30.00	0.00	30.00	29.0	29.99	0.00	29.99	30.0	30.0	1.0036	
60.00	0.00	60.00	30.0	60.79	0.00	60.79	31.0	31.0	0.9903	
60.00	0.00	60.00	30.0	60.85	0.00	60.85	31.0	31.0	0.9893	
90.00	0.00	90.00	31.0	91.43	0.00	91.43	32.0	32.0	0.9876	
90.00	0.00	90.00	32.0	91.45	0.00	91.45	32.0	32.0	0.9840	
Avg.									0.9936	

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

Calibrated by:

Mr. Waruna Puppe
RYG Field Service Scientist (3)

Approved by:

Mr. Nattapon Jangwanwong
RYG Field Service Specialist (1)

FORM NO. F-68-023 REVISION NO. 1 ISSUE DATE 30/6/22



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date : 10 Jan 25		Ambient Temperature (°C) 28.1			
Calibration sheet No. : C-100125-BKK_FS0563		Relative Humidity (%) : 37.9			
Digital Temperature ID : BKK_FS0563		Reference Temperature ID : RYG_FS0881			
Serial No. : 1606011		Serial No. : 201000014918			
Model : XC-62-CV		Model : Digicon-CC-VI-MS			
Next Calibrate ,		13 May 25			
Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass
	100	100	0	±3	Pass
	150	150	0	±3	Pass
	200	199	-1	±3	Pass
	250	250	0	±3	Pass
	300	299	-1	±3	Pass
	500	499	-1	±3	Pass
	100	100	0	±3	Pass
Probe	120	119	-1	±3	Pass
	140	139	-1	±3	Pass
Oven					
Filter	100	100	0	±3	Pass
	120	120	0	±3	Pass
	140	140	0	±3	Pass
Exit	0	0	0	±3	Pass
	10	10	0	±3	Pass
	20	19	-1	±3	Pass
Meter	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass
ALOX	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass

MPE : (Maximum permissible error of measurement) ค่ามาตรฐานทางอุตสาหกรรมกำหนดไว้

Calibrated by:

Mr. Waruna Puppe
RYG Field Service Scientist (3)

Approved by:

Mr. Nattapon Jangwanwong
RYG Field Service Specialist (1)

FORM NO. F-68-027 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 Archemica Lab Co., Ltd.

ICS-2100 S/N: 15010977

AS-HV S/N: 5450A36659

For

ALS Laboratory Group (Thailand) Co., Ltd.



Operator Signature:

(Mr. Nutdanai Laekhwan)

Date: Jan 12, 2024

Application Chemist



CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Barometric Pressure (mmHg) : 752
Relative Humidity (%) : 45.5
Temperature (°C) : 31.5
Reference Dry Gas Meter Data :
Reference Dry Gas Meter ID : BKK_F51122
Serial No. : A2003240
Correction Factor (Y) : 1.0000
Next Calibration Date : 25 Feb 26

Calibration of Date : 6-Feb-25
Next Cal. Date : 6-Aug-25
Console Control Meter Data :
Calibration No. : C-060225-RYG_F50315
Dry Gas Meter ID : RYG_F50315
Serial No. : 1706091
Model No. : XC-572-V

		Reference Dry Gas Meter Calibration						Console Control Dry Gas Meter						Dry Gas Meter Correction		Digital Calibration	
		Vn (Liters)		Tn (°C)		Vn (Liters)		Tn (°C)		Vn (Liters)		Tn (°C)		Factor (%)		Factor	
		Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial
ΔH (mmHg)	15	12.07	150.18	0.00	150.18	150.18	150.18	150.18	150.18	150.18	150.18	150.18	150.18	150.18	150.18	150.18	150.18
	25	9.33	150.04	0.00	150.04	150.04	150.04	150.04	150.04	150.04	150.04	150.04	150.04	150.04	150.04	150.04	150.04
	50	8.58	150.10	0.00	150.10	150.10	150.10	150.10	150.10	150.10	150.10	150.10	150.10	150.10	150.10	150.10	150.10
	100	5.10	150.82	0.00	150.82	150.82	150.82	150.82	150.82	150.82	150.82	150.82	150.82	150.82	150.82	150.82	150.82
		120	4.17	150.88	0.00	150.88	150.88	150.88	150.88	150.88	150.88	150.88	150.88	150.88	150.88	150.88	150.88
		Avg.															

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

ΔHg : Difference between differential final reading to 21.24 mm of air @ 25 °C and 760 mm of mercury; mmHg; tolerance for individual values ± 0.08 from average

Procedure: 42 CFR 80 APP A METH SEC 5.3.1.7

Calculated by:

(Mr. Nutdanai Laekhwan)

Approved by:

(Mr. Nattapon Jangwanwong)

RYG Field Service Scientist (4)

RYG Field Service Specialist (1)

Form No. F-68-023, Revision No. 1, Issue Date 30/6/22



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date : 2 Jun 25		Ambient Temperature (°C)		31.5	
Calibration sheet No. : C-000225-RYG_FS0315		Relative Humidity (%) :		45.5	
Digital Temperature ID : RYG_FS0315		Reference Temperature ID :		RYG_FS0681	
Serial No. : 1700991		Serial No. :		201090014918	
Model : XC-672-V		Model :		Digicon-CC-VT-MS	
		Next Calibrate :		13 May 25	
Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass
	100	101	1	±3	Pass
	150	151	1	±3	Pass
	200	200	0	±3	Pass
	250	250	0	±3	Pass
	300	301	1	±3	Pass
	500	501	1	±3	Pass
	100	102	2	±3	Pass
Probe	120	121	1	±3	Pass
	140	141	1	±3	Pass
	100	101	1	±3	Pass
Oven	120	120	0	±3	Pass
	140	141	1	±3	Pass
	100	101	1	±3	Pass
Filter	120	121	1	±3	Pass
	140	140	0	±3	Pass
	0	0	0	±3	Pass
Exif	10	10	0	±3	Pass
	20	20	0	±3	Pass
	0	-1	-1	±3	Pass
Meter	25	24	-1	±3	Pass
	50	49	-1	±3	Pass
	0	0	0	±3	Pass
AUX	25	25	0	±3	Pass
	50	50	0	±3	Pass

MPE : (Maximum permissible error of measurement) ค่าความคลาดเคลื่อนสูงสุดที่ยอมรับได้

Calibrated by : Saksit Phaisanphut Approved by : Nattaporn Jengwarewong
(Mr. Saksit Phaisanphut) (Mr. Nattaporn Jengwarewong)
RYG Field Service Scientist (4) RYG Field Service Specialist (1)

FORM NO. T 05-027 REVISION NO. 2 ISSUE DATE: 19/2/23



PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

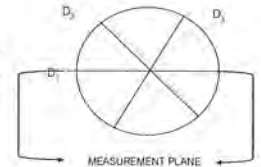
Calibration Date :	5 Feb 25			Nozzle Set ID :	RYG_FS0319
Calibration Sheet No. :	C-060325-RYG_FS0319			Vernier Caliper ID :	BKK_FS1123
Nozzle ID #	Nozzle Diameter (cm.)			Hi - Lo ΔD	$(D_1 + D_2 + D_3) / 3$ D_{avg}
	D_1	D_2	D_3		
1	0.298	0.300	0.305	0.007	0.301
2	0.465	0.475	0.465	0.010	0.468
3	0.605	0.605	0.605	0.000	0.605
4	0.540	0.540	0.540	0.000	0.540
5	0.770	0.760	0.765	0.010	0.765
6	0.930	0.928	0.930	0.002	0.929
7	1.082	1.080	1.085	0.005	1.082
8	1.240	1.230	1.235	0.010	1.235
9	1.594	1.558	1.551	0.043	1.568

Where :

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

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

D_{avg} = (D₁ + D₂ + D₃) / 3



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

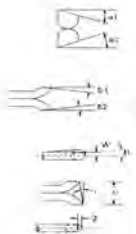
Approved by : Nattaporn Jengwarewong
(Mr. Nattaporn Jengwarewong)
RYG Field Service Specialist (1)

FORM NO. T 06-002 REVISION NO. 1 ISSUE DATE: 19/2/23



Type S Pitot Tube Calibration

Date Calibration 6-Feb-25 Due Date 9-Aug-25
Pitot ID RYG_FS0320 Inclinator ID BKK_FS1131
Pitot SN - Vernier ID RYG_FS0539



Parameter	Value	Allowable Range	Check
α1	0.5	-10° < α1 < +10°	OK
α2	1.5	-10° < α2 < +10°	OK
β1	-2.2	-5° < β1 < +5°	OK
β2	-0.6	-5° < β2 < +5°	OK
V	-1.2	-	-
θ	1.4	-	-
Z = A tan γ	-0.018	Z ≤ 0.125"	OK
W = A tan θ	0.021	W ≤ 0.031"	OK
Dt	0.310	0.188" to 0.375"	OK
A/2Dt	1.403	1.05 ≤ PA/Dt ≤ 1.5	OK
A	0.87	2.1Dt ≤ A ≤ 3Dt	OK

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

Calibrated by : Saksit Phaisanphut Approved by : Nattaporn Jengwarewong
(Mr. Saksit Phaisanphut) (Mr. Nattaporn Jengwarewong)
RYG Field Services Scientist (4) RYG Field Services Specialist (1)

FORM NO. F 06-114 REVISION NO. 0 ISSUE DATE: 25/12/21

SARTORIUS

Accredited by
NSC-TISI-TIS 17025
Calibration 0428



Calibration certificate

Calibration Certificate No. 25BK0003

Object	Electronic non-automatic weighing instrument	This calibration certificate documents the traceability to national standards.
Manufacturer	Sartorius	Uncertainties of measurements are taken into account when only statements of compliance are made.
Type	MSU224S-100-DU	This certificate was prepared by Sartorius Corporation in accordance to the current ISO/IEC 17025:2017 Standard and Sartorius Work Instruction (Method) SOP WI 03.
Serial / OM Ident. no.	31709552 RYG_EN0003	This certificate relate and apply this equipment only.
Customer	ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)	
Order no.	2230	
Number of pages	4	
Date of calibration	20 Feb 2025	

616/10 Moo 5 T.Maenam Khu, A.Pluak Daeng, Rayong 21140, Thailand.

REVIEW BY : Thanitak
APPROVED BY : D. Jengwarewong
NEXT CAL DATE : 20/02/26

This calibration certificate may not be reproduced other than in full except with the permission of NSC-TISI-TIS-17025 and the issuing laboratory. Calibration certificates without signature are not valid.
The user is obliged to have the object recalibrated at appropriate intervals.

Date 05 Mar 2025 Approval of the Calibration Certificate Person in charge
Chonchai Inthana Kachen
Mr. Chonchai Inthana Kachen Lalae

Calibration object

Single range instrument

Model MSU224S-100-DU
Serial Number 31709552
QM Ident. no | Inventory no. RYG_EN0003 | —

Maximum capacity (Max. load) 220.0000 g
Measured range 220.0000 g
Scale interval 0.0001 g

Place of calibration

Address According to page 1
Department | Cost center Laboratory Department: | —
Building | Floor — | 1st Floor.
Room Balance Room.
Maximum temperature variation at place of calibration 5 K

Calibration procedure

EURAMET cg-18, V4.0 - Guidelines on the Calibration of Non-Automatic Weighing Instruments

Test equipment

Test equipment type	Test equipment ID	Valid until
Thermometer	MHB-382SD s/nB011342 Traceable to SI unit through DKSH	21 Aug 2025
Test weight set OIML R111 E2	Certificate No.M2308197S_E2(Traceable to SI unit through TCS)	23 Aug 2025

Adjustment Status

The measuring device was internally adjusted before the calibration.

Environmental and measuring conditions

Date of calibration 20 Feb 2025
Temperature at place of calibration | Temp. diff. 24.7 °C | 0.3 K
Weights - T place
Measuring conditions The installation site is suitable. The device was levelled. Balance was loaded up to Max before test.
Comments Humidity 62.3 %RH.

Measurement results | Measurement uncertainties

Repeatability	Eccentricity
Test load (nominal): 10 g 200 g	Test load (nominal): 100 g
10 g	200 g
1 10.0000 g 200.0000 g	Center 100.0000 g
2 10.0000 g 200.0001 g	Front left 100.0000 g
3 9.9999 g 200.0000 g	Back left 100.0001 g
4 10.0000 g 200.0000 g	Back right 99.9999 g
5 10.0000 g 200.0001 g	Front right 99.9999 g
6 9.9998 g 200.0000 g	Maximum deviation from centric loading indication
7 10.0000 g 200.0000 g	[Δ]ecc,max = 0.0001 g
8 10.0000 g 200.0000 g	
9 10.0000 g 200.0000 g	
10 10.0000 g 200.0001 g	
s = 0.00004 g s = 0.00005 g	

Error of indication

Testload	Indication	Error	Expansion factor	Uncertainty	Uncertainty relative
L	I	E	K	U(E)	U _{rel} (E)
0.0100 g	0.0100 g	0.0000 g	2.00	0.00012 g	1.2 %
0.1000 g	0.1000 g	0.0000 g	2.00	0.00013 g	0.13 %
0.5000 g	0.5000 g	0.0000 g	2.00	0.00013 g	0.026 %
1.0000 g	1.0000 g	0.0000 g	2.00	0.00013 g	0.013 %
5.0000 g	5.0000 g	0.0000 g	2.00	0.00013 g	0.0026 %
10.0000 g	10.0000 g	0.0000 g	2.00	0.00013 g	0.0013 %
20.0000 g	20.0000 g	0.0000 g	2.00	0.00014 g	0.0008 %
50.0000 g	50.0000 g	0.0000 g	2.00	0.00015 g	0.00029 %
100.0000 g	100.0001 g	0.0001 g	2.00	0.00018 g	0.00018 %
200.0000 g	200.0000 g	0.0000 g	2.00	0.00028 g	0.00014 %
220.0000 g	220.0000 g	0.0000 g	2.00	0.00032 g	0.00015 %
Maximum error of indication		[E] _{max} = 0.0001 g			

U_{rel}(E) is the quotient of U(E) and test load L. The uncertainty of measurement U(E) is valid only if error E is considered. You will find reference notes on the uncertainty of measurement in use under Appendix to the calibration certificate. Interpretation of measurement results.
Reference note: The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the documented Expansion factor, determined in accordance with the European Calibration Guidelines EURAMET cg-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

End of calibration certificate

Interpretation of measurement results | Appendix to the calibration certificate

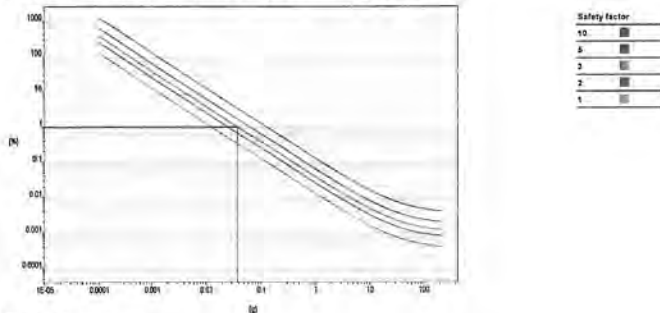
Uncertainty of measurement in use

Device adjusted before measurement Yes
Temperature deviation considered 1.5 K (isoCAL active)
Temperature coefficient considered 1 · 10⁻⁶ %/K
Uncertainty of the weighing result U₀₁(W) U₀₁(W) = 0.00013 g + 3.42 · 10⁻⁶ · R

Reference note: The current uncertainty of measurement is calculated by entering of the reading R into this formula. In relation to this, there is no need for a correction of the indication error. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied with an Expansion factor of 2, determined in accordance with the European Calibration Guidelines EURAMET cg-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

Indication in % from max load	Net indication R	Uncertainty U ₀₁ (W)	Uncertainty relative U ₀₁ (W) _{rel}
1 %	2.2000 g	0.00014 g	0.0063 %
25 %	55.0000 g	0.00032 g	0.00058 %
50 %	110.0000 g	0.00051 g	0.00046 %
75 %	165.0000 g	0.00059 g	0.00042 %
100 %	220.0000 g	0.00088 g	0.00040 %

Graphic realization of the relative uncertainty of measurement | process accuracy



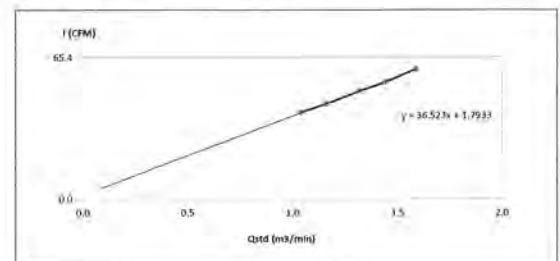
Displayed example

Process accuracy 1.00 %
Safety factor 3
Minimum sample weight 0.0380 g

High Volume Air Sampler Calibration Worksheet

Project Site:	Michelin Siam Co., Ltd.	Barometric Pressure (mm Hg):	756.8
Calibrate Location:	สำนักงานมาตรฐานการวัด (A1)	Temperature (°C):	30.0
Calibrate Date:	28-Mar-25	High Volume ID:	RYG-FS0393
Calibration Sheet No.:	C-280325-RYG-FS0393	High Volume Model:	TE-S170D
Calibrator ID:	RYG-FS0205	High Volume S/N:	5602
Calibrator Model:	TE-S028A	Calibrator Slope:	1.52567
Calibrator S/N:	1166	Calibrator Intercept:	-0.03613

Test No.	Delta H ₂ O (inch)	Q _{air} (m ³ /min)	I: Chart (CFM)	Linear Regression
1	2.4	1.0410	40	Slope: 36.5225
2	3.0	1.1596	44	Intercept: 1.7933
3	3.9	1.3171	50	Correlation Coefficient: 0.9992
4	4.7	1.4424	54	
5	5.7	1.5847	60	



Calibrated by: [Signature]
(Mr. Anurak Tongkajonsakul)
RYG-Field Services Scientist (2)

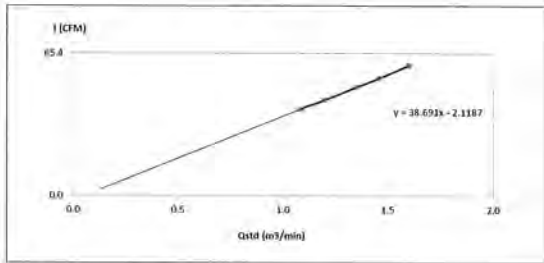
Approved by: [Signature]
(Mr. Supot Salameh)
RYG-Field Services Section Head



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 756.8
Calibrate Location : สำนักงานใหญ่ (A2) Temperature (°C) : 30
Calibrate Date : 28-Mar-25 High Volume ID : RYG-FS0394
Calibration Sheet No. : C-280325-RYG-FS0394 High Volume Model : TE-5170D
Calibrator ID : RYG-FS0205 High Volume S/N : 5690
Calibrator Model : TE-5028A Calibrator Slope : 1.52567
Calibrator S/N : 1166 Calibrator Intercept : -0.03613

Test No.	Delta H ₂ O (inch)	Q _{ad} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.6	1.0820	40	Slope : 38.6910 Intercept : -2.1187 Correlation Coefficient : 0.9995
2	3.2	1.1965	44	
3	4.1	1.3495	50	
4	4.8	1.4572	54	
5	5.0	1.5983	60	



Calibrated by : [Signature]
(Mr. Anurak Tongkha) (onakda)
RYG-Field Services Scientist (2)

Approved by : [Signature]
(Mr. Supot Salameh)
RYG-Field Services Section Head

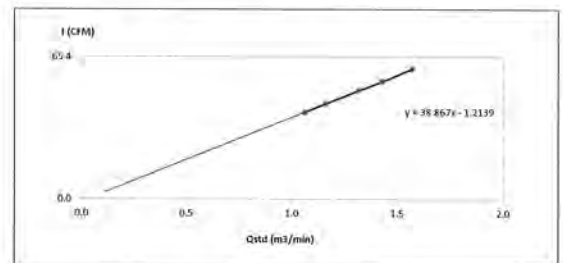
FORM NO. F-06-073 REVISION NO.2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 756.8
Calibrate Location : สำนักงานใหญ่ (A3) Temperature (°C) : 30.0
Calibrate Date : 28-Mar-25 High Volume ID : RYG-FS0395
Calibration Sheet No. : C-280325-RYG-FS0395 High Volume Model : TE-5170D
Calibrator ID : RYG-FS0205 High Volume S/N : 5692
Calibrator Model : TE-5028A Calibrator Slope : 1.52567
Calibrator S/N : 1166 Calibrator Intercept : -0.03613

Test No.	Delta H ₂ O (inch)	Q _{ad} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.5	1.0617	40	Slope : 38.8672 Intercept : -1.2139 Correlation Coefficient : 0.9998
2	3.0	1.1596	44	
3	3.9	1.3171	50	
4	4.6	1.4273	54	
5	5.6	1.5711	60	



Calibrated by : [Signature]
(Mr. Anurak Tongkha) (onakda)
RYG-Field Services Scientist (2)

Approved by : [Signature]
(Mr. Supot Salameh)
RYG-Field Services Section Head

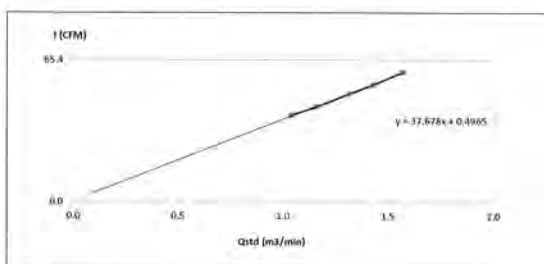
FORM NO. F-06-073 REVISION NO.2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 756.8
Calibrate Location : สำนักงานใหญ่ (A4) Temperature (°C) : 30.0
Calibrate Date : 28-Mar-25 High Volume ID : RYG-FS0396
Calibration Sheet No. : C-280325-RYG-FS0396 High Volume Model : TE-5170D
Calibrator ID : RYG-FS0205 High Volume S/N : 5688
Calibrator Model : TE-5028A Calibrator Slope : 1.52567
Calibrator S/N : 1166 Calibrator Intercept : -0.03613

Test No.	Delta H ₂ O (inch)	Q _{ad} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.4	1.0410	40	Slope : 37.6784 Intercept : 0.4965 Correlation Coefficient : 0.9994
2	3.0	1.1596	44	
3	3.9	1.3171	50	
4	4.6	1.4273	54	
5	5.6	1.5711	60	



Calibrated by : [Signature]
(Mr. Anurak Tongkha) (onakda)
RYG-Field Services Scientist (2)

Approved by : [Signature]
(Mr. Supot Salameh)
RYG-Field Services Section Head

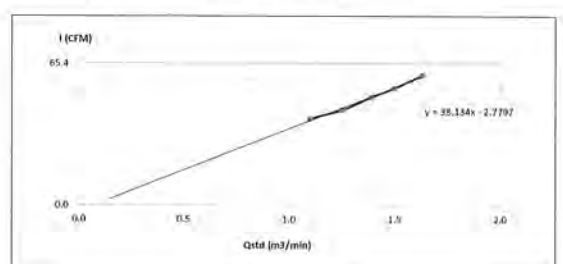
FORM NO. F-06-073 REVISION NO.2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 752.3
Calibrate Location : สำนักงานใหญ่ (A1) Temperature (°C) : 29
Calibrate Date : 23-May-25 High Volume ID : RYG-FS0177
Calibration Sheet No. : C-230525-RYG-FS0177 High Volume Model : TE-5170D
Calibrator ID : RYG-FS0206 High Volume S/N : 4803
Calibrator Model : TE-5028A Calibrator Slope : 1.48469
Calibrator S/N : 1543 Calibrator Intercept : -0.02523

Test No.	Delta H ₂ O (inch)	Q _{ad} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.6	1.0986	40	Slope : 38.1345 Intercept : -2.7797 Correlation Coefficient : 0.9952
2	3.4	1.2827	44	
3	4.2	1.3894	50	
4	4.9	1.4987	54	
5	5.8	1.6284	60	



Calibrated by : [Signature]
(Mr. Chatchai Sukjai)
RYG-Field Services Scientist (1)

Approved by : [Signature]
(Mr. Noppong Jintarapan)
BKK Field Coordinator Scientist (3)

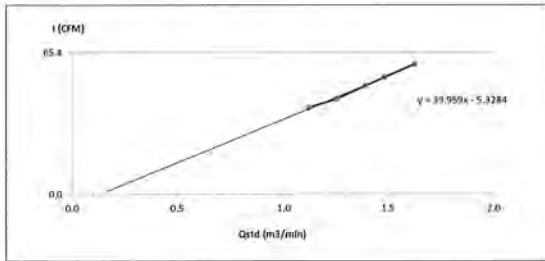
FORM NO. F-06-073 REVISION NO.2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 752.3
Calibrate Location : บ้านสวนกล้วย (A4) Temperature (°C) : 29
Calibrate Date : 23-May-25 High Volume ID : RYG_FS0180
Calibration Sheet No. : C-230525-RYG_FS0180 High Volume Model : TE-5170D
Calibrator ID : RYG_FS0206 High Volume S/N : 1328
Calibrator Model : TE-5028A Calibrator Slope : 1.48469
Calibrator S/N : 1543 Calibrator Intercept : -0.02523

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.7	1.1190	40	Slope : 39.9590 Intercept : -5.3284 Correlation Coefficient : 0.9980
2	3.4	1.2527	44	
3	4.2	1.3894	50	
4	4.8	1.4836	54	
5	5.8	1.6284	60	



Calibrated by :
(Mr. Chatchai Sukpia)
RYG- Field Services Scientist (1)

Approved by :
(Mr. Noppong Juntarupai)
BKK Field Coordinator Scientist (2)

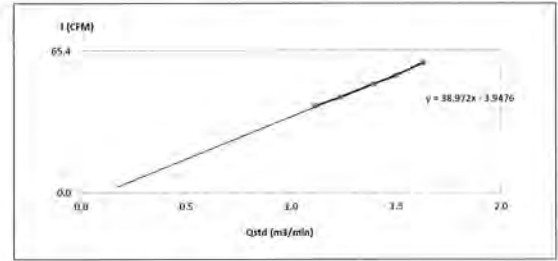
FORM NO.: F 66-073 REVISION NO.: 2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 752.3
Calibrate Location : บ้านสวนกล้วย (A2) Temperature (°C) : 29
Calibrate Date : 23-May-25 High Volume ID : RYG_FS0396
Calibration Sheet No. : C-230525-RYG_FS0396 High Volume Model : TE-5170D
Calibrator ID : RYG_FS0206 High Volume S/N : 5688
Calibrator Model : TE-5028A Calibrator Slope : 1.48469
Calibrator S/N : 1543 Calibrator Intercept : -0.02523

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.7	1.1190	40	Slope : 38.9719 Intercept : -3.9476 Correlation Coefficient : 0.9987
2	3.3	1.2345	44	
3	4.2	1.3894	50	
4	4.9	1.4987	54	
5	5.8	1.6284	60	



Calibrated by :
(Mr. Chatchai Sukpia)
RYG- Field Services Scientist (1)

Approved by :
(Mr. Noppong Juntarupai)
BKK Field Coordinator Scientist (2)

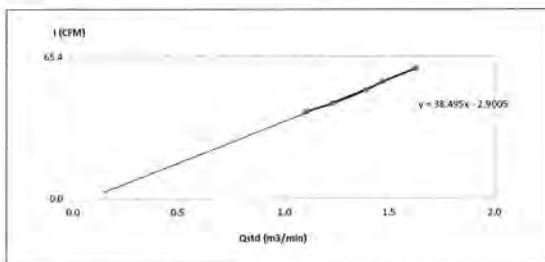
FORM NO.: F 66-073 REVISION NO.: 2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 752.3
Calibrate Location : บ้านสวนกล้วย (A3) Temperature (°C) : 29
Calibrate Date : 23-May-25 High Volume ID : RYG_FS0661
Calibration Sheet No. : C-230525-RYG_FS0661 High Volume Model : TE-5009X
Calibrator ID : RYG_FS0206 High Volume S/N : 6258
Calibrator Model : TE-5028A Calibrator Slope : 1.48469
Calibrator S/N : 1543 Calibrator Intercept : -0.02523

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.6	1.0986	40	Slope : 38.4947 Intercept : -2.9005 Correlation Coefficient : 0.9974
2	3.3	1.2345	44	
3	4.2	1.3894	50	
4	4.7	1.4684	54	
5	5.8	1.6284	60	



Calibrated by :
(Mr. Chatchai Sukpia)
RYG- Field Services Scientist (1)

Approved by :
(Mr. Noppong Juntarupai)
BKK Field Coordinator Scientist (2)

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

SARTORIUS



Accredited by
NSC-TISI-TIS 17025
Calibration 0428

Calibration certificate

Calibration Certificate No. 25BKL0001

Object	Electronic non-automatic weighing instrument	This calibration certificate documents the traceability to national standards.
Manufacturer	Sartorius	Uncertainties of measurements are taken into account when only statements of compliance are made.
Type	LA130S-F	This certificate was prepared by Sartorius Corporation in accordance to the current ISO/IEC 17025:2017 standard and Sartorius Work Instruction (Method) SOP WI 08.
Serial / OM Ident. no.	25409664 / RYG_EN0001	This certificate relate and apply this equipment only.
Customer	ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch) 616/10 Moo 5 T Maenam Khu, A.Pluak Daeng, Rayong 21140, Thailand.	
Order no.	2230	
Number of pages	4	
Date of calibration	20 Feb 2025	

This calibration certificate may not be reproduced other than in full except with the permission of NSC-TISI-TIS-17025 and the issuing laboratory. Calibration certificates without signature are not valid.
The user is obliged to have the object recalibrated at appropriate intervals.

Date 06 Mar 2025 Approval of the Calibration Certificate Person in charge
 Mr. Chonchai Inthana
 Kachen Lalee

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

Verical®
Version 5.5

Calibration object

Single range instrument

Model	LA130S-F
Serial Number	25499664
QM Ident. no Inventory no.	RYG_EN0001 ---

Maximum capacity (Max. load)	150.0000 g
Measured range	150.0000 g
Scale interval	0.0001 g

Place of calibration

Address	According to page 1
Department Cost center	Laboratory Department. ---
Building Floor	--- 1st Floor.
Room	Balance Room.
Maximum temperature variation at place of calibration	5 K

Calibration procedure

EURAMET cg-16, V4.0 - Guidelines on the Calibration of Non-Automatic Weighing Instruments

Test equipment

Test equipment type	Test equipment ID	Valid until
Thermometer	MHB-362SD s/nB011342 Traceable to SI unit through DKSH	21 Aug 2025
Test weight set OIML R111 E2	Certificate No.M2308197S_E2(Traceable to SI unit through TCS)	23 Aug 2025

Adjustment Status

The measuring device was internally adjusted before the calibration.

Environmental and measuring conditions

Date of calibration	20 Feb 2025
Temperature at place of calibration Temp. diff.	24.5 °C 1.0 K
Twilight - Tplace	
Measuring conditions	The installation site is suitable. The device was levelled. Balance was loaded up to Max before test.
Comments	Humidity 58.0 %RH.

Measurement results | Measurement uncertainties

Repeatability	Eccentricity
Test load (nominal): 10 g 100 g	Test load (nominal): 50 g
10 g	Center
100 g	Front left
1	Back left
2	Back right
3	Front right
4	Maximum deviation from centric loading indication
5	ΔL _{max} = 0.0001 g
6	
7	
8	
9	
10	
s = 0.00004 g	s = 0.00005 g

Testload	Indication	Error	Expansion factor	Uncertainty	Uncertainty relative
L	I	E	k	U(E)	U _{rel} (E)
0.0100 g	0.0100 g	0.0000 g	2.00	0.00012 g	1.2 %
0.0500 g	0.0500 g	0.0000 g	2.00	0.00013 g	0.25 %
0.1000 g	0.1000 g	0.0000 g	2.00	0.00013 g	0.13 %
0.5000 g	0.5000 g	0.0000 g	2.00	0.00013 g	0.026 %
1.0000 g	1.0000 g	0.0000 g	2.00	0.00013 g	0.013 %
2.0000 g	2.0000 g	0.0000 g	2.00	0.00013 g	0.0065 %
5.0000 g	5.0000 g	0.0000 g	2.00	0.00013 g	0.0026 %
10.0000 g	10.0000 g	0.0000 g	2.00	0.00013 g	0.0013 %
20.0000 g	20.0000 g	0.0000 g	2.00	0.00014 g	0.00059 %
100.0000 g	100.0000 g	0.0000 g	2.00	0.00021 g	0.00021 %
150.0000 g	149.9999 g	-0.0001 g	2.00	0.00026 g	0.00019 %
Maximum error of indication		E _{max} = 0.0001 g			

U_{rel}(E) is the quotient of U(E) and test load L. The uncertainty of measurement U(E) is valid only if error E is considered. You will find reference notes on the uncertainty of measurement in use under: Appendix to the calibration certificate | Interpretation of measurement results.
Reference note: The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the documented expansion factor, determined in accordance with the European Calibration Guideline EURAMET cg-16, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

End of calibration certificate

Interpretation of measurement results | Appendix to the calibration certificate

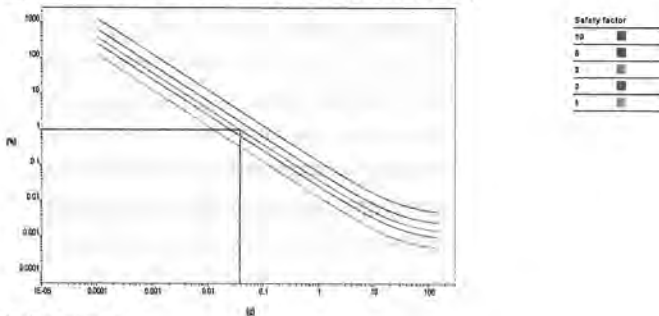
Uncertainty of measurement in use

Device adjusted before measurement	Yes
Temperature deviation considered	1.5 K (isoCAL active)
Temperature coefficient considered	1 · 10 ⁻⁴ /K
Uncertainty of the weighing result U ₉₅ (W)	U ₉₅ (W) = 0.00013 g + 3.96 · 10 ⁻⁴ · R

Reference note: The current uncertainty of measurement is calculated by entering of the reading R into this formula. In relation to this, there is no need for a correction of the indication error. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied with an Expansion factor of 2, determined in accordance with the European Calibration Guideline EURAMET cg-16, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

Indication in % from max load	Net indication	Uncertainty	Uncertainty relative
	R	U ₉₅ (W)	U ₉₅ (W) _{rel}
1 %	1.5000 g	0.00014 g	0.0091 %
25 %	37.5000 g	0.00028 g	0.00074 %
50 %	75.0000 g	0.00043 g	0.00057 %
75 %	112.5000 g	0.00058 g	0.00051 %
100 %	150.0000 g	0.00072 g	0.00048 %

Graphic realization of the relative uncertainty of measurement | process accuracy



Displayed example

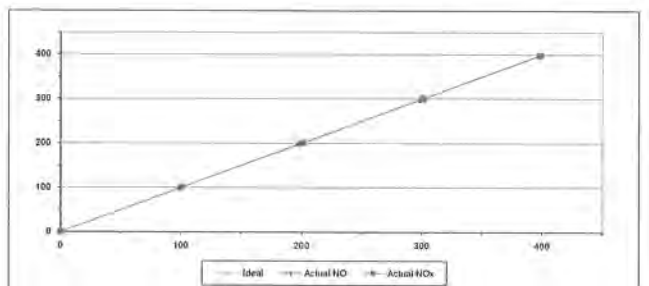
Process accuracy	1.00 %
Safety factor	3
Minimum sample weight	0.0380 g



MULTIPOINT CALIBRATION REPORT

Calibration Date	4-Jan-25	Equipment Name	NOx Analyzer
Manufacturer	Teledyne API	Model	T200
Serial No.	2198	Equipment ID	RYG_FS0252
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	8-Feb-22	Expired Date	8-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	98.70	-1.30	-1.30	101.00	1.00	1.00
2	200.00	198.20	-1.80	-0.90	201.30	1.30	0.65
3	300.00	298.50	-1.50	-0.50	301.30	1.30	0.43
4	400.00	398.20	-1.80	-0.45	398.60	-1.40	-0.35
AVERAGE (%)				-0.61			0.37



Calibrated By

Approved By

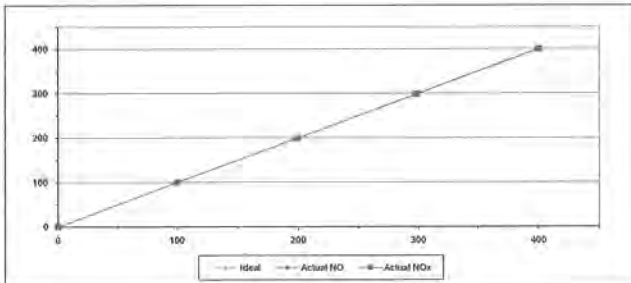
(Mr.Jirawat Sakorn)
Field Environmental Scientist (3)(Mr.Sarayuht Jittrantorn)
Assistant General Manager



MULTIPOINT CALIBRATION REPORT

Calibration Date	4-Jan-25	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	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	Alrgas 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	100.30	0.30	0.30
2	200.00	198.40	-1.60	-0.80	198.80	-0.20	-0.10
3	300.00	297.70	-2.30	-0.77	296.50	-1.50	-0.50
4	400.00	398.60	-1.40	-0.35	400.50	0.50	0.13
AVERAGE (%)				-0.70			-0.01



Calibrated By

(Mr.Jirawut Sakarn)
Field Environmental Scientist (3)

Approved By

(Mr.Sarayuth Jitranont)
Assistant General Manager

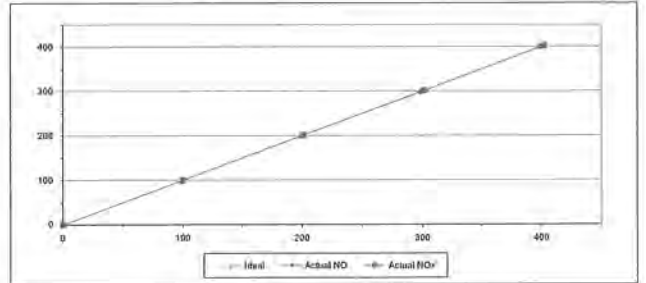
ALS Laboratory Group
FORM NO.: F-06-056 REVISION NO.: - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	4-Jan-25	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	T8SHWM41	Equipment ID	RYG_FS0481
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	55.88	Cylinder No.	GN0027222
Cylinder Pressure (psi)	1800	Certified By	Alrgas 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	98.70	-1.30	-1.30	100.10	0.10	0.10
2	200.00	201.00	1.00	0.50	201.00	1.00	0.50
3	300.00	298.70	-1.30	-0.43	302.10	2.10	0.70
4	400.00	398.40	-1.60	-0.40	402.60	2.60	0.65
AVERAGE (%)				-0.31			0.41



Calibrated By

(Mr.Jirawut Sakarn)
Field Environmental Scientist (3)

Approved By

(Mr.Sarayuth Jitranont)
Assistant General Manager

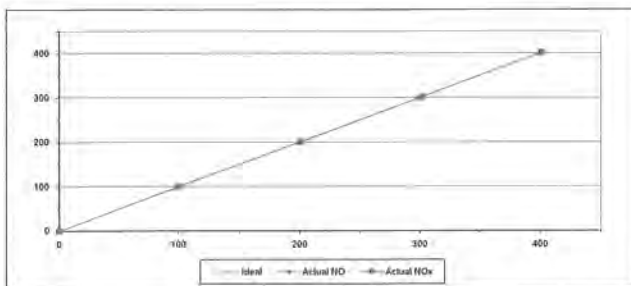
ALS Laboratory Group
FORM NO.: F-06-056 REVISION NO.: - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	4-Jan-25	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	R06K0177	Equipment ID	RYG_FS0463
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	55.88	Cylinder No.	GN0027222
Cylinder Pressure (psi)	1800	Certified By	Alrgas 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	98.80	-1.20	-1.20	101.30	1.30	1.30
2	200.00	201.30	1.30	0.65	201.20	1.20	0.60
3	300.00	299.40	-0.60	-0.20	302.30	2.30	0.77
4	400.00	398.70	-1.30	-0.33	401.50	1.50	0.38
AVERAGE (%)				-0.20			0.63



Calibrated By

(Mr.Jirawut Sakarn)
Field Environmental Scientist (3)

Approved By

(Mr.Sarayuth Jitranont)
Assistant General Manager

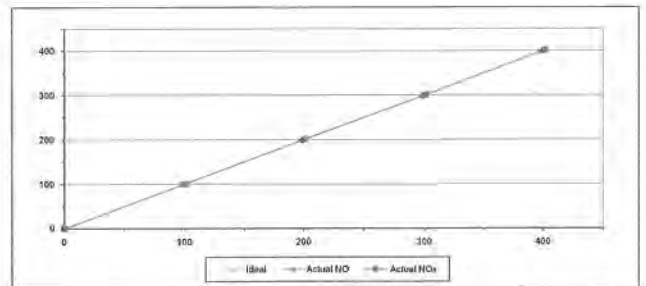
ALS Laboratory Group
FORM NO.: F-06-056 REVISION NO.: - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	3-Jan-25	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	30K16RHM	Equipment ID	BKK_FS1088
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	55.88	Cylinder No.	GN0027222
Cylinder Pressure (psi)	1800	Certified By	Alrgas 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	0.05	0.05	0.10	0.10	0.10	0.10
1	100.00	99.50	-0.50	-0.50	100.20	0.20	0.20
2	200.00	198.30	-1.70	-0.85	201.10	1.10	0.55
3	300.00	298.00	-2.00	-0.67	301.10	1.10	0.37
4	400.00	398.60	-1.40	-0.35	401.30	1.30	0.33
AVERAGE (%)				-0.46			0.31



Calibrated By

(Mr.Jirawut Sakarn)
Field Environmental Scientist (3)

Approved By

(Mr.Sarayuth Jitranont)
Assistant General Manager

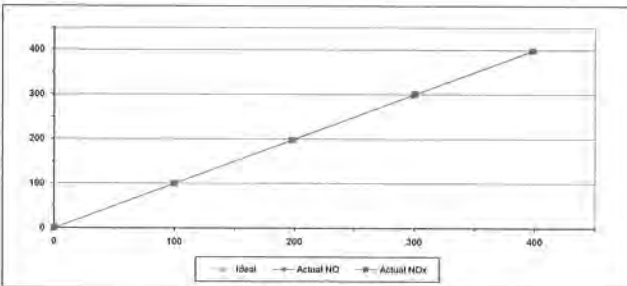
ALS Laboratory Group
FORM NO.: F-06-056 REVISION NO.: - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	3-Jan-25	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	PX13CWA0	Equipment ID	BKK_FS1088
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	55.88	Cylinder No.	GN0027222
Cylinder Pressure (psi)	1800	Certified By	Airgas 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	99.10	-0.90	-0.90	100.20	0.20	0.20
2	200.00	198.30	-1.70	-0.85	198.10	-1.90	-0.95
3	300.00	298.40	-1.60	-0.53	301.30	1.30	0.43
4	400.00	396.90	-3.10	-0.78	398.70	-1.30	-0.33
AVERAGE (%)				-0.59			-0.11



Calibrated By

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

Approved By

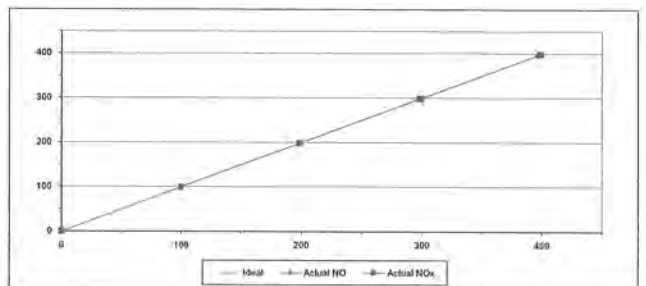
(Mr. Sarayuth Jitranont)
Assistant General Manager

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

MULTIPOINT CALIBRATION REPORT

Calibration Date	4-Jan-25	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	Airgas 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	100.10	0.10	0.10
2	200.00	198.10	-1.90	-0.95	198.70	-1.30	-0.65
3	300.00	297.30	-2.70	-0.90	298.60	-1.40	-0.47
4	400.00	396.40	-3.60	-0.90	398.80	-1.20	-0.30
AVERAGE (%)				-0.61			-0.24



Calibrated By

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

Approved By

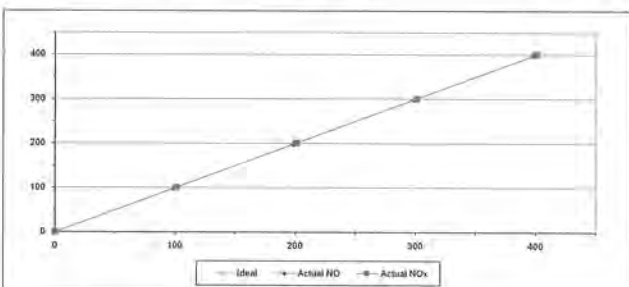
(Mr. Sarayuth Jitranont)
Assistant General Manager

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

MULTIPOINT CALIBRATION REPORT

Calibration Date	4-Jan-25	Equipment Name	NOx Analyzer
Manufacturer	Teledyne API	Model	N200
Serial No.	107	Equipment ID	RYG_FS0731
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	55.88	Cylinder No.	GN0027222
Cylinder Pressure (psi)	1800	Certified By	Airgas 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	99.00	-1.00	-1.00	101.30	1.30	1.30
2	200.00	196.50	-1.50	-0.75	201.30	1.30	0.65
3	300.00	296.70	-1.30	-0.43	301.70	1.70	0.57
4	400.00	396.10	-1.90	-0.47	401.30	1.30	0.33
AVERAGE (%)				-0.51			0.59



Calibrated By

(Mr. Jirawut 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

Certificate of Calibration

Customer	ALS Laboratory Group (Indust) Ltd. Ltd.	Certificate No.:	13-AI-M001
Name	ALS Laboratory Group (Indust) Ltd. Ltd.	Request No.:	Req 2024/034
Address	104/101 Phrasimabha Road, Samut Prakan, Bangkok 10650		

Unit Under Calibration Details	
Measurement Item	Primary Flow Calibration
Manufacturer	Bosch
Model	Gerlach 5100
Serial Number	110927
ID	RYG_FS0731

Location of Calibration	LAB + AIR VERIFICATION
Calibration Environment and Details	
Temperature	23.0 °C ± 0.1 °C
Humidity	55% RH ± 5% RH
Barometric Pressure	1013.1 hPa ± 0.1 hPa
Received Date	3 January 2024
Calibration Date	11 February 2024

Calibration Procedure: 44 hours method CP-AEM-01 by Commissioned Laboratory with Standard Primary Flow Calibration				
Reference Standard	Model	Serial Number	Traceable	Due Calibration
Zero Flow Meter	Gilbertson 21.00 Flow	1950100000	Scandynav	12 July 2024
Zero Flow Meter	Gilbertson 1 Standard Flow	1904100000	Scandynav	12 July 2024
Temperature sensor	GT 11	054000057	Orekom	21 February 2024
Pressure meter	CPG2400	41000610751862	IPA	6 November 2024

Traceability:
This Certificate is valid only if the flowmeter is used in accordance with the instructions provided in the certificate.
Note:
The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor k = 2, providing a level of confidence of approximately 95%.

Calibration By:	Mr. Jirawut Sakam	Approved By:	Mr. Sarayuth Jitranont
Signature	Signature	Signature	Signature
Date	11 February 2024	Date	11 February 2024

Certificate No : 25-AFM-013
Request No : Req-2024-0251

Result of Calibration : Without Adjustment

Temperature	Pressure	STD	UUC	Error	Uncertainty
(°C)	(kPa)	(cc/min)	(cc/min)	(cc/min)	(cc/min)
24.50	101.26	20	19.965	0.0	1.3
24.20	101.23	101	100.30	-0.5	2.8
24.00	101.31	200	199.13	-0.0	3.6
23.90	101.42	301	300.56	2.6	5.4
24.10	101.41	401	401.57	4	11
24.10	101.49	450	451.51	3.5	7.0

Note: STD : Standard UUC : UUC Under Calibration
UUT Reference Condition: A) atmospheric pressure and room temperature condition
How Raw was corrected: for zero standard opening condition by using equation:

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

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

* Indicates non-compliance.

End of Certificate



Calibration Certificate

Certificate No. 610563
Product 200-510M Defender 510 Medium Flow
Serial No. 151114
Cal. Date 21-May-2024

Sold To:

All calibrations are performed in accordance with ISO 17025 at Mesa Laboratories, Inc., 12100 W. 6th Ave, Lakewood, CO 80226, an ISO 17025:2017 accredited laboratory through NVLAP. This report shall not be reproduced except in full without the written approval of the laboratory. Results only relate to the items calibrated. This report must not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

As Received Calibration Data

Technician	Derek Dollaps	Lab. Pressure	614.2 mmHg
		Lab. Temperature	24.3 °C
Instrument Reading	Lab Standard Reading	Deviation	Allowable Deviation
0 ccm	4504.81 ccm	-100.0%	1.00%
0 ccm	1000.58 ccm	-100.0%	1.00%
0 ccm	248.55 ccm	-100.0%	1.00%
			As Received
			Out of Tolerance
			Out of Tolerance
			Out of Tolerance

Mesa Laboratories Standards Used

Description	Standard Serial Number	Calibration Date	Calibration Due Date
ML-800-24	117891	13-Nov-2023	13-Nov-2024

Mesa Laboratories Inc. 12100 W. 6th Ave. Lakewood, CO 80226 USA
(303) 857-8000 www.mesalabs.com Symbol: MLAB for the NIST logo

FM-00228 Rev. B

Dissemination Error: to the nearest hundredth. This certificate shall not be reproduced except in full, without the written approval of the Innovative Instrument Co., Ltd.
[M-009-M-01 Rev.01 Issue date 25/01/23]



As Shipped Calibration Data

Certificate No	610563	Lab. Pressure	617 mmHg
Technician	Derek Dollaps	Lab. Temperature	24.6 °C
Instrument Reading	Lab Standard Reading	Deviation	Allowable Deviation
4482.47 ccm	4493.49 ccm	-0.25%	1.00%
997.25 ccm	996.83 ccm	0.04%	1.00%
248.51 ccm	248.67 ccm	-0.06%	1.00%
			As Shipped
			In Tolerance
			In Tolerance
			In Tolerance

Mesa Laboratories Standards Used

Description	Standard Serial Number	Calibration Date	Calibration Due Date
ML-800-24	211053	04-Oct-2023	04-Oct-2024

Calibration Notes

This expanded uncertainty of flow has a coverage factor of k = 2 for a confidence interval of approximately 95%.
Flow testing is in accordance with our test number MP-00672 with an expanded uncertainty of 0.27% using high-purity nitrogen in filtered laboratory air.
Traceability to the International System of Units (SI) is verified by accreditation to ISO/IEC 17025 by NVLAP under NVLAP Code 200661-0.

Technician Notes:

By:

Approved By:

Troy Thacker

Derek Dollaps
Production Assistant II

Troy Thacker
Quality Engineer

Mesa Laboratories, Inc. certifies that the above instrument meets or exceeds published specifications, and that the calibration results in this certificate were obtained using equipment capable of producing results that are traceable through NIST to the International System of Units (SI). Calibration results are in compliance with ISO/IEC 17025:2017. Calibration process has a Test Uncertainty Ratio (TUR) of 4:1 or greater. Any Pass/Fail determination is made without taking measurement uncertainty into account and is based on UUT performance against required tolerance only.

Certificate of Calibration

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

Certificate No : 25-AFM-023
Request No : Req-2025-0160

Unit Under Calibration Details

Measurement Item	Air Flow Meter
Manufacturer	Mesa Labs
Model	200-510L
Serial Number	130027
ID	RYG_FS0208
Location of Calibration	LAB 4 AIR VELOCITY METER
Calibration Environment and Details	
Temperature	23 °C ± 1 °C
Humidity	55 %RH ± 20 %RH
Barometric Pressure	1013 kPa ± 10 kPa
Received Date	21 January 2025
Calibration Date	27 January 2025
Calibration Procedure	In house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

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

REVIEW BY: *Spt S*
APPROVED BY: *[Signature]*
NEXT CAL DATE: *2026-01-28*

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	2 August 2025
Temperature meter	GT 11	09000057	Qeborn	1 March 2025
Pressure meter	CPG2400	41000KDC061882	TPA	21 October 2025

Traceability:

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

Note:

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

Calibration By: *[Signature]*
Mr. Noppakorn Luangtan
Service Calibration Engineer

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

Certificate No : 25-AFM-023
Request No : Req-2025-0169

Result of Calibration : Without Adjustment

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

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

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

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

* Indicates non accredited
MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)
N/A = Not Available, Customer does not require a statement of conformity.

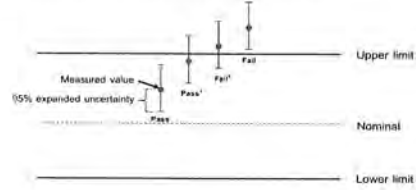
The results stated only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FM-705-AFM-01 Rev.04 Issue date 17/6/24

Certificate No : 25-AFM-023
Request No : Req-2025-0169

Decision Rule for Statements of Conformity

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

Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit
Pass¹ = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit
Fail¹ = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit
Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Certificate

The results stated only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FM-705-AFM-01 Rev.04 Issue date 17/6/24

Certificate of Calibration

Certificate No : 24-AFM-179
Request No : Req-2024-1197

Customer : ALS Laboratory Group (Thailand) Co., Ltd.
Name : 105 Soi Phatthanakit 40, Phatthanakit Road, Suan Luang
Address : Bangkok 10250

Unit Under Calibration Details

Measurement Item : Air Flow Meter
Manufacturer : Mesalabs
Model : Defender S10-M
Serial Number : 15114
ID : BKA-F50544
Accuracy : 1% of Reading
Sensor Model :
Sensor Serial Number :
Instrument Status : Used

Location of Calibration : LAB 4 AIR VELOCITY MEET

Calibration Environment and Details

Temperature : 23.1°C ± 0.1°C
Humidity : 73% RH ± 2% RH
Barometric Pressure : 1013.1 hPa ± 0.1 hPa
Received Date : 29 August 2024
Calibration Date : 9 September 2024

Calibration Procedure : In-house method (F-AFM-01) by Comparison technique with Standard Primary Flow Calibration

Reference Standard	Model	Serial Number	Traceability	Due Calibration
Air Flow Meter	Calibration 3 Low flow	1850101010	Senalabs	6 August 2025
Air Flow Meter	Calibration 3 Standard flow	1901011010	Senalabs	2 August 2025
Temperature meter	GT 11	0808097	Quiborn	1 March 2025
Pressure meter	CPG3400	410801010101082	TPA	9 November 2024

Traceability :

This Certificate is traceable to SI Unit through Senalabs A21.3 Accreditation No. 394/01

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

Calibration By : P. J. J.
Mr. Nopphol J. Jangjai
Service Calibration Engineer

Approved By : P. J. J.
Mr. Pichai Mataveen
Calibration Engineer (Senior)

Issue Date : 9 September 2024

The results stated only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FM-705-AFM-01 Rev.04 Issue date 17/6/24

Certificate No : 24-AFM-179
Request No : Req-2024-1197

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
24.30	100.92	100	100.41	-0.1	2.8	1.0	N/A
24.40	100.90	500	500.47	+0.2	7.1	3.0	N/A
24.50	100.97	1000	1001.3	-2	14	10.0	N/A
25.00	100.02	2014	2009.6	-4	29	20.1	N/A
25.20	101.03	3027	3055.3	11	44	30.4	N/A
25.50	101.10	4001	4005.1	+3	57	40.4	N/A
25.50	101.14	5002	5003.9	1	61	50.6	N/A

Note : STD : Standard UUC : Unit Under Calibration
UUC Reference Condition : Atmospheric pressure and room temperature condition
Flow Rate was corrected for non-standard operating condition by using equation :

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

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

* Indicates non accredited
MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)
N/A = Not Available, Customer does not require a statement of conformity.

The results stated only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FM-705-AFM-01 Rev.04 Issue date 17/6/24



Certificate of Calibration

Certificate No. C-280225-RYG_FS0128

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gitan
Model/Type : G2Air Plus
Equipment ID : RYG_FS0128
Serial No. : 20150410004
Calibration Date : 28-Feb-25
Next calibration date : 28-May-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : BKK_FS0619
Serial No. : 130026
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.5	20.9	19.9	20.4	5%	19 - 21	Passed
50	49.4	51.0	49.0	49.8	5%	48 - 53	Passed
100	100.6	99.7	100.5	100.3	5%	95 - 105	Passed
200	202.1	201.5	200.9	201.5	5%	190 - 210	Passed
High Flow							
500	503.9	498.2	500.2	500.8	3%	485 - 515	Passed
1000	1000.4	999.8	999.9	1000.0	3%	970 - 1030	Passed
2000	2000.0	2003.4	1998.3	2000.6	3%	1940 - 2060	Passed
2500	2523.9	2525.9	2524.3	2524.7	3%	2425 - 2575	Passed
4000	4030.4	4033.9	4036.1	4033.5	3%	3880 - 4120	Passed

END OF REPORT

Calibrated By: Nattakorn V.
(Mr. Nattakorn Vongyoo)
Field Services

Approved By: Spt S
(Mr. Supot Salamteah)
Field Services Section Head

Issue date : 28-Feb-25



Certificate of Calibration

Certificate No. C-060425-RYG_FS0504

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gitan
Model/Type : G2Air Plus
Equipment ID : RYG_FS0504
Serial No. : 20220731506
Calibration Date : 06-Apr-25
Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.7	20.4	20.8	20.6	5%	19 - 21	Passed
50	50.9	51.6	51.5	51.4	5%	48 - 53	Passed
100	101.6	100.3	100.9	100.9	5%	95 - 105	Passed
200	200.8	200.6	201.3	200.9	5%	190 - 210	Passed
High Flow							
500	495.8	496.2	500.0	497.3	3%	485 - 515	Passed
1000	998.9	991.8	1007.3	999.3	3%	970 - 1030	Passed
2000	2002.4	1992.6	2005.7	2000.2	3%	1940 - 2060	Passed
2500	2507.1	2511.3	2501.7	2506.7	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By: Spt S
(Mr. Natchapon Thamklang)
RYG Field Services Scientist (1)

Approved By: Spt S
(Mr. Supot Salamteah)
RYG Field Services Section Head

Issue date : 06-Apr-25



Certificate of Calibration

Certificate No. C-030425-RYG_FS0506

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gitan
Model/Type : G2Air Plus
Equipment ID : RYG_FS0506
Serial No. : 20201110091
Calibration Date : 03-Apr-25
Next calibration date : 03-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.6	20.4	19.8	19.9	5%	19 - 21	Passed
50	51.0	51.5	51.4	51.3	5%	48 - 53	Passed
100	104.5	103.2	104.8	104.2	5%	95 - 105	Passed
200	202.8	201.4	202.4	202.2	5%	190 - 210	Passed
High Flow							
500	502.2	502.8	498.7	501.2	3%	485 - 515	Passed
1000	1000.4	999.1	1007.4	1002.3	3%	970 - 1030	Passed
2000	2015.6	2013.2	2018.7	2015.8	3%	1940 - 2060	Passed
2500	2494.3	2504.6	2523.8	2507.6	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By: Spt S
(Mr. Watcharin Pongsamuan)
RYG Field Services Scientist (1)

Approved By: Spt S
(Mr. Supot Salamteah)
RYG Field Services Section Head

Issue date : 03-Apr-25



Certificate of Calibration

Certificate No. C-030425-RYG_FS0508

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gitan
Model/Type : G2Air Plus
Equipment ID : RYG_FS0508
Serial No. : 20201110106
Calibration Date : 03-Apr-25
Next calibration date : 03-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : RYG_FS0208
Serial No. : 130027
Calibration Date : 27-Jan-25
Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.1	20.8	20.2	20.0	5%	19 - 21	Passed
50	50.1	50.4	50.6	50.4	5%	48 - 53	Passed
100	98.3	98.6	98.6	98.5	5%	95 - 105	Passed
200	198.7	198.1	198.3	197.7	5%	190 - 210	Passed
High Flow							
500	499.0	501.2	500.3	500.4	3%	485 - 515	Passed
1000	991.0	991.3	993.2	991.8	3%	970 - 1030	Passed
2000	2009.0	2008.7	2007.8	2008.5	3%	1940 - 2060	Passed
2500	2498.7	2497.6	2487.0	2494.4	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By: Spt S
(Mr. Natchapon Thamklang)
RYG Field Services Scientist (1)

Approved By: Spt S
(Mr. Supot Salamteah)
RYG Field Services Section Head

Issue date : 03-Apr-25



Certificate of Calibration

Certificate No. C-060425-RYG_FS0505

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump	Equipment ID : RYG_FS0505
Brand : Gilan	Serial No. : 20201110098
Model/Type : GFAir Plus	Calibration Date : 06-Apr-25
	Next calibration date : 06-Jul-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter	Equipment ID : RYG_FS0208
Brand : Metalabs	Serial No. : 130027
Model/Type : Defender 510-L	Calibration Date : 27-Jan-25
	Due Date : 26-Jan-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter	Equipment ID : BKK_FS0614
Brand : Metalabs	Serial No. : 151114
Model/Type : Defender 510-M	Calibration Date : 9-Sep-24
	Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/Fail)
	1	2	3				
Low Flow							
20	19.6	19.8	19.7	19.7	0%	19 - 21	Passed
50	50.2	50.4	50.4	50.3	0%	48 - 53	Passed
100	99.9	100.5	100.1	100.2	0%	95 - 105	Passed
200	201.3	201.6	201.5	201.5	0%	190 - 210	Passed
High Flow							
500	489.3	489.2	492.3	489.9	3%	485 - 515	Passed
1000	993.4	989.6	996.9	993.3	3%	970 - 1030	Passed
2000	1982.9	1984.1	2001.8	1989.6	3%	1940 - 2060	Passed
2500	2483.7	2485.4	2488.3	2485.8	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By: Approved By:
(Mr. Walcharin Pongsamsuan) (Mr. Supot Salamteh)
RYG Field Services Scientist (1) RYG Field Services Section Head
Issue date: 06-Apr-25



Accredited calibration laboratory
ISO/IEC 17025:2017
NSC-TIS-15 17025
CALIBRATION 0367



Certificate Number
CWS-031-87

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:

Place of Calibration

CALIBRATION CONDITIONS

Preconditioning

Measurement Condition

TABULATION OF RESULTS

Calibrated by:

Remarks:

Calibration procedure:

Traceability:

Uncertainty of Measurement:

Discrepancy:

Discrepancy:

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Measurement Results:

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

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

Calibration Range: 20%RH to 80%RH

Air Temperature (°C)	Standard Reading (%RH)	UNC Reading (%RH)	Error (%RH)	Uncertainty (%RH)
29.81	19.64	17.8	-11.8	0.83
29.89	50.73	48.0	-2.7	1.3
29.81	82.34	78.5	-3.8	2.3

UNC: Unc Under Calibration

End of Certificate of Calibration



Certificate Number

CWS-035-67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS RECEIVED

CUSTOMER

Cap anemometer

Novatek

Sensor: WS-02F

Data logger: 110-WS-250-D

Sensor: WS-AS789

Data logger: AS789

RYS, J50531

Used item

ALS Laboratory Group (Thailand) Co., Ltd.

104 Phrathumkarn 40, Phrathumkarn Rd, Khwaeng Suan Luang,

Khut Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

08 Aug 2024

MEASUREMENT DATE

28 Aug 2024

ISSUE DATE

28 Aug 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature: 23.0 ± 0.5 °C

Relative Humidity: 55.0 ± 15.0 %RH

Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITIONS

Wind tunnel cross-section area¹ 900 cm²

Wind direction frontal area² 100 cm²

Diameter of mounting pipe³ 10 mm

Blockage ratio of test object⁴ 0.143 [-]

Preconditioning

24 hours at ambient conditions.

Measurement Condition

1st average values during measurement are (23.0) °C, (43.2) %RH and (1009) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

Mr. Sorawat Thangphad

Mr. Mas Jiranan Lertkarnphong



Approved signature:

Mr. Petcha Booncharoen
Calibration Department Manager

Remark:

¹ Actual 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: [-].

Calibration procedure:

The cap anemometer was calibrated against standard air velocity transducer model 8415-42 and tested tube with pressure coefficient (pressure meter model) DM25000 in order to determine the effective wind tunnel with 900 cm² cross test section area. The W-CL-02F sensor is in the 400-12.5 Wind energy generation system - Part 12-1. Power performance measurements of electricity producing wind turbines, March 2017 was used as a calibration guide.

Traceability:

This certificate provides a traceability of the measurement to recognize the national standards and to recognize the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate Number: NMV 0027 and NMV 0066-37.

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).

REVIEW BY

Mr. Petcha Booncharoen

APPROVED BY

Mr. Petcha Booncharoen

NEXT CAL DATE

31/12/26

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

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The Cap anemometer, Unc Under Calibration (UUC) was exposed at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 6.5 m/s to 5 m/s was calculated by a standard air velocity transducer which was installed 50 mm away from wind tunnel nozzle and installed 40 mm away from top of the test section and the standard air velocity 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 50 mm away from wind tunnel nozzle and installed 40 mm away from top of the test section. UUC was mounted on a round vertical tube of the down plate at center of test section. The calibration was carried out under both rising and falling air velocity in the range of 3 m/s to 15 m/s at calibration standard 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)
1.027	24.10	23.90	0.9	-0.1	0.31
2.054	23.72	23.80	1.8	-0.2	0.31
2.991	24.02	23.50	2.9	-0.1	0.31
4.083	24.04	23.90	3.9	-0.2	0.31
4.98	23.70	23.60	5.0	0.0	0.31
6.03	23.60	23.90	6.0	0.0	0.31
7.08	23.70	23.90	7.1	0.1	0.31
7.88	23.58	23.90	8.3	0.1	0.31
8.95	23.70	23.90	9.2	0.3	0.31
9.97	23.50	23.90	10.1	0.1	0.31
10.96	23.78	23.90	11.3	0.3	0.31
12.01	23.50	23.90	12.2	0.2	0.31
12.97	23.80	23.90	13.3	0.3	0.31
14.01	23.58	23.90	14.3	0.3	0.31
15.03	23.80	23.80	15.3	0.3	0.31
16.02	23.70	23.90	16.3	0.3	0.31

Remark:

¹ Calibration results are only valid for the tested circumstances and environmental conditions (range, when calibration was done).

² Velocity of mass flow.

³ Velocity at Unc Under Calibration.

PHOTO OF CALIBRATION SET-UP



Calibration setup of the Cap anemometer (UUC) in the wind tunnel of Jiranan Associates Co., Ltd. The Cap anemometer shown (by driver from 100 cm) is not used. (Remark: The measurement of the air velocity is not done by the tube due to imaging problem).

End of Certificate of Calibration

Certificate Number

CWD-016-67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS RECEIVED

CUSTOMER

Wind Direction Sensor

Novatek

Sensor: WD-02F

Data logger: 110-WS-250-D

Sensor: WS-AS789

Data logger: AS789

RYS, J50531

Used item

ALS Laboratory Group (Thailand) Co., Ltd.

104 Phrathumkarn 40, Phrathumkarn Rd, Khwaeng Suan Luang,

Khut Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

08 Aug 2024

MEASUREMENT DATE

28 Aug 2024

ISSUE DATE

28 Aug 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature: 23.0 ± 0.5 °C

Relative Humidity: 55.0 ± 15.0 %RH

Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITION

Wind tunnel cross-section area¹ 900 cm²

Wind direction frontal area² 120 cm²

Diameter of mounting pipe³ 10 mm

Blockage ratio of test object⁴ 0.143 [-]

Preconditioning

24 hours at ambient conditions.

Measurement Condition

1st average values during measurement are (23.0) °C, (50.2) %RH and (1009) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

Mr. Sorawat Thangphad

Mr. Mas Jiranan Lertkarnphong



Approved signature:

Mr. Petcha Booncharoen
Calibration Department Manager

Remark:

¹ Actual 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: [-].

Calibration procedure:

The wind direction sensor was calibrated against standard velocity encoder model 8415-42 (NAP-42-42) in an effel test section of Effel type wind tunnel with 900 cm² cross test section area. The W-CL-02F sensor is in the 400-12.5 Wind energy generation system - Part 12-1. Power performance measurements of electricity producing wind turbines, March 2017 was used as a calibration guide.

Traceability:

This certificate provides a traceability of the measurement to recognize the national standards and to recognize the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate Number: NMV 0027 and NMV 0066-37.

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).

Certificate Number
CWD-035-67

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 of finally 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 _{cal} Degree (°)	D _{ref} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
	0.000	0	0	0.00
	45.000	43	-3	0.80
	90.000	87	-3	0.80
	135.000	131	-3	0.80
	180.000	180	0	0.80
	225.000	227	2	0.80
	270.000	273	3	0.80
	315.000	318	3	0.80

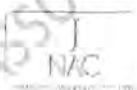
Remark:

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

² Direction of standard.

³ Direction of specified calibration.

End of Certificate of Calibration



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

Temperature measurement laboratory
Calibration services department



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-163-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Data logger with Temperature sensor
MANUFACTURER : Novolyte
MODEL/TYPE : 110-WS-250L-D
SERIAL NUMBER : AS789
ID NUMBER : RYG_F50531
CONDITION AS-RECEIVED : Used Item
CUSTOMER : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand

RECEIVED DATE : 08 Aug 2024
MEASUREMENT DATE : 28 Aug 2024
ISSUE DATE : 28 Aug 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibration procedure:
The temperature calibration was done by in-house calibration method as WI-CI-001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale was based on ITS-90.

Traceability:
The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT).
Certificate number: 17-0047-24, Certificate number: FR 0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 AS50, Serial No.: 667882-05,
Due date: 26 Mar 2025
2. Digital Temperature Indicator
Model: DT-1000-A MKII, Serial No.: 673437,
00591 Due date: 14 Sep 2024

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

Calibrated by:
☒ Mr. Supavut Thacholai
☒ Mr. Jitraporn Lertsomphol
☒ Miss Ruangrungsai Pitsommet



Approved signature: Mr. Parinya Booncharat
Calibration Department Manager

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



Continuation of Certificate of Calibration Number CDT-163-67

Page 2 of 2 Pages

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 °C to 40 °C

Function:

Table 3: This equipment was connected with temperature sensor Model: HMP60 S/N: T0230901.
Dimension: Diameter 12 mm, Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.049	19.6	-0.4	0.099
80	25.053	24.6	-0.5	0.099
80	30.044	29.7	-0.3	0.099
80	35.027	34.5	-0.5	0.099
80	40.019	39.5	-0.5	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



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

Relative humidity and Air Temperature measurement laboratory
Calibration services department

CERTIFICATE OF CALIBRATION

Certificate No. : CDT-033-47

Page 1 of 2 Pages

MEASUREMENT ITEM : Relative humidity with data logger
MANUFACTURER : Novolyte
MODEL/TYPE : Data Logger: 110-WS-250L-D
Sensor: HMP60
SERIAL NUMBER : Data Logger: AS789
Sensor: T0230901
ID NUMBER : RYG_F50531
CONDITION AS-RECEIVED : Used Item
CUSTOMER : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE : 08 Aug 2024
MEASUREMENT DATE : 28 Aug 2024
ISSUE DATE : 28 Aug 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibration procedure:
The relative humidity and Air Temperature calibration was done by in-house calibration method as WI-CI-020 and WI-CI-070 according to comparison method with standard digital humidity generator and standard humidity generator chamber.

Traceability:
The measurements are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT).
Certificate number: 17-0059-23 and through, customer Agreement Co., Ltd. (Certificate number: CDT-001-6).

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

Calibrated by:
☒ Mr. Supavut Thacholai
☒ Mr. Jitraporn Lertsomphol
☒ Miss Ruangrungsai Pitsommet



Approved signature: Mr. Parinya Booncharat
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

Measurement Results:

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Table 1: The results of calibration of relative humidity at 30 °C are reported in table below.
Calibration Range: 20%RH to 80%RH

Air Temperature (°C)	Standard Reading (%RH)	UUC Reading (%RH)	Error (%RH)	UUC Uncertainty (%RH)
29.81	19.84	17.9	-1.7	0.89
29.88	50.70	47.5	-3.2	1.8
29.86	80.37	77.6	-2.6	2.3

UUC: Unit Under Calibration

End of Certificate of Calibration



Certificate Number

CWS-017-47

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
Cup anemometer
Novelty
Sensor: WS-02F
Data logger: 1105-WS-2500-11
Sensor: WS0-A5912
Data logger: AS5912
(RIG-15061)

SERIAL NUMBER
1105-WS-2500-11

ID NUMBER
1105-WS-2500-11

CONDITION AS RECEIVED
Used item

CUSTOMER
JAS Laboratory group (Thailand) Co., Ltd.
104 Phatthanasak 40, Phatthanasak Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand

Calibration procedure:

The cup anemometer was calibrated against standard air velocity transducer against NIST 1105-WS-2500-11 and pitot tube with precision differential pressure meter model: DM2500 in on flow test section of 100 mm wind tunnel with 300 mm² cross test section area. The WS-02F based on IEC 61010-12-1, 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 measurements to recognized the national standards and to realization of the international system of units (SI) through the NMRI National Metrology Institute of Thailand via Certificate Number: NM-0307-24 and NM-0305-21

Uncertainty of Measurement:

The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2. k=2.0 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
16 Jun 2024

MEASUREMENT DATE
16 Jun 2024

ISSUE DATE
16 Jun 2024

ENVIRONMENTAL CONDITIONS:
Ambient condition in the laboratory are as follows:
Temperature: 23.0 ± 0.5 °C
Relative Humidity: 55.0 ± 15.0 %RH
Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION
Enter type wind tunnel of Jirana Associates Co., Ltd.

CALIBRATION CONDITIONS
Wind tunnel cross-section area¹ 900 cm²
Wind direction (upstream)² 120 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 (24.0) °C, (55.0) %RH and (1010.0) hPa.

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

Calibrated by:
Mr. Somchai Thongkiet
Mr. Jirana Associates Co., Ltd.



Approved signature

Mr. Panyas Boonvachon
Calibration Department Manager

Remarks:
¹ Assumed cross-section area of the wind tunnel
² Upstream cross-section area of the tested object include mounting pipe
³ Diameter of mounting pipe
⁴ Ratio [-]

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

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 0.3 m/s to 5 m/s was calibrated by a standard air velocity transducer which was installed 50 mm away from wind tunnel nozzle and installed 40 mm away from tip of the test section and the standard air velocity 5 m/s to 30 m/s was calibrated by a pitot tube with precision differential pressure meter which was installed 50 mm away from wind tunnel nozzle and installed 40 mm away from tip of the test section. UUC was mounted on a round vertical tube of the lower side at center of test section. The calibration was carried out under both rising and falling air velocity in the range of 0 m/s to 30 m/s at calibration interval of 0.3 m/s. The results of calibration are stated and measurement uncertainties are reported in the table below.

UUC (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	v _{ref} (m/s)	Error (m/s)	U (k=2) (m/s)
1.000	24.00	24.00	0.8	-0.2	0.31
1.993	24.00	24.00	1.7	-0.3	0.31
2.973	24.00	24.00	2.6	-0.2	0.32
4.054	24.00	24.00	3.5	-0.3	0.31
4.95	23.62	24.00	4.4	0.0	0.31
6.00	24.27	24.00	5.3	0.0	0.31
7.04	24.82	24.00	6.2	0.0	0.31
7.97	24.16	24.00	7.1	0.0	0.31
8.99	23.64	24.00	8.0	0.1	0.31
9.99	23.98	24.00	8.9	0.1	0.31
11.00	23.80	24.00	9.8	0.2	0.31
11.99	23.53	24.00	10.7	0.2	0.31
13.00	23.80	24.00	11.6	0.3	0.31
14.06	23.83	24.00	12.5	0.4	0.31
15.04	23.80	24.00	13.4	0.4	0.31
15.96	23.80	24.00	14.3	0.4	0.31

Remarks:
Calibration results is only valid for the tested environmental conditions during which calibration took place.
¹ Values of air speed
Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SETUP



Location overview of the Cup anemometer calibration in the wind tunnel of Jirana Associates Co., Ltd. (See type measurement) does may differ from this calibration due to the properties of the air used for tests due to changing pressure.



Certificate Number

CWS-017-47

Certificate Number

CWS-017-47

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
Wind direction sensor
Novelty
Sensor: WS-02F
Data logger: 1105-WS-2500-11
Sensor: WS0-A5912
Data logger: AS5912
(RIG-15061)

SERIAL NUMBER
1105-WS-2500-11

ID NUMBER
1105-WS-2500-11

CONDITION AS RECEIVED
Used item

CUSTOMER
JAS Laboratory group (Thailand) Co., Ltd.
104 Phatthanasak 40, Phatthanasak Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand

Calibration procedure:

The wind direction sensor was calibrated against standard Airspeed Encoder model: 1105-WS-2500-11 in an air speed measurement of 100 mm wind tunnel with 300 mm² cross test section area. The WS-02F based on IEC 61010-12-1, 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 measurements to recognized the national standards and to realization of the international system of units (SI) through the NMRI National Metrology Institute of Thailand via Certificate Number: NM-0307-24

Uncertainty of Measurement:

The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2. k=2.0 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
16 Jun 2024

MEASUREMENT DATE
16 Jun 2024

ISSUE DATE
16 Jun 2024

ENVIRONMENTAL CONDITIONS:
Ambient condition in the laboratory are as follows:
Temperature: 23.0 ± 0.5 °C
Relative Humidity: 55.0 ± 15.0 %RH
Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION
Enter type wind tunnel of Jirana Associates Co., Ltd.

CALIBRATION CONDITION
Wind tunnel cross-section area¹ 900 cm²
Wind direction (upstream)² 120 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 (23.0) °C, (55.0) %RH and (1010.0) hPa.

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

Calibrated by:
Mr. Somchai Thongkiet
Mr. Jirana Associates Co., Ltd.



Approved signature

Mr. Panyas Boonvachon
Calibration Department Manager

Remarks:
¹ Assumed cross-section area of the wind tunnel
² Upstream cross-section area of the tested object include mounting pipe
³ Diameter of mounting pipe
⁴ Ratio [-]

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MEASUREMENT RESULTS¹

The wind direction sensor was calibrated against standard rotary encoder by comparison method. During calibration, the measurement was carried out at 45° increments in clockwise and counterclockwise directions after initial 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 ₂₀₀ Degree (°)	Error Degree (°)	U (k=2) Degree (°)
0.000	0	0	0	0.00
45.000	45	-2	-2	0.80
90.000	82	3	3	0.80
135.000	181	-4	-4	0.80
180.000	177	3	3	0.80
225.000	225	6	6	0.80
270.000	273	3	3	0.80
315.000	318	3	3	0.80

Remark:

¹ Calibration results are subject to the stated circumstances and environmental conditions during which calibration took place.

² Division of standard.

³ Division of this Unit Calibration.

End of Certificate of Calibration



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



Pressure measurement laboratory
Calibration services department

CERTIFICATE OF CALIBRATION

Certificate No.: CCR-007-07

Page 1 of 2 Pages

MEASUREMENT ITEM

Digital barometer

MANUFACTURER

Novatex

MODEL/TYPE

Sensor: 110-WS-25DL-D

SERIAL NUMBER

Sensor: BP-AS912

ID NUMBER

RYG-F50611

CONDITION AS RECEIVED

Used item

CUSTOMER

ALS Laboratory group (Thailand) Co., Ltd.
104 Phattanakarn Rd., Phattanakarn Rd.,
Khwaeng San Luang, Khwaeng San Luang,
Bangkok 10250 Thailand

RECEIVED DATE

10 Jun 2024

MEASUREMENT DATE

26 Jun 2024

ISSUE DATE

26 Jun 2024

Calibration procedure:

The Digital barometer was calibrated against Digital pressure calibrator. The 110-WS-25DL-D was used as a calibration gage.

Traceability:

The measurement results are traceable to the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: MP-0009-24

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.

CONDITION OF THIS RESULT OF CALIBRATION:

1. Reference Standard Instrument.

Instrument

Model

Serial No.

Certificate No.

Due Date

Absolute Pressure Transducer

CP02500

41001264

MP-0009-24

27 Dec 2024

2. Calibration effort for calibration sequence B.

3. The UMC* was installed in vertical orientation above reference standard instrument and center of UMC* was used as the reference level.

3. Calibration conditions

4. Conditions

Pressure Measurement medium

Air

p₀ (20°C, 1 bar)1.01 kg/m³H_{max}

(55±15) %

T_{max}

(24±3) °C

P_{max}

(1010±10) mbar

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

Calibrated by:

Mr. Sornwong Thongtad

Mr. Pibangorn Lertsomphol



Approved signature:

Mr. Pibangorn Lertsomphol

Calibration Department Manager

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

Pressure measurement laboratory
Calibration services department



NSC-TISI-TIS 17025
CALIBRATION 0367



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

Temperature measurement laboratory
Calibration services department



NSC-TISI-TIS 17025
CALIBRATION 0367



CERTIFICATE OF CALIBRATION

Certificate No.: CCR-007-07

Page 2 of 2 Pages

MEASUREMENT RESULTS

☐ Without adjustment ☒ With adjustment

CALIBRATION IN THE RANGE OF

950 mbar to 1050 mbar

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

STD (mbar)	UMC* (mbar)	Error (mbar)	Uncertainty (k=2) (mbar)
950.0	951.8	1.8	0.37
970.0	971.8	1.8	0.37
990.0	991.8	1.8	0.37
1010.0	1010.4	0.4	0.37
1030.0	1029.6	-0.4	0.37
1050.0	1049.3	-0.7	0.47

Note: UMC* Unit Under Calibration

¹ To convert the results to report units to Pa should be multiply by 100

End of certificate



Certificate No.: COT-104-07

Page 1 of 2 Pages

MEASUREMENT ITEM

Data Logger with Temperature sensor

MANUFACTURER

Novatex

MODEL/TYPE

110-WS-25DL-D

SERIAL NUMBER

AS912

ID NUMBER

RYG-F50611

CONDITION AS RECEIVED

Used item

CUSTOMER

ALS Laboratory group (Thailand) Co., Ltd.
104 Phattanakarn Rd., Phattanakarn Rd.,
Khwaeng San Luang, Khwaeng San Luang,
Bangkok 10250 Thailand

RECEIVED DATE

10 Jun 2024

MEASUREMENT DATE

26 Jun 2024

ISSUE DATE

26 Jun 2024

Calibration procedure:

The temperature calibration was carried out by the comparison method against the digital temperature calibrator and standard temperature probe. The temperature scale was based on ITS-90.

Traceability:

The measurement results are traceable to the international system of units (SI) through the National Institute of Standards and Technology (NIST) via Certificate number: TT-0047-24. Certificate number: TT-0047-24

Reference Used During Calibration:

1. Standard Temperature Probe

Model: 518-100-AS50. Serial No.: 667682-00

Due date: 26 Mar 2025

2. Digital Temperature Indicator

Model: DTI-1000-A ASIL. Serial No.: 671407-00097. Due date: 14 Sep 2024

Uncertainty of Measurement:

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

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature

(23.0 ± 3.0) °C

Relative humidity

(55.0 ± 15.0) %RH

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

TABULATION OF RESULTS:

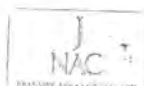
The table on next page give the measured values.

Calibrated by:

Mr. Sornwong Thongtad

Mr. Pibangorn Lertsomphol

Mr. Pibangorn Lertsomphol



Approved signature:

Mr. Pibangorn Lertsomphol

Calibration Department Manager

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Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 °C to 40 °C

Function:

Table 3: This equipment was connected with temperature sensor Model: HM960 S/N: U3911242.
Dimension: Diameter 12 mm, Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.005	19.6	-0.4	0.099
80	25.058	24.6	-0.5	0.099
80	30.048	29.7	-0.3	0.099
80	35.033	34.7	-0.4	0.114
80	40.045	39.5	-0.5	0.099

UUC*: Unit Under Calibration

Remark: The reported uncertainty of measurement is 0.14, based on standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

End of Certificate of Calibration



Jhranatee Associate Co., Ltd.
42/24-25, 42/27-28,
Krasakarn Road, 82 Sukhumvit Bangkok,
Bangkok 10110 (Thailand)
Tel: +662 010 1212
Mobile: +662 010 1213
Email: jhranateecol@jhranateecol.com
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Accredited calibration laboratory
ISO/IEC 17025:2017
MSC-TIS-TIS 17025
CALIBRATION 0367

Air speed measurement laboratory
Calibration services department

CERTIFICATE OF CALIBRATION

Certificate No.: CRT-016-67

Page 2 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

Relative humidity with data logger

Humidity

Data logger: 110 WS-2500-D

Sensor: HM960

Data logger: AS932

Sensor: U3911242

UUC: 255611

Used item

ALS laboratory group (Thailand) Co., Ltd.

104 Phatthanakan Rd, Phatthanakan Rd, Khwaeng Suan Luang,

Khut Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

10 Jun 2024

26 Jun 2024

16 Jun 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature: 23.9 ± 1.8 °C

Relative Humidity: 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.



Calibrated by:

☐ Mr. Pongsak Thongkiet
☒ Mr. Jitthaporn Lertkarnkiet
☐ Mr. Jitthaporn Lertkarnkiet

Approved signature:

Mr. Pongsak Thongkiet
Calibration Department Manager

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Measurement Results:

The result of measurement and associated measurement uncertainties are provided in the table below.

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Table 1: The result of calibration of relative humidity at 20°C, the reported in table below.

Calibration Range: 20.0% to 90.0%

Air Temperature (°C)	Standard Reading (%RH)	UUC Reading (%RH)	Error (%RH)	Uncertainty (%RH)
20.50	29.00	28.6	-0.4	0.77
20.40	40.00	39.0	-1.0	1.1
20.31	81.11	79.8	-1.3	2.3

UUC*: Unit Under Calibration

End of Certificate of Calibration



Jhranatee Associate Co., Ltd.
42/24-25, 42/27-28,
Krasakarn Road, 82 Sukhumvit Bangkok,
Bangkok 10110 (Thailand)
Tel: +662 010 1212
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Email: jhranateecol@jhranateecol.com
jhranateecol.com

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

Air speed measurement laboratory
Calibration services department



MSC-TIS-TIS 17025
CALIBRATION 0367

Certificate Number

CWS-063-67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

Cup anemometer

Humidity

Sensor: WS-02F

Data logger: 110 WS-2500-D

Sensor: WS0 AS565

Data logger: AS565

UUC: 25330

Used item

ALS laboratory group (Thailand) Co., Ltd.

104 Phatthanakan Rd, Phatthanakan Rd, Khwaeng Suan Luang,

Khut Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

22 Nov 2024

27 Nov 2024

27 Nov 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature: 23.0 ± 3.0 °C

Relative Humidity: 55.0 ± 15.0 %RH

Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION

Effect type wind tunnel of Jhranatee Associates Co., Ltd.

CALIBRATION CONDITIONS

Wind tunnel cross-section area: 900 m²

Wind direction (upstream): 100 mm

Diameter of measuring pipe: 10 mm

Blockage ratio of test object: 0.111

Preconditioning

Measurement Condition

24 hours in ambient condition

The average values during measurement are (24.7) °C, (42.6) %RH and (1012.5) hPa

TABULATION OF RESULTS:

The table on next page give the integrated values

Calibrated by:

☐ Mr. Pongsak Thongkiet
☒ Mr. Jitthaporn Lertkarnkiet
☐ Mr. Jitthaporn Lertkarnkiet

Remark:

*Area of cross-section area of the wind tunnel

*Frangipani section area of the test object include mounting pipe

*Diameter of measuring pipe

*Pipe 10"

Approved signature:

Mr. Pongsak Thongkiet
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

CERTIFICATE OF CALIBRATION

Certificate No. : CWR 031-67

Page 2 of 2 Pages

MEASUREMENT RESULTS : ☐ Without adjustment ☒ With adjustment

CALIBRATION IN THE RANGE OF : 950 mbar to 1050 mbar

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

STD (mbar)	UNC ^a (mbar)	Error (mbar)	Uncertainty (k=2) (mbar)
950.01	950.8	1.8	0.37
950.04	951.8	1.7	0.37
950.05	950.2	0.7	0.37
1050.99	1050.3	0.1	0.37
1050.02	1050.5	-0.5	0.37
1050.04	1050.0	0.0	0.37

Note: UNC^a Unit Under Calibration

To convert the result to report unit to Pa should be multiply by 100

End of certificate



Page 3 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 condition in the laboratory are as follow:

Temperature : 23.0 ± 1.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1010 ± 10 hPa

PLACE OF CALIBRATION

1) Real type wind tunnel of Jirantee Associates Co., Ltd.

CALIBRATION CONDITIONS

Wind tunnel cross section area¹ : 900 cm²
Wind direction frontal area² : 100 cm²
Diameter of mounting pipe³ : 10 mm
Blockage ratio of test object⁴ : 0.11

Preconditioning

Measurement Condition

24 hours at ambient conditions.
The average values during measurement are (24.2) °C, (41.5) %RH and (1007.9) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values

Calibrated by:

☒ Mr. Sornchai Thongkiet
☒ Mrs. Jiraporn Jirapornkiet

Remarks:

¹ Frontal 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



Approved signature

Mr. Panyaporn Boonchuan
Calibration Department Manager

REVIEW BY : Panyaporn Boonchuan
APPROVED BY : Panyaporn Boonchuan
NEXT CAL. DATE : 2022/12/6

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

Page 2 of 2 Pages

MEASUREMENT RESULTS^a

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 6.5 m/s to 1 m/s was calculated by a standard air velocity transducer which was installed 50 mm away from wind tunnel nozzle and installed 40 mm away from top of the test section and the standard air velocity 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure header which was installed 50 mm away from wind tunnel nozzle and installed 40 mm away from top of the test section. UUC was mounted on a round vertical tube of the lower duct at 10 m/s of test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

V _{std} (m/s)	Temp. wind tunnel (°C)	Temp. roots (°C)	V _{std} (m/s)	Error (m/s)	U (k=2) (m/s)
0.999	23.99	24.20	0.9	-0.1	0.31
2.043	24.42	24.20	1.8	-0.2	0.31
2.982	23.80	24.20	2.9	-0.3	0.31
4.108	23.82	24.20	3.8	-0.3	0.31
4.97	23.62	24.20	4.9	-0.1	0.31
5.95	23.54	24.20	6.0	0.0	0.31
7.01	23.46	24.20	7.0	0.0	0.31
7.96	23.80	24.20	8.0	0.0	0.31
8.98	23.90	24.20	9.1	0.3	0.31
9.96	23.74	24.20	10.1	0.1	0.31
10.94	24.00	24.20	11.1	0.2	0.31
12.01	23.42	24.20	12.7	0.2	0.31
12.92	24.00	24.20	13.1	0.2	0.31
14.06	23.46	24.20	14.2	0.3	0.31
15.00	24.00	24.20	15.2	0.2	0.31
15.93	23.96	24.20	16.2	0.2	0.31

Remarks:

^a Calibration results only valid for the tested conditions and environmental conditions during with calibration take place

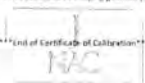
^b Velocity of standard

Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration is (up of the Cup anemometer) calibration in the wind tunnel of Jirantee Associates Co., Ltd. The Cup anemometer (Jirantee Associates Co., Ltd.) calibrated (see Remark). The position of the set-up is not true to scale due to image geometry.



Page 3 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 condition in the laboratory are as follow:

Temperature : 23.0 ± 1.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1010 ± 10 hPa

PLACE OF CALIBRATION

1) Real type wind tunnel of Jirantee Associates Co., Ltd.

CALIBRATION CONDITION

Wind tunnel cross section area¹ : 900 cm²
Wind direction frontal area² : 120 cm²
Diameter of mounting pipe³ : 10 mm
Blockage ratio of test object⁴ : 0.14

Preconditioning

Measurement Condition

24 hours at ambient conditions.
The average values during measurement are (23.7) °C, (42.5) %RH and (1007.9) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values

Calibrated by:

☒ Mr. Sornchai Thongkiet
☒ Mrs. Jiraporn Jirapornkiet

Remarks:

¹ Frontal 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



Approved signature

Mr. Panyaporn Boonchuan
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

Certificate Number
CWS-036-67



Accredited calibration laboratory
ISO/IEC 17025:2017
MSC 106 TH 17025
CALIBRATION 0367



Certificate Number
CWS-036-67

MEASUREMENT RESULTS¹

The wind direction sensor was calibrated against standard rotary encoder by comparison method. During calibration, the encoder was set at 45° intervals in clockwise and counter-clockwise directions after offset adjustment has been made. The flow speed of wind tunnel (initially 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 (°)
	45.000	45	-1	0.80
	50.000	47	-3	0.80
	135.000	132	-3	0.80
	180.000	181	1	0.80
	225.000	229	-4	0.80
	270.000	275	-5	0.80
	315.000	320	-5	0.80
	350.000	359	-1	0.80

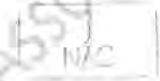
Remarks:

¹ Calibration results only valid for the tested conditions and environmental conditions during which calibration took place.

² Direction of rotation.

³ Direction of Wind Under Calibration.

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS RECEIVED

CUSTOMER

Cup anemometer

Novalyse

Sensor: WS-02F

Data logger: 700-WS-250A

Sensor: WSD-AS374

Data logger: AS374

Used item

ALS Laboratory group (Thailand) Co., Ltd.

104 Phatthanasak Rd, Phatthanasak Rd, Khwaeng Suan Luang,

Khwaeng Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature

Relative Humidity

Atmospheric Pressure

23.0 ± 3.0 °C

55.0 ± 15.0 %RH

1010 ± 10 hPa

PLACE OF CALIBRATION

Filler type wind tunnel of Iranatree Associates Co., Ltd.

CALIBRATION CONDITIONS

Wind tunnel cross-section area¹

Wind direction frontal area²

Diameter of mounting pipe³

Blockage ratio of test object⁴

900 cm²

100 cm²

mm

0.111

Preconditioning

Measurement Condition

24 hours at ambient conditions.

The average values during measurement are (23.2) °C, (46.9) %RH and (1003.8) hPa.

TABULATION OF RESULTS

The table on next page give the measured values.

Calibrated by:
Mr. Soravit Thachalad
Miss Athiporn Lertkarnprad



Approved Signature

Mr. Parinya Boonharoon
Calibration Services Manager

Remarks:

¹ Source cross-section area of the wind tunnel

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

³ Diameter of mounting pipe

⁴ Ratio "a/b"

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

Certificate Number
CWS-036-67



Accredited calibration laboratory
ISO/IEC 17025:2017
MSC 106 TH 17025
CALIBRATION 0367



Certificate Number
CWS-036-67

MEASUREMENT RESULTS¹

The Cup anemometer, U10 Under Calibration (UUC) was tested 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 calibrated by a standard air velocity transducer which was installed 50 mm away from wind tunnel nozzle and installed 40 mm away from top of the test section and the standard air velocity 5 m/s to 30 m/s was calibrated by a pitot tube with precision differential pressure sensor which was installed 50 mm away from inlet tunnel nozzle and installed 40 mm away from top of the test section. UUC was mounted on a round vertical tube of the lower air jet at center of test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 30 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

V _{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V _{meas} (m/s)	Error (m/s)	U (k=2) (m/s)
0.998	23.04	23.20	0.8	-0.2	0.31
1.215	23.30	23.20	2.0	-0.2	0.31
1.002	22.96	23.20	3.0	0.0	0.31
4.228	22.56	23.20	4.0	-0.2	0.33
4.94	23.04	23.20	5.0	0.0	0.33
5.56	22.90	23.20	6.0	0.1	0.33
7.02	22.74	23.20	7.7	0.1	0.33
7.97	23.14	23.20	8.0	0.0	0.31
8.97	22.70	23.20	9.0	0.0	0.31
9.96	22.94	23.20	10.1	0.1	0.34
11.08	22.80	23.20	11.0	-0.1	0.31
12.02	22.90	23.20	12.0	0.0	0.34
12.93	22.48	23.20	13.1	0.1	0.40
13.91	22.90	23.20	14.0	0.0	0.44
15.09	22.90	23.20	15.2	0.2	0.33
15.97	23.00	23.20	16.2	0.3	0.48

Remarks:

¹ Calibration results only valid for the tested conditions and environmental conditions during which calibration took place.

² Velocity of standard

³ Velocity of test under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration setup of the Cup anemometer calibration in the wind tunnel of Iranatree Associates Co., Ltd. The Cup anemometer (UUC) was tested at 10 m/s for 5 minutes prior to calibration being performed. The projection of the pitot tube was 40 mm to 50 mm from the top of the test section.

End of Certificate of Calibration

CERTIFICATE OF CALIBRATION

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS RECEIVED

CUSTOMER

Cup anemometer

Novalyse

Sensor: WS-02F

Data logger: 310-WS-250-D

Sensor: WSD-AS374

Data logger: AS374

Used item

ALS Laboratory group (Thailand) Co., Ltd.

104 Phatthanasak Rd, Phatthanasak Rd, Khwaeng Suan Luang,

Khwaeng Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature

Relative Humidity

Atmospheric Pressure

23.0 ± 3.0 °C

55.0 ± 15.0 %RH

1010 ± 10 hPa

PLACE OF CALIBRATION

High speed wind tunnel of Iranatree Associates Co., Ltd.

CALIBRATION CONDITIONS

Wind tunnel cross-section area¹

Wind direction frontal area²

Diameter of mounting pipe³

Blockage ratio of test object⁴

900 cm²

100 cm²

mm

0.111

Preconditioning

Measurement Condition

24 hours at ambient conditions.

The average values during measurement are (23.8) °C, (44.4) %RH and (1003.8) hPa.

TABULATION OF RESULTS

The table on next page give the measured values.

Calibrated by:
Mr. Soravit Thachalad
Miss Athiporn Lertkarnprad



Approved Signature

Mr. Parinya Boonharoon
Calibration Services Manager

Remarks:

¹ Source cross-section area of the wind tunnel

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

³ Diameter of mounting pipe

⁴ Ratio "a/b"

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

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 anemometer which was installed 50 mm away from wind tunnel nozzle and installed 40 mm away from top of the flow section and the standard air velocity 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 50 mm away from wind tunnel nozzle and installed 40 mm away from top of the flow section. UUC was mounted on a round vertical tube of the flow pipe at center of test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 3 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_{uc} (m/s)	Error (m/s)	U (k=2) (m/s)
0.999	23.70	23.80	0.9	-0.1	0.33
2.021	23.90	23.80	1.8	-0.2	0.33
2.999	23.70	23.80	2.9	-0.1	0.33
4.094	23.70	23.80	3.8	-0.1	0.33
4.97	23.72	23.80	5.0	0.0	0.33
5.97	23.60	23.80	6.0	0.0	0.33
7.04	23.80	23.80	7.0	0.0	0.33
7.98	23.62	23.80	8.0	0.0	0.33
9.00	23.72	23.80	9.1	0.1	0.33
9.98	23.60	23.80	10.1	0.1	0.33
10.97	23.70	23.80	11.1	0.1	0.33
12.04	23.90	23.80	12.1	0.1	0.33
12.98	23.80	23.80	13.1	0.1	0.33
14.10	23.50	23.80	14.2	0.1	0.33
15.04	23.70	23.80	15.2	0.2	0.33
15.97	23.60	23.80	16.2	0.2	0.33

Remarks:

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

² Uncertainty of standard.

³ Uncertainty of Unit Under Calibration.

PHOTO OF CALIBRATION SET-UP



Calibration set-up of the Cup anemometer calibration in the wind tunnel of Jirarattee Associates Co., Ltd. The Cup anemometer shows only the flow direction. Remarks: The position of the set-up must be true to scale due to imaging geometry.

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

Air speed (m/s)	D ¹ _{90°} Degree (°)	D ¹ _{45°} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
	0.000	0	0	0.80
	45.000	44	-1	0.80
	90.000	87	-3	0.80
5.04	135.000	133	-2	0.80
	180.000	176	-4	0.80
	225.000	222	-3	0.80
	270.000	272	2	0.80
	315.000	320	5	0.80

Remarks:

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

² Uncertainty of standard.

³ Uncertainty of Unit Under Calibration.

End of Certificate of Calibration



Certificate Number:

CWS-026-67



JIRARATTEE ASSOCIATES CO., LTD.

Jirarattee Associates Co., Ltd.
60211-11, 14100-10
Tachakumbi, 1/11, 1/11, 1/11, 1/11, 1/11
Bangkok 10000 (Thailand)
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Mobile: +662-000-0000
E-mail: jirarattee@jirarattee.com
Web: www.jirarattee.com

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

Wind direction measurement laboratory
Calibration services department



MSC-TIS-TIS 17025
CALIBRATION 0367

Certificate Number:

CWS-026-67

CERTIFICATE OF CALIBRATION

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS RECEIVED

CUSTOMER

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature	23.0 ± 0.5	°C
Relative Humidity	55.0 ± 15.0	%RH
Atmospheric Pressure	1010.0 ± 0.5	hPa

PLACE OF CALIBRATION

11th floor wind tunnel of Jirarattee Associates Co., Ltd.

CALIBRATION CONDITION

Wind tunnel cross-section area ¹	970	mm ²
Wind direction (typical angle) ²	120	mm
Diameter of mounting pipe ³	0.141	mm

Preparation Condition

24 hours at ambient conditions.
The storage values during measurement are 22.2°C, 47.3% RH and 1001.7 hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:
Mr. Somchai Thirakulchai
Mr. May Puangruepa Phoommit



Approved signature:

Mr. Tanyap Boonkarnan
Calibration Department Manager

Remarks:

¹ Edge 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 1:1.

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



JIRARATTEE ASSOCIATES CO., LTD.

Jirarattee Associates Co., Ltd.
60211-11, 14100-10
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Web: www.jirarattee.com

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

Temperature measurement laboratory
Calibration services department



MSC-TIS-TIS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No.: CDT-121-67

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 condition in the laboratory are as follows:

Temperature	23.0 ± 0.5	°C
Relative Humidity	55.0 ± 15.0	%RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:
Mr. Somchai Thirakulchai
Mr. May Puangruepa Phoommit



Approved signature:

Mr. Tanyap Boonkarnan
Calibration Department Manager

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 70 °C to 40 °C

Functions:

Table 3: This equipment was connected with temperature sensor Model: HMP60 S/N: U9641223.
Dimension: Diameter 12 mm, Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.047	19.6	-0.4	0.099
80	25.043	24.6	-0.4	0.099
80	30.034	29.7	-0.3	0.099
80	35.028	34.7	-0.3	0.099
80	40.018	39.5	-0.5	0.099

UUC's UUC Calibration

End of Certificate of Calibration



Jiranan Associates Co., Ltd.
63/14 25, 25/05, 26
Pattana 2, 2/1, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 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625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 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1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1343, 1344, 1345, 1346, 1347, 1348, 1349, 1350, 1351, 1352, 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2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 20

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MEASUREMENT RESULTS¹

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

V _u (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V _u (m/s)	Error (m/s)	U (k=2) (m/s)
0.993	24.50	24.60	0.5	-0.3	0.31
2.014	24.70	24.60	1.7	-0.1	0.31
2.985	24.68	24.60	2.8	-0.2	0.31
4.131	24.64	24.60	3.8	-0.3	0.31
4.97	24.60	24.60	4.9	-0.5	0.31
5.98	24.46	24.60	6.0	0.0	0.31
7.04	24.50	24.60	7.1	0.0	0.31
7.98	24.32	24.60	8.1	0.1	0.31
8.02	24.70	24.60	9.1	0.7	0.31
9.98	24.50	24.60	10.2	0.2	0.31
11.02	24.70	24.60	11.3	0.3	0.31
11.99	24.70	24.60	12.3	0.3	0.31
13.03	24.70	24.60	13.3	0.3	0.31
14.05	24.50	24.60	14.4	0.4	0.31
15.06	24.70	24.60	15.4	0.4	0.31
15.99	24.46	24.60	16.4	0.4	0.31

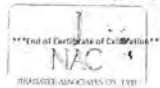
Remark:

- Calibration results only valid for the tested circumstances and environmental conditions during which calibration took place
- Velocity at standard
- Velocity of Wind Under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration setup of the Cup anemometer calibration in the wind tunnel of Jirarattee Associates Co., Ltd. The Cup anemometer shown may differ from that calibrated are shown. The photograph of the set-up is not true to scale due to imaging geometry.



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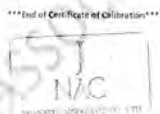
MEASUREMENT RESULTS¹

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

Air speed (m/s)	D ₅₀ Degree (°)	D ₁₀₀ Degree (°)	Error Degree (°)	U (k=2) Degree (°)
0.000	0	0	0	0.80
45.000	45	45	0	0.80
90.000	89	89	-1	0.80
135.000	132	132	-3	0.80
180.000	177	177	-3	0.80
225.000	223	223	-2	0.80
270.000	270	270	0	0.80
315.000	316	316	1	0.80

Remark:

- Calibration results only valid for the tested circumstances and environmental conditions during which calibration took place
- Direction at standard
- Direction of Wind Under Calibration



Jirarattee Associates Co., Ltd.
42/14-15, Route 10,
Pattana 2/1, Rd. Wongsakul, Bangkok
Tel: 02-016-0112
Email: jirarattee@jirarattee.com
Web site: www.jirarattee.com

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

Wind direction measurement laboratory
(Calibration services department)



Certificate Number
CWD-016-67

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	23.0 ± 1.0	°C
Relative Humidity	55.0 ± 15.0	%RH
Atmospheric Pressure	1010 ± 10	hPa

PLACE OF CALIBRATION

3rd floor wind tunnel of Jirarattee Associates Co., Ltd.

CALIBRATION CONDITION

Wind tunnel cross-section area ¹	900	cm ²
Wind direction figure area ²	1.08	cm ²
Diameter of measuring area ³	-	mm
Blockage ratio of test object ⁴	0.143	%

Preconditioning

24 hours at ambient conditions

Measurement Condition

The average values during measurement are (24.0°C, 55.0% RH and 1009.2 hPa)

TABULATION OF RESULTS:

The table on next page give the measured results.

Calibrated by:
Mr. Jirarattee Thirachai
Mr. Jirarattee Thirachai



Approved signature:
Mr. Jirarattee Thirachai
Calibration Department Manager

Remark:
¹ Inside investigation area of the wind tunnel
² Provided cross section area of the tested object inside measuring tube
³ Diameter of measuring pipe
⁴ Ratio = V_u/V₀

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



Jirarattee Associates Co., Ltd.
42/14-15, Route 10,
Pattana 2/1, Rd. Wongsakul, Bangkok
Tel: 02-016-0112
Email: jirarattee@jirarattee.com
Web site: www.jirarattee.com

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

Pressure measurement laboratory
(Calibration services department)



CERTIFICATE OF CALIBRATION

Certificate No.: CWS-009-67

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MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS RECEIVED

CUSTOMER

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

CONDITION OF THIS RESULT OF CALIBRATION:

1. Reference Standard Instrument:

Instrument	Model	Serial No.	Certificate No.	Due Date
Absolute Pressure Transducer	CPG2500	4350126P	MP-0009-24	27 Dec 2024

- Calibration effort for calibration sequence B
- The UUC¹ was installed in vertical orientation above reference standard instrument and center of UUC¹ was aligned with the reference fluid
- Calibration conditions:
- Condition:

Pressure transmitting medium	Oil	Atmosphere
At (20°C, 1 bar)	1.19 kg/m ³	
M _{ref}	(55.15) N	
T _{ref}	(23.8) °C	
P _{ref}	(1013.25) mbar	
- The certificate is valid only to the item calibrated on date and place of calibration.

Calibrated by:
Mr. Jirarattee Thirachai
Mr. Jirarattee Thirachai



Approved signature:
Mr. Jirarattee Thirachai
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

CERTIFICATE OF CALIBRATION

Certificate No.: COT-006-67

Page 2 of 2 Pages

MEASUREMENT RESULTS: ☐ Without adjustment ☒ With adjustment

CALIBRATION IN THE RANGE OF: 950 mbar to 1050 mbar

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

STD (mbar)	UUC* (mbar)	Error (mbar)	Uncertainty (k=2) (mbar)
950.15	951.6	1.5	0.37
970.11	971.6	0.0	0.37
990.06	990.7	0.7	0.37
1010.03	1010.4	0.4	0.37
1030.07	1030.1	0.0	0.37
1050.07	1049.8	-0.3	0.37

Note: UUC* Unit Under Calibration

To convert the result in report unit to Pa should be multiply by 100

End of certificate



Certificate No.: COT-303-67

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS-RECEIVED
CUSTOMER

Data Logger with Temperature sensor
Navulynx
110-WS-250L-D
A5011
RYG-150610
Used Item
AIS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Klong Luang, Klong Luang, Bangkok 10510 Thailand.

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

18 Jun 2024
26 Jun 2024
26 Jun 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature: 23.0 ± 3.0 °C
Relative Humidity: 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibration procedure:

The temperature calibration was done by
in-house calibration method by WCL-001
according to comparison method with standard
digital temperature indicator and standard
temperature probe. The temperature scale was
based on ITS-90.

Traceability:

The measurement results are traceable to the
international system of units (SI) through
National Institute of Metrology (NIMT)
Certificate number: IT-0047-24. Certificate
number: EP-0101-23

Reference Used During Calibration:

1. Standard Temperature Probe
Model: S15-100 A500, Serial No.: 627642-00
Due date: 26 Mar 2025
2. Digital Temperature Indicator
Model: DSI-3000 A.M.H, Serial No.: 473409
Due date: 14 Sep 2024

Uncertainty of Measurement:

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

Calibrated by:
☒ Mr. Sornwit Thachakid
☒ Miss Jiraporn Lertlumpit
☒ Miss Jiraporn Lertlumpit



Approved signature:

Mr. Ramya Boonlunee
Calibration Department Manager

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

Continuation of Certificate of Calibration Number COT-303-67

Page 2 of 2 Pages

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 30 °C to 40 °C

Function:

Table 3: This equipment was connected with temperature sensor Model: HMP60 S/N: U3911245.
Dimension: Diameter 32 mm, Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.054	19.8	-0.3	0.16
80	24.051	24.9	0.9	0.16
80	30.046	29.9	-0.1	0.099
80	35.034	34.8	-0.2	0.099
80	40.043	39.8	-0.2	0.099

UUC*: Unit Under Calibration

Remark: The reported uncertainty of measurement is 0.16, based on standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

End of Certificate of Calibration



Certificate No.: CRT-015-67

Page 1 of 3 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS-RECEIVED
CUSTOMER

Relative humidity with data logger
Navulynx
Data Logger: 110-WS-250L-D
Sensor: HMP60
Data Logger: A5011
Sensor: U3911245
RYG-150610
Used Item
AIS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd, Klong Luang, Klong Luang,
Klong Luang, Bangkok 10510 Thailand

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

18 Jun 2024
26 Jun 2024
26 Jun 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature: 23.0 ± 3.0 °C
Relative Humidity: 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibration procedure:

The Relative humidity and Air Temperature
calibration was done by in-house calibration
method by WCL-001 and WCL-002 according to
comparison method with standard digital
hygrometer with temperature sensor and standard
humidity generator chamber.

Traceability:

The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology (NIMT) Certificate
number: IT-0047-24 and through National
Institute of Metrology (NIMT) Certificate
number: EP-0101-23

Uncertainty of Measurement:

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

Calibrated by:
☒ Mr. Sornwit Thachakid
☒ Miss Jiraporn Lertlumpit
☒ Miss Jiraporn Lertlumpit



Approved signature:

Mr. Ramya Boonlunee
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

Measurement Result:

(The results of all instruments and systems of measurement are certified as correct to the following:

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Table 1: The results of calibration of reference standards to be calibrated in 1000 Hz
Calibration Range: 700 Hz to 1000 Hz

Air Temperature (°C)	Standard Reading (dB)	UNC Reading (dB)	Error (dB)	Uncertainty (dB)
23.0	15.61	17.0	-2.0	0.53
23.0	16.68	17.4	-3.0	1.0
23.0	18.42	18.0	-0.4	1.0

UNC: 1000 Hz Calibration

End of Certificate of Calibration



Certificate of Calibration

Customer

Name: ALS Laboratory Group Thailand Co., Ltd.

Certificate No : 25-ACT-010

Address: 104 Soi Phatthanakom 40, Phatthanakom Road, Suan Luang, Bangkok 10250

Request No : Req-2025-0091

Unit Under Calibration Details

Measurement item: Acoustic Calibrator

Class: 1

Manufacturer: RION

Range: 94 dB / 1000 Hz

Model: NC-74

Instrument Status: Used

Serial Number: 34178121

ID: RYG_FS0213

Calibration Environment and Details

Temperature: (23 ± 2 °C)

Humidity: (50 ± 20 %RH)

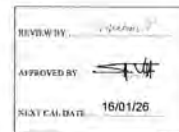
Barometric Pressure: (1013 ± 10.0 hPa)

Received Date: 15 January 2025

Calibration Date: 16 January 2025

Location of Calibration: LAB 1 Acoustic

Calibration Procedure: In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators



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

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

Note

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

Calibrated By:
Mr. Noppadon Lutzang
Service Calibration Engineer

Approved By:
Mr. Pacit Mathavorn
Calibration Engineer Supervisor
Issue Date: 16 January 2025

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

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



Certificate No : 25-ACT-010

Request No : Req-2025-0091

Sound pressure level

Calibration Results : Without Adjustment

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

Frequency of Sound pressure level

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

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

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

Note:

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

- Acceptance limit was IEC 60942:2017 Class 1

- The calibration results exclude the calibration pressure correction

- The calibration results exclude the microphone volume correction



Certificate No : 25-ACT-010

Request No : Req-2025-0091

Decision Rule for Statements of Conformity

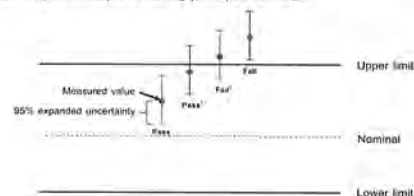
The stated decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:2019, Guidelines for the Reporting of Compliance with Specification as following Fig. and statements:

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

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

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

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



End of Calibration

Cert. No. : ACL25074
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-12 / Microphone UC-S2 / Preamplifier NH-24
Serial No.: 00233183 / 157777 / 22653
ID No.: RYG_FS0034

Condition As Found : GOOD

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

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 30) %

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

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

Calibrated by : Nathakorn Pichapaisan

Approved by :

T. Petchur
(Thanakul Petchur)

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

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

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	3351111	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL-BP 20/0267	13-FEB-25
Digital Multimeter	34461A	MY60024273	EEL-BP 22/0267	13-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-52KA1	34560495	AA-3001-24	05-FEB-25

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

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

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

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

Summary of Measurement Result :

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

Cert. No. : ACL25074
Job No. : VC68AC0059
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value: (dB)
18.2

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

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

3. Acoustical signal tests of frequency weightings

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

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

Cert. No. : ACL25074
Job No. : VC68AC0059
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long-term stability

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

T. Pich

Cert. No. : ACL25074
Job No. : VC68AC0059
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7. Level linearity on the reference level range

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

T. Pich

Cert. No. : ACL25074
Job No. : VC68AC0059
Pages : 7 of 8

8. Level linearity including the level range control

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

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

9. Tone burst response

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

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.4	0.0	±1.0

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

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

T. Pich

T. Pich



Air Sampling Pump Calibration Report

Air Sampling Pump Detail

Calibration Date	7 Jan 2025	Next cal.	7 Apr 2025
Air Sampling Pump ID	RYG_FS0135	Barometric (mmHg)	751
Serial No.	20150410011	Temperature (°C)	25.0

Reference Standard Low Flow Meter

Brand	MesaLabs	ID	RYG_FS0208
Model	Defender 510-L	Serial No.	130027
Due Date	13-Aug-25		

Reference Standard High Flow Meter

Brand	MesaLabs	ID	BKK_FS0614
Model	Defender 510-M	Serial No.	151114
Due Date	21-May-25		

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Standard Flow Reading (cc/min)			Avg. (cc/min)	Acceptable (cc/min)		Evaluation Pass/ Fail
	1	2	3				
20	20.2	20.6	20.0	20.3	21	19	Passed
50	50.6	50.0	50.6	50.4	52.5	47.5	Passed
100	99.4	100.3	100.7	100.1	105	95	Passed
200	200.2	199.4	199.4	199.7	210	190	Passed
500	486.9	491.2	493.5	490.5	515	485	Passed
1000	1005.6	1003.7	1005.7	1005.0	1010	990	Passed
2000	2012.1	2008.9	2004.9	2008.6	2020	1980	Passed
2500	2522.1	2519.2	2528.4	2523.2	2550	2450	Passed

Note : Reference Specifications $\pm 5\%$ of set flow or $\pm 3\%$ cc/min whichever is Higher

Calibrated by : Gilan Approved By : Wichan Choonharat
 (Mr. Chanon Booncheun) (Mr. Wichan Choonharat)
 Enviro Field Services Scientist (1) Enviro Field Services Manager

FORM NO.: F 06-115 REVISION NO.: 1 ISSUE DATE: 10/04/24



Air Sampling Pump Calibration Report

Air Sampling Pump Detail

Calibration Date	7 Jan 2025	Next cal.	7 Apr 2025
Air Sampling Pump ID	RYG_FS0144	Barometric (mmHg)	751
Serial No.	20220731504	Temperature (°C)	25.0

Reference Standard Low Flow Meter

Brand	MesaLabs	ID	RYG_FS0208
Model	Defender 510-L	Serial No.	130027
Due Date	13-Aug-25		

Reference Standard High Flow Meter

Brand	MesaLabs	ID	BKK_FS0614
Model	Defender 510-M	Serial No.	151114
Due Date	21-May-25		

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Standard Flow Reading (cc/min)			Avg. (cc/min)	Acceptable (cc/min)		Evaluation Pass/ Fail
	1	2	3				
20	19.5	19.9	19.2	19.5	21	19	Passed
50	50.8	50.9	50.5	50.7	52.5	47.5	Passed
100	99.9	99.7	99.6	99.7	105	95	Passed
200	198.8	199.8	199.3	199.3	210	190	Passed
500	502.0	496.4	505.8	501.4	515	485	Passed
1000	999.6	1001.1	998.9	999.9	1010	990	Passed
2000	1985.8	1994.2	1996.6	1992.2	2020	1980	Passed
2500	2531.5	2546.9	2541.0	2539.8	2550	2450	Passed

Note : Reference Specifications $\pm 5\%$ of set flow or $\pm 3\%$ cc/min whichever is Higher

Calibrated by : Nattakorn V. Approved By : Wichan Choonharat
 (Mr. Nattakorn Vongyinyoo) (Mr. Wichan Choonharat)
 Enviro Field Services Scientist (1) Enviro Field Services Manager

FORM NO.: F 06-115 REVISION NO.: 1 ISSUE DATE: 10/04/24

ALS Laboratory Group (Thailand) Co., Ltd.
 104 Prathananakan Rd., Prathanakan Rd.
 Prathanakan, Suan Luang, Bangkok 10250
 T +66 2 760 3000 F +66 2 760 3197



Certificate of Calibration

Certificate No. C-160225-BKK_FS0315

Air Sampling Pump Detail

Equipment name	Personal Air Sampling Pump	Equipment ID	BKK_FS0315
Brand	Gilan	Serial No.	20150910049
Model/Type	GI Air Plus	Calibration Date	18-Feb-25
		Next calibration date	18-May-25

Reference Standard Low Flow Meter

Equipment name	Air Flow Meter	Equipment ID	BKK_FS0614
Brand	MesaLabs	Serial No.	151114
Model/Type	Defender 510-M	Calibration Date	9-Sep-24
		Due Date	9-Sep-25

Reference Standard High Flow Meter

Equipment name	Air Flow Meter	Equipment ID	BKK_FS0619
Brand	MesaLabs	Serial No.	130026
Model/Type	Defender 510-L	Calibration Date	9-Sep-24
		Due Date	9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.1	20.3	20.0	20.1	5%	19 - 21	Passed
50	50.2	50.8	50.1	50.4	5%	48 - 53	Passed
100	100.0	100.0	99.7	100.2	5%	95 - 105	Passed
200	202.7	202.3	202.3	202.4	5%	190 - 210	Passed
High Flow							
500	507.3	507.9	507.6	507.6	3%	485 - 515	Passed
1000	1004.5	1005.0	1004.1	1004.5	3%	970 - 1030	Passed
2000	2001.4	2000.2	2002.3	2001.3	3%	1940 - 2060	Passed
2500	2503.4	2501.5	2502.2	2502.4	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By : Mr. Jessadn Kongkudith Approved By : Mr. Warakorn Poekrak
 (Mr. Jessadn Kongkudith) (Mr. Warakorn Poekrak)
 Field Services Field Services Supervisor

Issue date : 20-Feb-25

ALS Laboratory Group (Thailand) Co., Ltd.
 104 Prathananakan Rd., Prathanakan Rd.
 Prathanakan, Suan Luang, Bangkok 10250
 T +66 2 760 3000 F +66 2 760 3197



Certificate of Calibration

Certificate No. C-160225-BKK_FS0317

Air Sampling Pump Detail

Equipment name	Personal Air Sampling Pump	Equipment ID	BKK_FS0317
Brand	Gilan	Serial No.	20150910051
Model/Type	GI Air Plus	Calibration Date	18-Feb-25
		Next calibration date	18-May-25

Reference Standard Low Flow Meter

Equipment name	Air Flow Meter	Equipment ID	BKK_FS0614
Brand	MesaLabs	Serial No.	151114
Model/Type	Defender 510-M	Calibration Date	9-Sep-24
		Due Date	9-Sep-25

Reference Standard High Flow Meter

Equipment name	Air Flow Meter	Equipment ID	BKK_FS0619
Brand	MesaLabs	Serial No.	130026
Model/Type	Defender 510-L	Calibration Date	9-Sep-24
		Due Date	9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.9	20.7	20.5	20.7	5%	19 - 21	Passed
50	50.3	50.1	50.5	50.3	5%	48 - 53	Passed
100	100.6	100.4	100.7	100.6	5%	95 - 105	Passed
200	200.3	201.3	200.2	200.6	5%	190 - 210	Passed
High Flow							
500	503.4	502.7	505.2	503.8	3%	485 - 515	Passed
1000	995.7	997.4	996.9	996.7	3%	970 - 1030	Passed
2000	2007.5	2009.5	2007.8	2008.3	3%	1940 - 2060	Passed
2500	2499.4	2499.8	2500.5	2499.9	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By : Mr. Jessadn Kongkudith Approved By : Mr. Warakorn Poekrak
 (Mr. Jessadn Kongkudith) (Mr. Warakorn Poekrak)
 Field Services Field Services Supervisor

Issue date : 20-Feb-25



SARTORIUS

Certificate of Calibration

REVIEW BY: *Thanit*
APPROVED BY: *D. Chonchai*
NEXT CAL. DATE: 01/01/2025

Model Number: MSE125P-100-DU Certificate No.: 248CI0071
Description: Semi-micro Balance Issued Date: Friday, February 23, 2024
Serial Number: 0033108993 Reference No.: 229196
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. Pluak Daeng, Rayong 21140, Thailand.

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

Calibrated By: Mr. Chonchai Inthana
Calibration Date: Thursday, February 22, 2024

Calibration Procedure No.: This calibration was conducted by Using in-house calibration procedure number (WI-003) Based on UKAS LAB 14: 2019

Reasons for calibration: ☐ New Installation ☐ Service / Repaired ☒ Recurrent/Preventive Maintenance

Measurement Method: UKAS Publication Ref: Lab 14
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents this traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came from list of Sartorius Metrological Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 5000g E2, YCS011-522-00	TCS	M2308197S	23-Aug-2026
MHB-382SD	Humidity/Balometer/Temp. Lutro MHB-382SD	DKSH	C1523184S	23-Aug-2024

This certificate relates and apply to this equipment only.
This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division Sartorius (Thailand) Co., Ltd.
SOP FM 33 03 February 2022

SARTORIUS

Certificate of Calibration

REVIEW BY: *Thanit*
APPROVED BY: *D. Chonchai*
NEXT CAL. DATE: 01/01/2025

Model Number: MSE125P-100-DU Certificate No.: 248CI0071
Description: Semi-micro Balance Issued Date: Friday, February 23, 2024
Serial Number: 0033108993 Reference No.: 229196
ID No.: RYG_EN0004
Manufacturer: Sartorius Page No.: 3 of 3

Calibration Results : Without Adjustment

Repeatability	Eccentricity (Off-center loading error)
The repeatability is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement 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 verified 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 R78).
Nominal Value : (Low Load) Tolerance 0.000015 g	Nominal value : 50 g Tolerance 0.00015 g
Nominal Value : (High Load) Tolerance 0.000015 g	Nominal value : 100 g Tolerance 0.000015 g
Standard Deviation 0.00003	Difference 1 - 2 - 3 - 4 - 5 - 6 -

Linearity

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

Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
65	65.0000	65.0000	0.0000	0.00015
70	70.0000	70.0000	0.0000	0.00015
75	75.0001	75.0000	-0.0001	0.00015
80	80.0001	80.0000	-0.0001	0.00015
85	85.0001	85.0001	0.0000	0.00015
90	90.0001	90.0001	0.0000	0.00015
95	95.0001	95.0001	0.0000	0.00015
100	100.0000	100.0000	0.0000	0.00015
110	110.0000	110.0000	0.0000	0.00015
120	120.0000	120.0000	0.0000	0.00015

SARTORIUS

Certificate of Calibration

Model Number: MSE125P-100-DU Certificate No.: 248CI0071
Description: Semi-micro Balance Issued Date: Friday, February 23, 2024
Serial Number: 0033108993 Reference No.: 229196
ID No.: RYG_EN0004
Manufacturer: Sartorius Page No.: 2 of 3

Calibration Results : Without Adjustment

Repeatability	Eccentricity (Off-center loading error)
The repeatability is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement 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 verified 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 R78).
Nominal Value : (Low Load) Tolerance 0.000015 g	Nominal value : 50 g Tolerance 0.00015 g
Nominal Value : (High Load) Tolerance 0.000015 g	Nominal value : 100 g Tolerance 0.000015 g
Standard Deviation 0.000006	Difference 1 - 2 -0.00001 3 0.00000 4 0.00001 5 0.00001 6 -

Linearity

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

Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
0.01	0.01000	0.01000	0.00000	0.000024
0.1	0.10000	0.10000	0.00000	0.000025
1	1.00000	1.00000	0.00000	0.000027
2	2.00002	2.00002	0.00000	0.000028
5	5.00002	5.00003	0.00001	0.000031
10	10.00002	10.00004	0.00002	0.000036
20	20.00002	20.00002	0.00000	0.000049
30	30.00004	30.00003	-0.00001	0.000069
40	40.00005	40.00003	-0.00002	0.000089
50	50.00002	50.00001	-0.00001	0.000089

Accredited by
NSC-TIS-TIS 17025
Calibration 0426

SARTORIUS



Calibration certificate

Calibration Certificate No. 258KL0006

Object	Electronic non-automatic weighing instrument	This calibration certificate documents the traceability to national standards.
Manufacturer	Sartorius	Uncertainties of measurements are taken into account when only statements of compliance are made.
Type	MSE125P-100-DU	This certificate was prepared by Sartorius Corporation in accordance to the current ISO/IEC 17025:2017 standard and Sartorius Work Instruction (Method) SCP WI 08.
Serial / QM Ident. no.	33108993 RYG_EN0004	This certificate relates and apply to this equipment only.
Customer	ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch) 616/10 Moo 5 T. Maenam Khu, A. Pluak Daeng, Rayong 21140, Thailand.	
Order no.	2230	
Number of pages	4	
Date of calibration	20 Feb 2025	

This calibration certificate may not be reproduced other than in full except with the permission of NSC-TIS-TIS-17025 and the issuing laboratory. Calibration certificates without signature are not valid.
The user is obliged to have the object recalibrated at appropriate intervals.

Date: 06 Mar 2025 Approval of the Calibration Certificate: *Chonchai* Person in charge: *Kachen*
Mr. Chonchai Inthana Kachen Lafee

Calibration object

Multi interval instrument

Model	MSE125P-100-DU	
Serial Number	33108993	
QM Ident. no Inventory no.	RYG_EN0004 ---	
Range	1	2
Maximum capacity (Max. load)	60.00000 g	120.0000 g
Measured range	60.00000 g	120.0000 g
Scale interval	0.00001 g	0.0001 g

Place of calibration

Address	According to page 1
Department Cost center	Laboratory Department. ---
Building Floor	--- 1st Floor.
Room	Balance Room.
Maximum temperature variation at place of calibration	5 K.

Calibration procedure

EURAMET cg-18, V4.0 - Guidelines on the Calibration of Non-Automatic Weighing Instruments

Test equipment

Test equipment type	Test equipment ID	Valid until
Thermometer	MHB-382SD s/nB011342 Traceable to SI unit through DKSH	21 Aug 2025
Test weight set OIML R111 E2	Certificate No.M2308197S, E2(Traceable to SI unit through TCS)	23 Aug 2025

Adjustment Status

The measuring device was internally adjusted before the calibration.

Environmental and measuring conditions

Date of calibration	20 Feb 2025
Temperature at place of calibration Temp. diff.	24.2 °C 0.3 K
Two weights - T place	
Measuring conditions	The installation site is suitable. The device was levelled. Balance was loaded up to Max before test.
Comments	Humidity 62.5 %RH.

Measurement results | Measurement uncertainties

Repeatability	Eccentricity
Test load (nominal): 50 g 100 g	Test load (nominal): 50 g
50 g	Center
1 50.00002 g	Front left
2 50.00001 g	Back left
3 50.00003 g	Back right
4 50.00002 g	Front right
5 50.00001 g	Maximum deviation from centric loading indication
6 50.00002 g	(Δf/cc) max = 0.00002 g
7 50.00002 g	
8 50.00001 g	
9 50.00001 g	
10 50.00002 g	
s = 0.000007 g	s = 0.00003 g

Error of indication	Testload	Indication	Error	Expansion factor	Uncertainty	Uncertainty relative
	L	I	E	k	U(E)	U _{rel} (E)
	0.01000 g	0.01000 g	0.00000 g	2.00	0.000024 g	0.24 %
	0.10000 g	0.10000 g	0.00000 g	2.00	0.000037 g	0.037 %
	1.00000 g	1.00000 g	0.00000 g	2.00	0.000037 g	0.0037 %
	5.00002 g	5.00002 g	0.00000 g	2.00	0.000050 g	0.0010 %
	20.00002 g	20.00002 g	0.00000 g	2.00	0.000069 g	0.00034 %
	55.00004 g	55.00003 g	-0.00001 g	2.00	0.00017 g	0.00031 %
	70.00000 g	70.00000 g	0.00000 g	2.00	0.00017 g	0.00024 %
	80.0001 g	80.0001 g	0.0000 g	2.00	0.00018 g	0.00023 %
	100.0000 g	100.0000 g	0.0000 g	2.00	0.00017 g	0.00017 %
	110.0000 g	110.0000 g	0.0000 g	2.00	0.00028 g	0.00025 %
	120.0000 g	119.9999 g	-0.0001 g	2.00	0.00028 g	0.00023 %
Maximum error of indication	E _{max} = 0.00010 g					

U_{rel}(E) is the quotient of U(E) and test load L. The uncertainty of measurement U(E) is valid only if error E is considered. You will find reference notes on the uncertainty of measurement in use under: Appendix to the calibration certificate | Interpretation of measurement results.

Reference note: The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the documented

Expansion factor, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95 % probability that the value of the

measurand will be in the assigned value range.

End of calibration certificate

Interpretation of measurement results | Appendix to the calibration certificate

Uncertainty of measurement in use

Device adjusted before measurement	Yes
Temperature deviation considered	1.5 K (see CAL. active)
Temperature coefficient considered	1 · 10 ⁻⁴ /K

Uncertainty of the weighing result U₉₅(W)

Partial weighing range 1 | 0.00000 g...60.00000 g

$$U_{95}(W) = 0.000016 \text{ g} + 5.61 \cdot 10^{-4} \cdot R$$

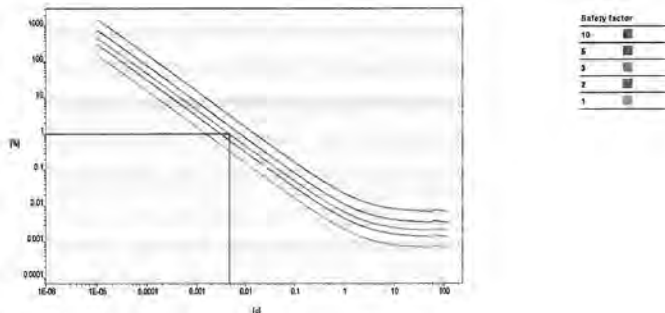
Partial weighing range 2 | 60.00000 g...120.0000 g

$$U_{95}(W) = 0.000086 \text{ g} + 6.19 \cdot 10^{-4} \cdot R$$

Reference note: The current uncertainty of measurement is calculated by entering the reading R into this formula. In relation to this, there is no need for a correction of the indication error. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied with an Expansion factor of 2, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

Indication in % from Max1	Net indication R	Uncertainty U ₉₅ (W)	Uncertainty relative U ₉₅ (W) _{net}
1 %	0.60000 g	0.000020 g	0.0033 %
25 %	15.00000 g	0.00012 g	0.00077 %
50 %	30.00000 g	0.00021 g	0.00071 %
75 %	45.00000 g	0.00031 g	0.00076 %
100 %	60.00000 g	0.00041 g	0.00069 %

Graphic realization of the relative uncertainty of measurement | process accuracy



Displayed example

Process accuracy	1.00 %
Safety factor	3
Minimum sample weight	0.00474 g



Air Sampling Pump Calibration Report

Air Sampling Pump Detail			
Calibration Date	6 Jan 2025	Next cal.	6 Apr 2025
Air Sampling Pump ID	RYG_FS0146	Barometric (mmHg)	755.9
Serial No.	20150310176	Temperature (°C)	25.9

Reference Standard Low Flow Meter			
Brand	MesaLabs	ID	RYG_FS0208
Model	Defender 510-L	Serial No.	130027
Due Date	13-Aug-25		

Reference Standard High Flow Meter			
Brand	MesaLabs	ID	BKK_FS0614
Model	Defender 510-M	Serial No.	151114
Due Date	21-May-25		

Calibration Data							
Air Sampling Pump setting (cc/min)	Reference Standard Flow Reading (cc/min)			Avg. (cc/min)	Acceptable (cc/min)	Evaluation	Pass/ Fail
	1	2	3				
20	20.9	20.8	20.8	20.8	21	19	Passed
50	49.6	49.5	49.6	49.6	52.5	47.5	Passed
100	100.2	99.7	100.0	100.0	105	95	Passed
200	200.5	200.9	200.6	200.7	210	190	Passed
500	490.3	502.3	509.5	500.7	515	485	Passed
1000	1001.0	1006.9	1005.1	1004.3	1010	990	Passed
2000	2019.9	1999.4	2005.6	2008.3	2020	1980	Passed
2500	2507.2	2510.4	2512.5	2510.0	2550	2450	Passed

Note: Reference Specifications ± 5% of set flow or ± 3% cc/min whichever is Higher

Calibrated by:
(Mr. Nantawat Sarin)
Enviro Field Services Scientist (I)

Approved By:
(Mr. Wichan Choonharat)
Enviro Field Services Manager



Certificate of Calibration

Certificate No. C-190225-BKK_FS0314

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilan
Model/Type : GSAir Plus
Equipment ID : BKK_FS0314
Serial No. : 20160910048
Calibration Date : 19-Feb-25
Next calibration date : 19-May-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : Mesalabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : Mesalabs
Model/Type : Defender 510-L
Equipment ID : BKK_FS0619
Serial No. : 130026
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/Fail)
	1	2	3				
Low Flow							
20	20.3	19.4	20.2	20.0	5%	18 - 21	Passed
50	49.7	49.0	51.6	50.1	5%	46 - 53	Passed
100	102.7	102.1	101.0	101.9	5%	95 - 105	Passed
200	202.8	200.7	199.9	201.1	5%	190 - 210	Passed
High Flow							
500	505.7	503.2	502.8	503.9	3%	485 - 515	Passed
1000	999.2	999.8	1000.7	999.9	3%	970 - 1030	Passed
2000	2000.3	1999.6	1999.1	1999.7	3%	1940 - 2060	Passed
2500	2514	2514.9	2513.7	2514.2	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:
(Mr. Jessadit Kongsakulchai)
Field Services
Issue date : 20-Feb-25
Approved By:
(Mr. Warakorn Pookrak)
Field Services Supervisor



Certificate of Calibration

Certificate No. C-210225-BKK_FS0318

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilan
Model/Type : GSAir Plus
Equipment ID : BKK_FS0318
Serial No. : 20150910052
Calibration Date : 21-Feb-25
Next calibration date : 21-May-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : Mesalabs
Model/Type : Defender 510-L
Equipment ID : BKK_FS0619
Serial No. : 130026
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : Mesalabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.4	19.9	19.9	20.1	3%	18 - 21	Passed
50	50.6	50.6	51.2	50.8	3%	48 - 53	Passed
100	99.0	98.9	98.5	99.3	3%	95 - 105	Passed
200	200.4	200.5	200.3	200.4	3%	190 - 210	Passed
High Flow							
500	498.44	497.6	504.1	500.2	5%	485 - 515	Passed
1000	998.83	1004.0	1004.3	1002.4	5%	970 - 1030	Passed
2000	1997.3	2005.6	1998.1	2000.3	5%	1940 - 2000	Passed
2500	2500.7	2504.7	2501.6	2502.3	5%	2425 - 2575	Passed

END OF REPORT

Calibrated By:
(Mr. Phuwich Promsard)
Field Services
Issue date : 21-Feb-25
Approved By:
(Mr. Warakorn Pookrak)
Field Services Supervisor



Air Sampling Pump Calibration Report

Page 1 of 1
Calibration No. : C-070125-RYG_FS0136

Air Sampling Pump Detail

Calibration Date : 7 Jan 2025
Air Sampling Pump ID : RYG_FS0136
Serial No. : 20150410012
Next cal. : 7 Apr 2025
Barometric (mmHg) : 751
Temperature (°C) : 25.0

Reference Standard Low Flow Meter

Brand : Mesalabs
Model : Defender 510-L
Due Date : 13-Aug-25
ID : RYG_FS0208
Serial No. : 130027

Reference Standard High Flow Meter

Brand : Mesalabs
Model : Defender 510-M
Due Date : 21-May-25
ID : BKK_FS0614
Serial No. : 151114

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Standard Flow Reading (cc/min)			Avg. (cc/min)	Acceptable (cc/min)	Evaluation Pass/Fail
	1	2	3			
20	20.8	20.6	20.9	20.8	21 19	Passed
50	49.7	50.3	50.1	50.0	52.5 47.5	Passed
100	100.5	100.9	101.5	101.0	105 95	Passed
200	200.6	200.3	200.4	200.4	210 190	Passed
500	509.2	512.6	508.2	510.0	515 485	Passed
1000	999.4	1007.1	1002.8	1003.1	1010 990	Passed
2000	2001.1	1992.2	2002.1	1998.5	2020 1980	Passed
2500	2525.5	2514.9	2501.7	2514.0	2550 2450	Passed

Note : Reference Specifications $\pm 5\%$ of set flow or $\pm 3\%$ cc/min whichever is Higher

Calibrated by:
(Mr. Chanon Booncheun)
Enviro Field Services Scientist (1)
Approved By:
(Mr. Wichan Choonharat)
Enviro Field Services Manager



Air Sampling Pump Calibration Report

Page 1 of 1
Calibration No. : C-070125-RYG_FS0111

Air Sampling Pump Detail

Calibration Date : 7 Jan 2025
Air Sampling Pump ID : RYG_FS0111
Serial No. : 20150310160
Next cal. : 7 Apr 2025
Barometric (mmHg) : 751
Temperature (°C) : 25.0

Reference Standard Low Flow Meter

Brand : Mesalabs
Model : Defender 510-L
Due Date : 13-Aug-25
ID : RYG_FS0208
Serial No. : 130027

Reference Standard High Flow Meter

Brand : Mesalabs
Model : Defender 510-M
Due Date : 21-May-25
ID : BKK_FS0614
Serial No. : 151114

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Standard Flow Reading (cc/min)			Avg. (cc/min)	Acceptable (cc/min)	Evaluation Pass/Fail
	1	2	3			
20	20.2	20.3	20.2	20.2	21 19	Passed
50	50.1	49.9	50.7	50.2	52.5 47.5	Passed
100	99.7	99.5	99.3	99.5	105 95	Passed
200	200.4	201.1	201.2	200.9	210 190	Passed
500	509.3	508.8	513.6	510.6	515 485	Passed
1000	1009.6	996.2	1006.2	1004.0	1010 990	Passed
2000	2000.8	1996.5	1994.8	1997.4	2020 1980	Passed
2500	2523.7	2519.0	2514.5	2519.1	2550 2450	Passed

Note : Reference Specifications $\pm 5\%$ of set flow or $\pm 3\%$ cc/min whichever is Higher

Calibrated by:
(Mr. Chanon Booncheun)
Enviro Field Services Scientist (1)
Approved By:
(Mr. Wichan Choonharat)
Enviro Field Services Manager



Certificate of Calibration

Certificate No. C-180225-BKK_F50313

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gillan
Model/Type : G4Air Plus
Equipment ID : BKK_F50313
Serial No. : 20150910047
Calibration Date : 18-Feb-25
Next calibration date : 18-May-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : BKK_FS0619
Serial No. : 130026
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	20.7	20.1	19.6	20.2	5%	19 - 21	Passed
50	50.6	50.3	50.4	50.4	5%	48 - 53	Passed
100	100.1	100.2	100.3	100.2	5%	95 - 105	Passed
200	200.2	200.5	200.6	200.4	5%	190 - 210	Passed
High Flow							
500	502.6	502.5	502.3	502.5	3%	485 - 515	Passed
1000	1001.3	1003.6	1002.1	1002.3	3%	970 - 1030	Passed
2000	1998.2	1985.4	1986.9	1986.8	3%	1940 - 2000	Passed
2500	2509.4	2509.4	2507.3	2508.7	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:
(Mr. Jessadin Kongsukdithai)
Field Services

Approved By:
(Mr. Warakorn Pookrak)
Field Services Supervisor

Issue date : 20-Feb-25



Certificate of Calibration

Certificate No. C-180225-BKK_F60312

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gillan
Model/Type : G4Air Plus
Equipment ID : BKK_F60312
Serial No. : 20150910048
Calibration Date : 18-Feb-25
Next calibration date : 18-May-25

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M
Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L
Equipment ID : BKK_FS0619
Serial No. : 130026
Calibration Date : 9-Sep-24
Due Date : 9-Sep-25

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/Fail)
	1	2	3				
Low Flow							
20	20.6	20.3	20.4	20.4	5%	19 - 21	Passed
50	50.4	50.2	50.3	50.3	5%	48 - 53	Passed
100	100.8	100.7	100.9	100.8	5%	95 - 105	Passed
200	203.1	203.4	202.7	203.1	5%	190 - 210	Passed
High Flow							
500	499.7	498.1	498.5	498.8	3%	485 - 515	Passed
1000	1004.3	1005.1	1004.3	1004.6	3%	970 - 1030	Passed
2000	2010.6	2005.6	2007.2	2007.8	3%	1940 - 2000	Passed
2500	2503	2503.9	2503.5	2503.6	3%	2425 - 2575	Passed

END OF REPORT

Calibrated By:
(Mr. Jessadin Kongsukdithai)
Field Services

Approved By:
(Mr. Warakorn Pookrak)
Field Services Supervisor

Issue date : 20-Feb-25

SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

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

SITHIPORN
RESEARCH



Cert. No. : ACC24055
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No. : 3417K124
ID No. : RYG_FS0216

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 : 18 OCTOBER 2024
Calibration Date : 22 OCTOBER 2024
Date of Issue : 24 OCTOBER 2024

Calibrated by : Nathakorn Pisutpaian

Approved by :
(Thanakul Petchumai)

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SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

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

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Cert. No. : ACC24055
Job No. : YC68AC0015
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-IIP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL-IIP 20/0267	15-FEB-25
Digital Multimeter	33461A	MY60024273	EEL-IIP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	FF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KA	34560495	AA-3001-24	05-FEB-25
Audio Analyzer	AVR-3360A	V74486069	EF-0009-24	09-FEB-25

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

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

3.1 National Institute of Metrology (Thailand),

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

Cert. No. : ACC24055
Job No. : VC68AC0015
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
94	94.19	0.19	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Acceptance limit (%)
1000	1001.3	0.1	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Acceptance limit (%)
1.82	0.10	3.0

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

End of Calibration Certificate

T. Petchum

Cert. No. : ACL25076
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No. : 00734221 / 187363 / 23230
ID No. : RYG_FSD027

Condition As Found : GOOD

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

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

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

REVIEW BY : Supt. S.
APPROVED BY :
NEXT CAL DATE : 21/01/2026

Calibrated by : Nathakorn Pinutpaisan

Approved by :
T. Petchum
(Thanakul Petchum)

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

Calibration Procedure : CP-AC-01

Calibration Method :

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

For tests results of each items were made by observation of each instruments display and also with SI M's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL_BP 21/02/67	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL_BP 20/02/67	13-FEB-25
Digital Multimeter	34461A	MY60024273	EEL_BP 22/02/67	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1601-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

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

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

3.1 National Institute of Metrology (Thailand).

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

T. Petchum

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

Summary of Measurement Result :

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

T. Petchum

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

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.4

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

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

3. Acoustical signal tests of frequency weightings

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

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

Z. Petcha

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

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

Z. Petcha

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

7. Level linearity on the reference level range

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

Z. Petcha

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

8. Level linearity including the level range control

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

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

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	109.0	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

Z. Petcha

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

10. Peak C sound level

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

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

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.6	0.1	±1.3

12. High level stability

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

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

End of Calibration Certificate

T. Petchur

Cert. No. : ACL24228
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier N11-24
Serial No. : 00734223 / 169439 / 72460
ID No. : RYG_FS0029

Condition As Found : GOOD

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

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

Received Date : 10 JULY 2024
Calibration Date : 11 JULY 2024
Date of Issue : 15 JULY 2024

Calibrated by : Natthakorn Pisutpaisan

Approved by :

T. Petchur
(Thinnukul Petchurai)

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other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL24228
Job No. : VC67AC0127
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

3.1 National Institute of Metrology (Thailand).

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

Summary of Measurement Result :

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

Cert. No. : ACL24228
Job No. : VC67AC0127
Pages : 3 of 8

T. Petchur

T. Petchur

Cert. No. : ACL24228
Job No. : VC67AC0127
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.6

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

Frequency Weighting	Weighting (dB)
A - weight	9.9
C - weight	16.7
Flat	22.4

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.4	0.4	0.4	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	-1.7	-1.6	-1.6	± 5.0

Cert. No. : ACL24228
Job No. : VC67AC0127
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	-0.1	± 2.0
125	0.0	0.0	-0.1	± 1.5
250	0.0	0.0	-0.1	± 1.5
500	0.0	0.0	-0.1	± 1.5
1000	0.0	0.0	0.0	± 1.0
2000	0.0	0.0	0.0	± 2.0
4000	0.0	0.0	0.0	± 3.0
8000	0.0	0.0	0.0	± 5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

Cert. No. : ACL24228
Job No. : VC67AC0127
Pages : 6 of 8Cert. No. : ACL24228
Job No. : VC67AC0127
Pages : 7 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.1	0.1	± 1.1
136.0	136.1	0.1	± 1.1
135.0	135.1	0.1	± 1.1
134.0	134.1	0.1	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.1	0.1	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.1	0.1	± 1.1
114.0	114.1	0.1	± 1.1
109.0	109.1	0.1	± 1.1
104.0	104.1	0.1	± 1.1
99.0	99.1	0.1	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.1	0.1	± 1.1
27.0	27.0	0.0	± 1.1
26.0	26.1	0.1	± 1.1
25.0	25.1	0.1	± 1.1

8. Level linearity including the level range control

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

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	± 3.0
One	136.4	135.3	-1.1	± 3.0

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

Cert. No. : ACL24228
Job No. : VC67AC0127
Pages : 8 of 8Cert. No. : ACL25082
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11. Overload indication

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

12. High level stability

Frequency	SLM Display at Initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Weighting				
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

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-52A / Microphone UC-59 / Preamplifier NH-25
Serial No.: 01120937 / 21845 / 22326
ID No.: RYG JS0628

Condition As Found : GOOD

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

Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %
Received Date : 07 JANUARY 2025
Calibration Date : 21 - 23 JANUARY 2025
Date of Issue : 24 JANUARY 2025

REVIEW BY:	
APPROVED BY:	
NEXT CAL DATE:	31/01/2026

Calibrated by : Nuthakorn Pisutpaisan

Approved by :
(Thanakul Peichurai)

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

Cert. No. : ACL25082
Job No. : VC68AC0059
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

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

Cert. No. : ACL25082
Job No. : VC68AC0059
Pages : 3 of 8

Summary of Measurement Result :

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

Cert. No. : ACL25082
Job No. : VC68AC0059
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
13.8

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

Frequency Weighting	Weighting (dB)
A - weight	10.8
C - weight	14.2
Flat	19.8

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.0
1000	0.2	0.2	0.2	± 0.7
8000	0.4	0.4	0.4	+ 1.5, - 2.5

Cert. No. : ACL25082
Job No. : VC68AC0059
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	0.0	0.0	±1.0
125	0.0	0.0	0.0	±1.0
250	0.0	0.0	-0.1	±1.0
500	0.0	0.0	-0.1	±1.0
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	0.0	0.1	0.1	+ 1.5, - 2.5
16000	0.0	-1.2	-1.2	+ 2.5, -16.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.1

Cert. No. : ACL25082
Job No. : VC68AC0059
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±0.8
136.0	136.0	0.0	±0.8
135.0	135.0	0.0	±0.8
134.0	134.0	0.0	±0.8
133.0	132.9	-0.1	±0.8
132.0	131.9	-0.1	±0.8
131.0	130.9	-0.1	±0.8
129.0	129.0	0.0	±0.8
124.0	124.0	0.0	±0.8
119.0	119.0	0.0	±0.8
114.0	114.0	0.0	±0.8
109.0	109.0	0.0	±0.8
104.0	104.0	0.0	±0.8
99.0	99.0	0.0	±0.8
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	34.0	0.0	±0.8
30.0	30.0	0.0	±0.8
29.0	29.0	0.0	±0.8
28.0	28.0	0.0	±0.8
27.0	27.0	0.0	±0.8
26.0	26.0	0.0	±0.8
25.0	25.1	0.1	±0.8

Cert. No. : ACL25082
Job No. : VC68AC0059
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±0.8

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±0.8

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	1.0 ; -3.0
	2	8	117.0	117.0	0.0	1.0 ; -1.5
	200	800	134.0	134.0	0.0	±0.5
Slow	2	8	108.0	108.0	0.0	1.0 ; -3.0
	200	800	127.6	127.6	0.0	±0.5
SEL	0.25	1	99.0	98.9	-0.1	1.0 ; -3.0
	2	8	108.0	108.0	0.0	1.0 ; -1.5
	200	800	128.0	128.0	0.0	±0.5

Cert. No. : ACL25082
Job No. : VC68AC0059
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±2.0
One	133.4	133.4	0.0	±2.0

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	±1.0
Positive half cycle	135.4	135.2	-0.2	±1.0
Negative half cycle	135.4	135.2	-0.2	±1.0

11. Overload indication

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

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.1

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

End of Calibration Certificate

T. Petchum

Cert. No. : ACL25083
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-52A / Microphone UC-59 / Preamplifier NH-35
Serial No.: 01120938 / 21888 / 22327
ID No.: RYG FS0629

Condition As Found : GOOD

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

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

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

Calibrated by : Natsakorn 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.

Cert. No. : ACL25083
Job No. : VC68AC0059
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC-61672-2 (2013) standard for sound level meter (SLM).
The SLM had test to Acoustical and Electrical signal tests of frequency weighting with Acoustic 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 Instruments

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EP-0009-24	05-FEB-25
Waveform Generator	33511B	MY52102742	EU-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-BF 21/0267	15-FEB-25
Digital Multimeter	33461A	MY53220076	EEL-BF 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL-BF 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EP-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAJ	34560495	AA-1001-24	05-FEB-25

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

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

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

T. Petchum

Cert. No. : ACL25083
Job No. : VC68AC0059
Pages : 3 of 8

Summary of Measurement Result :

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

T. Petchum

Cert. No. : ACL25083
Job No. : VC68AC0059
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limits (dB)
93.9 (93.94)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.6

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

Frequency Weighting	Weighting (dB)
A - weight	9.9
C - weight	14.5
Flat	20.2

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.0
1000	0.2	0.2	0.2	± 0.7
8000	1.0	1.0	1.0	+1.5, -2.5

Cert. No. : ACL25083
Job No. : VC68AC0059
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	-0.1	±1.0
125	-0.1	0.0	-0.1	±1.0
250	0.0	-0.1	-0.1	±1.0
500	0.0	0.0	-0.1	±1.0
1000	0.0	0.0	0.0	±1.0
2000	-0.1	0.0	0.0	±1.0
4000	-0.1	0.0	0.0	±1.0
8000	0.0	0.0	0.0	+1.5, -2.5
16000	-0.1	-1.3	-1.2	+2.5, -16.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.1

Cert. No. : ACL25083
Job No. : VC68AC0059
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±0.8
136.0	136.0	0.0	±0.8
135.0	135.0	0.0	±0.8
134.0	134.0	0.0	±0.8
133.0	133.0	0.0	±0.8
132.0	132.0	0.0	±0.8
131.0	131.0	0.0	±0.8
129.0	129.0	0.0	±0.8
124.0	124.0	0.0	±0.8
119.0	119.1	0.1	±0.8
114.0	114.0	0.0	±0.8
109.0	109.0	0.0	±0.8
104.0	104.1	0.1	±0.8
99.0	99.0	0.0	±0.8
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	34.0	0.0	±0.8
30.0	30.0	0.0	±0.8
29.0	28.9	-0.1	±0.8
28.0	28.0	0.0	±0.8
27.0	27.0	0.0	±0.8
26.0	25.9	-0.1	±0.8
25.0	25.0	0.0	±0.8

Cert. No. : ACL25083
Job No. : VC68AC0059
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±0.8

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±0.8

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	1.0; -3.0
	2	8	117.0	116.9	-0.1	1.0; -1.5
	200	800	134.0	134.0	0.0	±0.5
Slow	2	8	108.0	107.9	-0.1	1.0; -3.0
	200	800	127.6	127.5	-0.1	±0.5
SEL	0.25	1	99.0	98.8	-0.2	1.0; -3.0
	2	8	108.0	107.9	-0.1	1.0; -1.5
	200	800	128.0	128.0	0.0	±0.5

Cert. No. : AC125483
Job No. : VC68AC.0059
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Leq (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±2.0
One	133.4	133.3	-0.1	±2.0

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	±1.0
Positive half cycle	135.4	135.2	-0.2	±1.0
Negative half cycle	135.4	135.2	-0.2	±1.0

11. Overload indication

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

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.1

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

J
NAC
JIRANATEE ASSOCIATES CO., LTD.J
NAC
JIRANATEE ASSOCIATES CO., LTD.Accredited calibration laboratory
ISO/IEC 17025:2017
NSC-TIS-TIS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No. : CDT-216-67

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS RECEIVED
CUSTOMERHeat Stress Monitor
Delta OHM
HD32.2
15006713
RVG-F50218
Used Item
ALS Laboratory group (Thailand) Co., Ltd.
104 Phatthanasukan 40, Phatthanasukan Rd.,
Khuang Suan Luang, Khut Suan Luang,
Bangkok 10250 Thailand.RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE11 Dec 2024
20 Dec 2024
23 Dec 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

REVIEW BY: S.T.S.

APPROVED BY: S.T.S.

NEXT CAL DATE: 30/12/25

Calibrated by:
Mr. Satech Thunthulak
T.M. Satech Thunthulak
T.M. Satech ThunthulakJ
NAC
JIRANATEE ASSOCIATES CO., LTD.Approved signature: Mr. Panyai Ratchachon
Calibration Department ManagerTHIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED
IN WRITING FROM THE LABORATORY

Continuation of Certificate of Calibration Number CDT-216-67

Page 2 of 2 pages

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 °C to 60 °C

Examination

Table 1: This equipment was examined with wet bulb probe Model: H9901-2, S/N: 100000000.
Diameter: Diameter 3.3 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	DRG Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.052	20.2	0.1	0.099
30	25.061	25.2	0.1	0.102
30	30.073	30.2	0.1	0.107
30	35.085	35.2	0.1	0.109
30	40.094	40.1	0.1	0.112

Table 2: This equipment was examined with dry bulb probe Model: H9901-2, S/N: 100000000.
Diameter: Diameter 3.3 mm, Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	DRG Reading (°C)	Error (°C)	Uncertainty (°C)
100	20.052	20.2	0.1	0.099
100	25.061	25.2	0.1	0.102
100	30.073	30.2	0.1	0.107
100	35.085	35.2	0.1	0.109
100	40.094	40.2	0.1	0.112

Table 3: This equipment was examined with dry bulb probe Model: H9901-2, S/N: 100000000.
Diameter: Diameter 16 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	DRG Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.052	20.2	0.1	0.100
75	25.061	25.2	0.1	0.103
75	30.073	30.2	0.1	0.108
75	35.085	35.2	0.1	0.110
75	40.094	40.2	0.1	0.113

Table 4: This equipment was examined with dry bulb probe Model: H9901-2, S/N: 100000000.
Diameter: Diameter 16 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	DRG Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.052	20.2	0.1	0.100
75	25.061	25.2	0.1	0.103
75	30.073	30.2	0.1	0.108
75	35.085	35.2	0.1	0.110
75	40.094	40.2	0.1	0.113

End of Continuation of Calibration

J
NAC
JIRANATEE ASSOCIATES CO., LTD.Jiranatee Associates Co., Ltd.
6/11-15, 6/201-30,
Phatthanasukan 1/1, 1/2, 1/3, 1/4, 1/5, 1/6, 1/7, 1/8, 1/9, 1/10, 1/11, 1/12, 1/13, 1/14, 1/15, 1/16, 1/17, 1/18, 1/19, 1/20, 1/21, 1/22, 1/23, 1/24, 1/25, 1/26, 1/27, 1/28, 1/29, 1/30, 1/31, 1/32, 1/33, 1/34, 1/35, 1/36, 1/37, 1/38, 1/39, 1/40, 1/41, 1/42, 1/43, 1/44, 1/45, 1/46, 1/47, 1/48, 1/49, 1/50, 1/51, 1/52, 1/53, 1/54, 1/55, 1/56, 1/57, 1/58, 1/59, 1/60, 1/61, 1/62, 1/63, 1/64, 1/65, 1/66, 1/67, 1/68, 1/69, 1/70, 1/71, 1/72, 1/73, 1/74, 1/75, 1/76, 1/77, 1/78, 1/79, 1/80, 1/81, 1/82, 1/83, 1/84, 1/85, 1/86, 1/87, 1/88, 1/89, 1/90, 1/91, 1/92, 1/93, 1/94, 1/95, 1/96, 1/97, 1/98, 1/99, 1/100, 1/101, 1/102, 1/103, 1/104, 1/105, 1/106, 1/107, 1/108, 1/109, 1/110, 1/111, 1/112, 1/113, 1/114, 1/115, 1/116, 1/117, 1/118, 1/119, 1/120, 1/121, 1/122, 1/123, 1/124, 1/125, 1/126, 1/127, 1/128, 1/129, 1/130, 1/131, 1/132, 1/133, 1/134, 1/135, 1/136, 1/137, 1/138, 1/139, 1/140, 1/141, 1/142, 1/143, 1/144, 1/145, 1/146, 1/147, 1/148, 1/149, 1/150, 1/151, 1/152, 1/153, 1/154, 1/155, 1/156, 1/157, 1/158, 1/159, 1/160, 1/161, 1/162, 1/163, 1/164, 1/165, 1/166, 1/167, 1/168, 1/169, 1/170, 1/171, 1/172, 1/173, 1/174, 1/175, 1/176, 1/177, 1/178, 1/179, 1/180, 1/181, 1/182, 1/183, 1/184, 1/185, 1/186, 1/187, 1/188, 1/189, 1/190, 1/191, 1/192, 1/193, 1/194, 1/195, 1/196, 1/197, 1/198, 1/199, 1/200, 1/201, 1/202, 1/203, 1/204, 1/205, 1/206, 1/207, 1/208, 1/209, 1/210, 1/211, 1/212, 1/213, 1/214, 1/215, 1/216, 1/217, 1/218, 1/219, 1/220, 1/221, 1/222, 1/223, 1/224, 1/225, 1/226, 1/227, 1/228, 1/229, 1/230, 1/231, 1/232, 1/233, 1/234, 1/235, 1/236, 1/237, 1/238, 1/239, 1/240, 1/241, 1/242, 1/243, 1/244, 1/245, 1/246, 1/247, 1/248, 1/249, 1/250, 1/251, 1/252, 1/253, 1/254, 1/255, 1/256, 1/257, 1/258, 1/259, 1/260, 1/261, 1/262, 1/263, 1/264, 1/265, 1/266, 1/267, 1/268, 1/269, 1/270, 1/271, 1/272, 1/273, 1/274, 1/275, 1/276, 1/277, 1/278, 1/279, 1/280, 1/281, 1/282, 1/283, 1/284, 1/285, 1/286, 1/287, 1/288, 1/289, 1/290, 1/291, 1/292, 1/293, 1/294, 1/295, 1/296, 1/297, 1/298, 1/299, 1/300, 1/301, 1/302, 1/303, 1/304, 1/305, 1/306, 1/307, 1/308, 1/309, 1/310, 1/311, 1/312, 1/313, 1/314, 1/315, 1/316, 1/317, 1/318, 1/319, 1/320, 1/321, 1/322, 1/323, 1/324, 1/325, 1/326, 1/327, 1/328, 1/329, 1/330, 1/331, 1/332, 1/333, 1/334, 1/335, 1/336, 1/337, 1/338, 1/339, 1/340, 1/341, 1/342, 1/343, 1/344, 1/345, 1/346, 1/347, 1/348, 1/349, 1/350, 1/351, 1/352, 1/353, 1/354, 1/355, 1/356, 1/357, 1/358, 1/359, 1/360, 1/361, 1/362, 1/363, 1/364, 1/365, 1/366, 1/367, 1/368, 1/369, 1/370, 1/371, 1/372, 1/373, 1/374, 1/375, 1/376, 1/377, 1/378, 1/379, 1/380, 1/381, 1/382, 1/383, 1/384, 1/385, 1/386, 1/387, 1/388, 1/389, 1/390, 1/391, 1/392, 1/393, 1/394, 1/395, 1/396, 1/397, 1/398, 1/399, 1/400, 1/401, 1/402, 1/403, 1/404, 1/405, 1/406, 1/407, 1/408, 1/409, 1/410, 1/411, 1/412, 1/413, 1/414, 1/415, 1/416, 1/417, 1/418, 1/419, 1/420, 1/421, 1/422, 1/423, 1/424, 1/425, 1/426, 1/427, 1/428, 1/429, 1/430, 1/431, 1/432, 1/433, 1/434, 1/435, 1/436, 1/437, 1/438, 1/439, 1/440, 1/441, 1/442, 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1/729, 1/730, 1/731, 1/732, 1/733, 1/734, 1/735, 1/736, 1/737, 1/738, 1/739, 1/740, 1/741, 1/742, 1/743, 1/744, 1/745, 1/746, 1/747, 1/748, 1/749, 1/750, 1/751, 1/752, 1/753, 1/754, 1/755, 1/756, 1/757, 1/758, 1/759, 1/760, 1/761, 1/762, 1/763, 1/764, 1/765, 1/766, 1/767, 1/768, 1/769, 1/770, 1/771, 1/772, 1/773, 1/774, 1/775, 1/776, 1/777, 1/778, 1/779, 1/780, 1/781, 1/782, 1/783, 1/784, 1/785, 1/786, 1/787, 1/788, 1/789, 1/790, 1/791, 1/792, 1/793, 1/794, 1/795, 1/796, 1/797, 1/798, 1/799, 1/800, 1/801, 1/802, 1/803, 1/804, 1/805, 1/806, 1/807, 1/808, 1/809, 1/810, 1/811, 1/812, 1/813, 1/814, 1/815, 1/816, 1/817, 1/818, 1/819, 1/820, 1/821, 1/822, 1/823, 1/824, 1/825, 1/826, 1/827, 1/828, 1/829, 1/830, 1/831, 1/832, 1/833, 1/834, 1/835, 1/836, 1/837, 1/838, 1/839, 1/840, 1/841, 1/842, 1/843, 1/844, 1/845, 1/846, 1/847, 1/848, 1/849, 1/850, 1/851, 1/852, 1/853, 1/854, 1/855, 1/856, 1/857, 1/858, 1/859, 1/860, 1/861, 1/862, 1/863, 1/864, 1/865, 1/866, 1/867, 1/868, 1/869, 1/870, 1/871, 1/872, 1/873, 1/874, 1/875, 1/876, 1/877, 1/878, 1/879, 1/880, 1/881, 1/882, 1/883, 1/884, 1/885, 1/886, 1/887, 1/888, 1/889, 1/890, 1/891, 1/892, 1/893, 1/894, 1/895, 1/896, 1/897, 1/898, 1/899, 1/900, 1/901, 1/902, 1/903, 1/904, 1/905, 1/906, 1/907, 1/908, 1/909, 1/910, 1/911, 1/912, 1/913, 1/914, 1/915, 1/916, 1/917, 1/918, 1/919, 1/920, 1/921, 1/922, 1/923, 1/924, 1/925, 1/926, 1/927, 1/928, 1/929, 1/930, 1/931, 1/932, 1/933, 1/934, 1/935, 1/936, 1/937, 1/938, 1/939, 1/940, 1/941, 1/942, 1/943, 1/944, 1/945, 1/946, 1/947, 1/948, 1/949, 1/950, 1/951, 1/952, 1/953, 1/954, 1/955, 1/956, 1/957, 1/958, 1/959, 1/960, 1/961, 1/962, 1/963, 1/964, 1/965, 1/966, 1/967, 1/968, 1/969, 1/970, 1/971, 1/972, 1/973, 1/974, 1/975, 1/976, 1/977, 1/978, 1/979, 1/980, 1/981, 1/982, 1/983, 1/984, 1/985, 1/986, 1/987, 1/988, 1/989, 1/990, 1/991, 1/992, 1/993, 1/994, 1/995, 1/996, 1/997, 1/998, 1/999, 1/1000, 1/1001, 1/1002, 1/1003, 1/1004, 1/1005, 1/1006, 1/1007, 1/1008, 1/1009, 1/1010, 1/1011, 1/1012, 1/1013, 1/1014, 1/1015, 1/1016, 1/1017, 1/1018, 1/1019, 1/1020, 1/1021, 1/1022, 1/1023, 1/1024, 1/1025, 1/1026, 1/1027, 1/1028, 1/1029, 1/1030, 1/1031, 1/1032, 1/1033, 1/1034, 1/1035, 1/1036, 1/1037, 1/1038, 1/1039, 1/1040, 1/1041, 1/1042, 1/1043, 1/1044, 1/1045, 1/1046, 1/1047, 1/1048, 1/1049, 1/1050, 1/1051, 1/1052, 1/1053, 1/1054, 1/1055, 1/1056, 1/1057, 1/1058, 1/1059, 1/1060, 1/1061, 1/1062, 1/1063, 1/1064, 1/1065, 1/1066, 1/1067, 1/1068, 1/1069, 1/1070, 1/1071, 1/1072, 1/1073, 1/1074, 1/1075, 1/1076, 1/1077, 1/1078, 1/1079, 1/1080, 1/1081, 1/1082, 1/1083, 1/1084, 1/1085, 1/1086, 1/1087, 1/1088, 1/1089, 1/1090, 1/1091, 1/1092, 1/1093, 1/1094, 1/1095, 1/1096, 1/1097, 1/1098, 1/1099, 1/1100, 1/1101, 1/1102, 1/1103, 1/1104, 1/1105, 1/1106, 1/1107, 1/1108, 1/1109, 1/1110, 1/1111, 1/1112, 1/1113, 1/1114, 1/1115, 1/1116, 1/1117,

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Ranges: 20 °C to 40 °C

Functions:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2, S/N: J2035270.
Dimension: Diameter 3.3 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.068	20.1	0.0	0.099
80	25.059	25.1	0.0	0.099
80	30.050	30.1	0.1	0.099
80	35.042	35.1	0.1	0.099
80	40.036	40.1	0.1	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2, S/N: J2035467.
Dimension: Diameter 3.3 mm, Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.067	20.1	0.0	0.099
110	25.059	25.1	0.1	0.16
110	30.050	30.2	0.1	0.099
110	35.042	35.2	0.2	0.099
110	40.036	40.2	0.2	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2, S/N: J5015495.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.067	20.3	0.2	0.075
75	25.059	25.2	0.1	0.079
75	30.050	30.1	0.1	0.077
75	35.042	35.1	0.1	0.079
75	40.036	40.0	0.0	0.079

UUC: Uncertainty Calibration

Remark: The reported uncertainty of measurement is 0.16, based on standard uncertainty multiplied by a coverage factor k=2 (95% confidence level) of approximately 0.95%.

End of Certificate of Calibration



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

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

CERTIFICATE OF CALIBRATION

Certificate No.: CDT-217-67

MEASUREMENT ITEM
MANUFACTURER : Heat Stress Monitor
MODEL/TYPE : Delta OHM
SERIAL NUMBER : H032.2
ID NUMBER : S5006735
CONDITION AS-RECEIVED : RYG, F50220
CUSTOMER : Used item
ALS laboratory group (thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand

RECEIVED DATE : 11 Dec 2024
MEASUREMENT DATE : 20 Dec 2024
ISSUE DATE : 23 Dec 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values

REVIEW BY: *[Signature]*
APPROVED BY: *[Signature]*
NEXT CAL DATE: 20 /12 /25



Approved signature: *[Signature]*
Jirananate Associates Co., Ltd.
Calibration Department

Calibration procedure:
The temperature calibration is carried out by using calibration method as follows according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature probe was based on ITS-90.

Traceability:
The reported uncertainty of measurement is based on the standard uncertainty of units (SI) through National Institute of Metrology (NIM) Calibration number: 17-0017-24, Certificate number: 17-0017-24.

Reference Used During Calibration:
1. Standard Temperature Probe Model: S15 100 ASQ, Serial No: 167822-09, Due date: 26 Mar 2025
2. Digital Temperature Indicator Model: D11 3100 A MK II, Serial No: 671467, 9591 Due date: 21 Oct 2025.

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.

THIS CERTIFICATE OF CALIBRATION 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 Ranges: 20 °C to 40 °C

Functions:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2, S/N: J2035270.
Dimension: Diameter 3.3 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.067	20.0	-0.1	0.099
80	25.059	25.0	-0.1	0.099
80	30.050	30.0	-0.1	0.099
80	35.042	35.0	-0.0	0.099
80	40.036	40.0	-0.0	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2, S/N: J2035467.
Dimension: Diameter 3.3 mm, Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.067	20.0	-0.1	0.099
110	25.059	25.0	-0.1	0.099
110	30.050	30.0	-0.1	0.099
110	35.042	35.1	0.1	0.099
110	40.036	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2, S/N: J5015495.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.067	20.2	0.1	0.075
75	25.059	25.2	0.1	0.079
75	30.050	30.1	0.1	0.077
75	35.042	35.1	0.1	0.079
75	40.036	40.0	0.0	0.079

UUC: Uncertainty Calibration

End of Certificate of Calibration



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

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

CERTIFICATE OF CALIBRATION

Certificate No.: CDT-034-68

MEASUREMENT ITEM
MANUFACTURER : Heat Stress Monitor
MODEL/TYPE : Delta OHM
SERIAL NUMBER : H032.2
ID NUMBER : S5006720
CONDITION AS-RECEIVED : RYG, F50224
CUSTOMER : Used item
ALS laboratory group (thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand

RECEIVED DATE : 17 Jan 2025
MEASUREMENT DATE : 27 Jan 2025
ISSUE DATE : 29 Jan 2025

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values

REVIEW BY: *[Signature]*
APPROVED BY: *[Signature]*
NEXT CAL DATE: 27 /1 /2025



Approved signature: *[Signature]*
Jirananate Associates Co., Ltd.
Calibration Department

Calibration procedure:
The temperature calibration is carried out by using calibration method as follows according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature probe was based on ITS-90.

Traceability:
The reported uncertainty of measurement is based on the standard uncertainty of units (SI) through National Institute of Metrology (NIM) Calibration number: 17-0017-24, Certificate number: 17-0017-24.

Reference Used During Calibration:
1. Standard Temperature Probe Model: S15 100 ASQ, Serial No: 167822-09, Due date: 26 Mar 2025
2. Digital Temperature Indicator Model: D11 3100 A MK II, Serial No: 671467, 9591 Due date: 21 Oct 2025.

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.

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

Result of Calibration: 50 Without Adjustment 11 With Adjustment

Calibration Range: 20 °C to 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2, S/N: 15015854.
Dimension: Diameter 3.3 mm, Length 120 mm.

Immersion Depth (mm)	Standard Reading (°C)	MUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.067	19.7	-0.4	0.093
80	25.060	24.7	-0.4	0.093
80	30.051	29.7	-0.4	0.093
80	35.041	34.7	-0.3	0.093
80	40.028	39.6	-0.4	0.093

Table 2: This equipment was connected with Glove thermometer probe Model: TP3275.2, S/N: 20008275.
Dimension: Diameter 3.3 mm, Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	MUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.068	20.1	0.0	0.093
110	25.060	25.1	0.0	0.099
110	30.051	30.1	0.0	0.093
110	35.040	35.1	0.1	0.099
110	40.028	40.2	0.1	0.16

Table 3: This equipment was connected with temperature probe Model: TP3202.2, S/N: 15015498.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	MUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.066	20.3	0.2	0.099
75	25.060	25.2	0.1	0.099
75	30.051	30.1	0.0	0.099
75	35.040	35.1	0.1	0.099
75	40.028	40.0	0.0	0.099

UUC's (Unc) Under Calibration:

Remark: The reported uncertainty of measurement is 0.16, based on standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

End of Certificate of Calibration



Thiraneer Associates Co., Ltd.
6/16-15, 8/F, 108
Pattana 225, 2nd Floor, Bangkok
Bangkok 10000, Thailand
Tel: +662-0089112
Mobile: +662-0089113
E-mail: jiracalibration@jiracal.com
Web site: www.jiracal.com

Accredited calibration laboratory
ISO/IEC 17025:2017
MSC-TIS-TIS 17025
CALIBRATION 0367
Temperature measurement laboratory
Calibration services department



CERTIFICATE OF CALIBRATION

Certificate No.: COT-035-68

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS RECEIVED
CUSTOMER

: Heat Stress Monitor
: Delta OHM
: HD32.2
: 15006726
: RYG_F50226
: Used item
: ALS laboratory group (Thailand) Co., Ltd.
: 104 Phatthanakan 40, Phatthanakan Rd.,
: Khwaeng Soan Luang, Khet Soan Luang,
: Bangkok 10250 Thailand.

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

: 17 Jan 2025
: 27 Jan 2025
: 29 Jan 2025

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

REVIEW BY: *Spt S*
APPROVED BY: *[Signature]*
NEXT CAL DATE: 29 Oct 2026



Approved signature:

[Signature]
Mr. Panyia Booncharoen
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

Result of Calibration: 50 Without Adjustment 11 With Adjustment

Calibration Range: 20 °C to 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2, S/N: 15015841.
Dimension: Diameter 3.3 mm, Length 120 mm.

Immersion Depth (mm)	Standard Reading (°C)	MUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.067	20.1	0.0	0.16
80	25.060	25.0	-0.1	0.099
80	30.050	30.0	-0.1	0.099
80	35.041	35.0	0.0	0.099
80	40.028	40.0	0.0	0.099

Table 2: This equipment was connected with Glove thermometer probe Model: TP3275.2, S/N: 20008282.
Dimension: Diameter 3.3 mm, Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	MUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.067	20.1	0.0	0.093
110	25.060	25.1	0.0	0.099
110	30.051	30.1	0.0	0.16
110	35.041	35.1	0.1	0.099
110	40.028	40.0	0.0	0.099

Table 3: This equipment was connected with temperature probe Model: TP3202.2, S/N: 15015494.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	MUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.067	20.2	0.1	0.099
75	25.060	25.0	0.1	0.099
75	30.051	30.0	-0.2	0.099
75	35.041	34.9	-0.1	0.099
75	40.028	39.7	-0.2	0.099

UUC's (Unc) Under Calibration:

Remark: The reported uncertainty of measurement is 0.16, based on standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

End of Certificate of Calibration



Thiraneer Associates Co., Ltd.
6/16-15, 8/F, 108
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Accredited calibration laboratory
ISO/IEC 17025:2017
MSC-TIS-TIS 17025
CALIBRATION 0367
Temperature measurement laboratory
Calibration services department



CERTIFICATE OF CALIBRATION

Certificate No.: COT-081-68

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS RECEIVED
CUSTOMER

: Heat Stress Monitor
: Delta OHM
: HD32.2
: 15006714
: RYG_F50219
: Used item
: ALS laboratory group (Thailand) Co., Ltd.
: 104 Phatthanakan 40, Phatthanakan Rd.,
: Khwaeng Soan Luang, Khet Soan Luang,
: Bangkok 10250 Thailand.

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

: 02 Apr 2025
: 09 Apr 2025
: 10 Apr 2025

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

REVIEW BY: *Spt S*
APPROVED BY: *[Signature]*
NEXT CAL DATE: 09 Oct 2026



Approved signature:

[Signature]
Mr. Panyia Booncharoen
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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 °C to 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2, S/N: 22035263.
Dimension: Diameter 3.3 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.057	20.1	0.0	0.099
80	25.047	25.1	0.1	0.099
80	30.039	30.2	0.2	0.099
80	35.029	35.1	0.1	0.099
80	40.019	40.2	0.2	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2, S/N: 17013215.
Dimension: Diameter 3.3 mm, Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.057	20.0	-0.1	0.099
110	25.047	25.0	0.0	0.099
110	30.039	30.0	0.0	0.099
110	35.028	35.0	0.0	0.099
110	40.019	40.0	0.0	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2, S/N: 15015491.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.057	20.2	0.1	0.099
75	25.047	25.1	0.1	0.099
75	30.039	30.0	0.0	0.099
75	35.028	35.0	0.0	0.099
75	40.019	39.8	-0.2	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-217-67

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD37.2
SERIAL NUMBER : 15006715
ID NUMBER : RYG, FS0220
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 11 Dec 2024
MEASUREMENT DATE : 20 Dec 2024
ISSUE DATE : 23 Dec 2024

ENVIRONMENTAL CONDITIONS:
Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

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

REVIEW BY: *[Signature]*
APPROVED BY: *[Signature]*
NEXT CAL DATE: 20 /12/26

Calibrated by:
Mr. Somchai Thairakul
110/4, Jiranan Road, Chonburi
Jiranan Road, Chonburi



Approved signature:
Mr. Pinyan Boonchitorn
Calibration Department

THIS CERTIFICATE OF CALIBRATION 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 °C to 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2, S/N: 1893081.
Dimension: Diameter 3.3 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.057	20.0	-0.1	0.099
80	25.047	25.0	-0.2	0.099
80	30.035	30.0	0.1	0.099
80	35.023	35.0	-0.0	0.099
80	40.015	40.0	0.0	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2, S/N: 16019514.
Dimension: Diameter 3.3 mm, Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.057	20.0	-0.1	0.099
110	25.047	25.0	-0.1	0.099
110	30.035	29.9	-0.1	0.099
110	35.023	35.1	0.1	0.099
110	40.015	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2, S/N: 15015507.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.057	20.2	0.1	0.099
75	25.047	25.2	0.1	0.099
75	30.035	30.0	0.0	0.099
75	35.023	35.0	0.0	0.099
75	40.015	39.9	-0.1	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-034-68

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD37.2
SERIAL NUMBER : 15006720
ID NUMBER : RYG, FS0224
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 17 Jan 2025
MEASUREMENT DATE : 27 Jan 2025
ISSUE DATE : 29 Jan 2025

ENVIRONMENTAL CONDITIONS:
Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

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

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

Calibrated by:
Mr. Somchai Thairakul
110/4, Jiranan Road, Chonburi
Jiranan Road, Chonburi



Approved signature:
Mr. Pinyan Boonchitorn
Calibration Department

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

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

Calibration Range: 20 °C to 60 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3701.2, S/N: 15015454.
Dimension: Diameter 3.3 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.067	19.7	0.4	0.099
80	25.060	24.7	0.4	0.099
80	30.051	29.7	0.4	0.099
80	35.041	34.7	0.3	0.099
80	40.028	39.6	0.4	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2, S/N: 20008279.
Dimension: Diameter 3.3 mm, Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.068	20.1	0.0	0.099
110	25.060	25.3	0.0	0.099
110	30.051	30.1	0.0	0.099
110	35.040	35.1	0.1	0.099
110	40.028	40.2	0.1	0.16

Table 3: This equipment was connected with temperature probe Model: TP3207.2, S/N: 15035408.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.068	20.3	0.2	0.099
75	25.060	25.2	0.1	0.099
75	30.051	30.1	0.0	0.099
75	35.040	35.1	0.1	0.099
75	40.028	40.0	0.0	0.099

UUC (Unc) Data Calibration

Remark: The reported uncertainty of measurement is 0.16, based on standard uncertainty multiplied by a coverage factor $k=2$ (95% probability) providing a level of confidence of approximately 95%.

End of Certificate of Calibration



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

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



CERTIFICATE OF CALIBRATION

Certificate No. : COT-271-67

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 15020735
ID NUMBER : RVG, FS0231
CONDITION AS-RECEIVED : Used Item
CUSTOMER : ALS Laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khuaseng Soan Luang, Khut Soan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE
MEASUREMENT DATE : 11 Dec 2024
ISSUE DATE : 23 Dec 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

REVIEW BY: [Signature]
APPROVED BY: [Signature]
NEXT CAL DATE: 03/12/25



Approved signature: [Signature]
Mr. Panyee Booncharoen
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

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

Calibration Range: 20 °C to 60 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3701.2, S/N: 15033090.
Dimension: Diameter 3.3 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.064	20.1	0.0	0.099
80	25.063	25.3	0.0	0.099
80	30.052	30.1	0.1	0.099
80	35.042	35.0	0.0	0.099
80	40.029	40.0	0.0	0.099

Table 2: This equipment was connected with standard thermometer probe Model: TP3276.2, S/N: 17021316.
Dimension: Diameter 3.3 mm, Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.064	20.1	0.0	0.099
110	25.063	25.1	0.0	0.099
110	30.052	30.1	0.1	0.099
110	35.042	35.1	0.1	0.099
110	40.029	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2, S/N: 15033221.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.060	20.1	0.0	0.099
75	25.063	25.1	0.1	0.099
75	30.052	30.1	0.0	0.099
75	35.042	35.0	0.0	0.099
75	40.029	40.0	0.0	0.099

UUC (Unc) Calibration

End of Certificate of Calibration



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MSC-TIS-TIS 17025
CALIBRATION 0367

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



CERTIFICATE OF CALIBRATION

Certificate No. : COT-082-68

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 15020736
ID NUMBER : RVG, FS0232
CONDITION AS-RECEIVED : Used Item
CUSTOMER : ALS Laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khuaseng Soan Luang, Khut Soan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE
MEASUREMENT DATE : 02 Apr 2025
ISSUE DATE : 09 Apr 2025

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

REVIEW BY: [Signature]
APPROVED BY: [Signature]
NEXT CAL DATE: 03/04/2026



Approved signature: [Signature]
Mr. Panyee Booncharoen
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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 °C to 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2, S/N: 15027737.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.062	20.2	0.1	0.099
80	25.054	25.2	0.1	0.099
80	30.040	30.2	0.2	0.099
80	35.029	35.2	0.2	0.099
80	40.019	40.1	0.1	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2, S/N: 15031164.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.062	20.2	0.1	0.099
110	25.054	25.2	0.1	0.099
110	30.040	30.1	0.1	0.099
110	35.029	35.1	0.1	0.099
110	40.019	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2, S/N: 15015503.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.062	20.2	0.1	0.099
75	25.054	25.0	-0.1	0.099
75	30.040	29.9	-0.1	0.099
75	35.029	34.8	-0.2	0.099
75	40.019	39.7	-0.3	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No.: CDT-088-68

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS RECEIVED
CUSTOMER

Heat Stress Monitor
Delta OHM
HD32.2
20032243
RVG_F50523
Used Item
AIS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khuang Suan Luang, Khut Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

03 Mar 2025
18 Mar 2025
20 Mar 2025

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature: 23.0 ± 3.0 °C
Relative Humidity: 55.0 ± 13.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values

REVIEW BY: *Spt S*

APPROVED BY: *[Signature]*

NEXT CAL DATE: 10/07/2026



Calibrated by:
☐ Mr. Sorawit Thachulad
☒ Miss Jittrapon Lertsomphol
☐ Miss Ruangsamjai Phoommit

Approved signatory: *[Signature]*
Mr. Pailaya Booncharon
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.

BKK_EL0037

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 °C to 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2, S/N: 21001219.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.056	19.9	-0.2	0.099
80	25.050	25.0	0.0	0.099
80	30.032	30.0	0.0	0.099
80	35.019	35.0	0.0	0.099
80	39.996	40.0	0.0	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2, S/N: 22023935.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.056	20.1	0.0	0.099
110	25.050	25.1	0.0	0.099
110	30.032	30.0	0.0	0.099
110	35.019	35.0	0.0	0.099
110	39.996	40.0	0.0	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2, S/N: 21001786.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.056	20.1	0.0	0.099
75	25.050	25.1	0.1	0.099
75	30.032	30.0	0.0	0.099
75	35.019	35.0	0.0	0.099
75	39.996	40.0	0.0	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



Agilent Technologies

Customer Contact:

Agilent Laboratory Group (Thailand) Co., Ltd. Head Office
104 Phatthanakan 40, Phatthanakan Rd.
Khuang Suan Luang, Khut Suan Luang
TAX ID: 010554000899
chanatapan.lertsomphol@agilent.com
27803065

Invoice To:

Agilent Laboratory Group (Thailand) Co., Ltd. Head Office
104 Phatthanakan 40, Phatthanakan Rd.
Khuang Suan Luang, Khut Suan Luang

Delivery Site:

Agilent Laboratory Group (Thailand) Co., Ltd. Head Office
104 Phatthanakan 40, Phatthanakan Rd.
Khuang Suan Luang, Khut Suan Luang

Location:

Room
Bldg
Lvl
Dept

SERVICE REPORT

Customer Purchase Order Number:	Customer Number:
78371015	78371015
Service Request:	Service Request Date:
Service Order:	Service Confirmation:
880662061	880662061

REVIEW BY: *[Signature]*

APPROVED BY: *[Signature]*

NEXT CAL DATE: 13 Jan 2026

Direct Inquiries to:

Contact Name: Customer CONTACT 201901
Contact E-mail: noc-sa@agilent.com
Contact Telephone: +662 837 8363
Contact Fax: +662 837 8321

Agilent Laboratory Group (Thailand) Co., Ltd. Head Office
104 Phatthanakan 40, Phatthanakan Rd.
Khuang Suan Luang, Khut Suan Luang
TAX ID: 010554000899
chanatapan.lertsomphol@agilent.com
27803065

Service Instrument:

Model Number	Model Description	Serial Number	System Handle	Parent Asset
SYS-ID-5100	ICP-OES 5100/5110 System			
G8010A	Agilent 5100 SVDV ICP-OES Spectrometer	MY10010005	ICP OES 5100	SYS-ID-5100
G8410A	SPS 4 Autosampler	ALI15440764	ICP OES 5100	SYS-ID-5100

Service Items:

Item	Service/Part #	Description	Qty	Entitlement	Service Start	Service End
1000	EQO	Enterprise Operational Qualification	1.00	Agreement Entitlement 100 % covered	22.09.2024	23.09.2024
1010	661030100	Bottle ICP-OES Wavecal soln 500mL 5 ppm	1.00	Agreement Entitlement 100 % covered		
1020	5190-7001	Calibration blank solution Spect HVD3	1.00	Agreement Entitlement 100 % covered		

Additional Information:

Service Information:

Problem Description: WU-00-5100-5001253655		
Service Provided: Complete OQ/OV 5100/CP/OES Equipment ID: BKK_EL0037, all test passed		
Service Overview Code: Reason Code: Scheduled Service Diagnosis Code: Scheduled Service Resolution Code: Scheduled Service		
Reported Hours: 4.0	Travel Hours: 2.0	
Customer Field Service Representative Name: Sowan Onkhom	Customer Field Service Representative Signature: 	Date: 23 Sep 2024
Customer Name: CHANATTAGARN IMCHOM	Customer Signature: 	Date: 23 Sep 2024
Additional Comments:		



Metrological Center

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Certificate No. T231676

Page 1 of 6

Certificate of Calibration

Equipment : HEATING BLOCK
Manufacturer : Environmental Express
Model : SC 196
Serial No. : 6974CECW3285
Customer Code : BKK_EL0054
ID No. : T5306A3
Customer : A.L.S 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 : Sane Musikawan (Site Calibration Manager)
Approved By :  / Sujjar Naknakred (Site Calibration Manager)
Date of Issue : 28 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 in the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

Certificate No. 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-120.

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	1151	T230014	17 January 2024

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center / NSC-TIS-TJS 17625 CALIBRATION (034).


4. Condition of calibrated item : good

Equipment Description

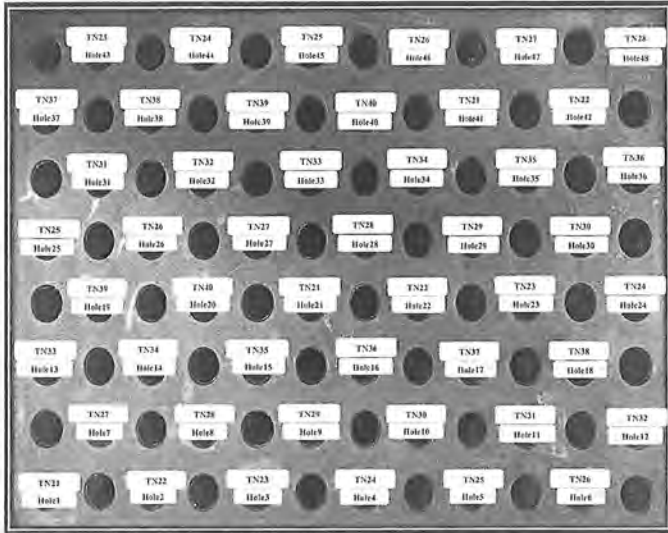
Time Constant : 2 Hour 20 Minute At 95 °C
Fresh Air Damper : ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

☐ without adjustment ☒ after adjustment

Approved By: 

Calibration Report



FRONT CONTROL

Approved By.

FM-L13 106/30-05-57

Calibration Report

Measurement Results		Average Standard Reading at each position (°C)					
Calibration Point		TN21	TN22	TN23	TN24	TN25	TN26
R1 Hole1-Hole6	CAL POINT	Max	95.01	94.41	95.20	95.41	95.17
		Min	94.57	93.95	94.75	94.92	94.60
	Average	94.79	94.18	94.98	95.17	94.26	94.95
R2 Hole7-Hole12	CAL POINT	Max	95.36	95.43	95.19	95.16	95.35
		Min	94.94	94.95	94.72	94.71	94.90
	Average	95.15	95.19	94.96	94.94	95.13	94.77
R3 Hole13-Hole18	CAL POINT	Max	95.37	95.50	95.25	95.21	95.33
		Min	94.99	95.09	94.78	94.87	94.96
	Average	95.18	95.30	95.00	95.02	95.11	95.13
R4 Hole19-Hole24	CAL POINT	Max	95.59	94.42	94.52	94.24	94.63
		Min	95.21	94.06	94.13	93.88	94.28
	Average	95.40	94.24	94.33	94.06	94.45	94.47
R5 Hole25-Hole30	CAL POINT	Max	95.19	95.38	92.93	95.30	95.14
		Min	94.83	95.03	92.56	94.95	94.79
	Average	95.01	95.20	92.75	95.12	94.96	94.87
R6 Hole31-Hole36	CAL POINT	Max	94.63	94.90	94.77	94.31	94.24
		Min	94.24	94.55	94.44	93.98	93.92
	Average	94.43	94.72	94.60	94.14	94.08	93.71
R7 Hole37-Hole42	CAL POINT	Max	94.30	94.44	94.04	93.81	94.89
		Min	93.95	94.05	93.67	93.48	94.39
	Average	94.13	94.24	93.86	93.65	94.64	95.12
R8 Hole43-Hole48	CAL POINT	Max	95.99	95.63	95.26	95.29	95.45
		Min	95.57	95.15	94.82	94.84	94.99
	Average	95.78	95.39	95.05	95.07	95.22	94.68

Approved By.

FM-L13 106/30-05-57

Calibration Report

Measurement Results		Average Standard Reading at each position (°C)					
Calibration Point		TN21	TN22	TN23	TN24	TN25	TN26
R1 Hole1-Hole6	CAL POINT	Max	105.23	104.32	105.43	105.25	104.44
		Min	104.94	103.95	105.15	105.04	104.11
	Average	105.09	104.13	105.29	105.15	104.28	105.12
R2 Hole7-Hole12	CAL POINT	Max	105.30	105.12	105.18	105.22	105.12
		Min	105.11	104.92	104.96	105.06	104.92
	Average	105.20	105.02	105.07	105.11	105.02	105.06
R3 Hole13-Hole18	CAL POINT	Max	105.37	105.63	105.02	104.80	104.69
		Min	105.17	105.37	104.75	104.59	104.50
	Average	105.27	105.50	104.88	104.69	104.60	105.09
R4 Hole19-Hole24	CAL POINT	Max	105.31	104.43	106.41	104.71	105.63
		Min	105.08	104.22	106.15	104.41	105.37
	Average	105.19	104.33	106.28	104.56	105.50	105.69
R5 Hole25-Hole30	CAL POINT	Max	104.95	106.26	107.34	105.78	105.58
		Min	104.67	105.96	105.03	105.56	105.36
	Average	104.81	106.11	105.21	105.67	105.48	105.77
R6 Hole31-Hole36	CAL POINT	Max	104.75	104.86	104.80	105.20	104.50
		Min	104.54	104.63	104.59	105.00	104.22
	Average	104.65	104.75	104.69	105.10	104.61	104.28
R7 Hole37-Hole42	CAL POINT	Max	104.30	104.80	104.85	104.65	104.88
		Min	104.09	104.72	104.66	104.49	104.63
	Average	104.19	104.81	104.75	104.57	104.76	104.68
R8 Hole43-Hole48	CAL POINT	Max	105.71	105.85	105.39	105.61	105.42
		Min	105.45	105.61	105.14	105.27	105.18
	Average	105.58	105.73	105.27	105.44	105.30	105.07

Approved By.

FM-L13 106/30-05-57

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 106/30-05-57



Metrological Center

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Certificate No. T250355

Page 1 of 6

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 : 26 February 2025
Calibrated By : Atiphong Rongrat (Technician)
Approved By : Boonchai Suriyawong (Site Calibration Manager)
Date of Issue : 27 MAR 2025



The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-L12 108/30-05-57



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Certificate No. T250355

Page 2 of 6

Calibration Report

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

Condition of this results of calibration :

1. This equipment was calibrated by insert nine standard thermocouples type T into its chamber, the other one standard thermocouples type T use for ambient temperature measurement. The calibration was done in according to WI-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	TN221-TN230	T240712	19 April 2025
TC	TYPE T	TN231-TN240	T240712	19 April 2025
TC	TYPE T	TN241-TN250	T240401	16 March 2025
TC	TYPE T	TN251-TN260	T240401	16 March 2025
DATA LOGGER	34970A	T193	T240401	16 March 2025

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

Equipment Description :

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

5. Adjustment :

() without adjustment (X) after adjustment

Approved By: Boonchai Suriyawong

FM-L13 108/30-05-57



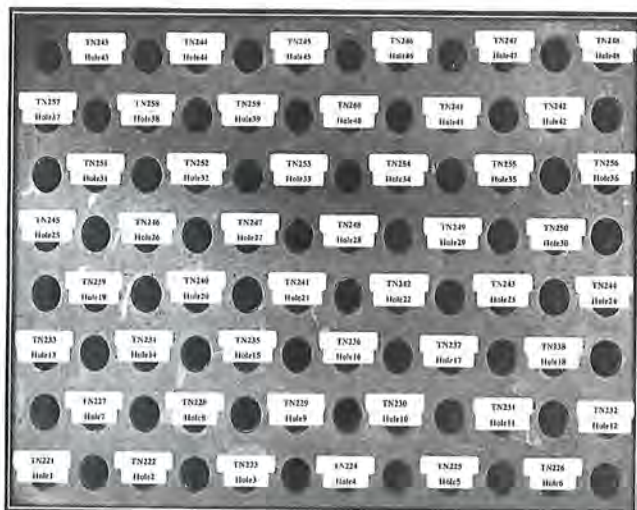
Metrological Center

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Certificate No. T250355

Page 3 of 6

Calibration Report



FRONT CONTROL

Approved By: Boonchai Suriyawong

FM-L12 108/30-05-57



Metrological Center

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Certificate No. T250355

Page 4 of 6

Calibration Report

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)					
R1 Hole1-Hole6	TN221	TN222	TN223	TN224	TN225	TN226
CAL POINT	Max	94.85	95.37	95.03	95.25	94.75
95	Min	94.17	94.66	94.38	94.63	94.87
	Average	94.51	95.02	94.70	94.94	94.43
R2 Hole7-Hole12	TN227	TN228	TN229	TN230	TN231	TN232
	Max	94.71	94.56	94.79	95.32	95.44
	Min	94.05	93.88	94.10	94.65	94.90
	Average	94.38	94.22	94.44	94.99	95.17
R3 Hole13-Hole18	TN233	TN234	TN235	TN236	TN237	TN238
	Max	95.26	95.43	95.40	95.71	95.41
	Min	94.54	94.64	94.71	95.10	94.86
	Average	94.90	95.03	95.06	95.41	95.13
R4 Hole19-Hole24	TN239	TN240	TN241	TN242	TN243	TN244
	Max	95.13	95.06	95.68	96.16	95.35
	Min	94.39	94.43	94.86	95.51	94.88
	Average	94.76	94.75	95.27	95.83	95.12
R5 Hole25-Hole30	TN245	TN246	TN247	TN248	TN249	TN250
	Max	94.95	95.81	95.39	95.82	95.66
	Min	94.47	95.03	94.67	94.99	94.84
	Average	94.71	95.42	95.03	95.41	95.25
R6 Hole31-Hole36	TN251	TN252	TN253	TN254	TN255	TN256
	Max	96.07	95.34	96.28	95.39	94.95
	Min	95.28	94.55	95.51	94.62	94.13
	Average	95.67	94.95	95.90	95.00	94.54
R7 Hole37-Hole42	TN257	TN258	TN259	TN260	TN261	TN262
	Max	95.15	95.63	96.11	95.09	95.34
	Min	94.38	94.88	95.32	94.78	94.54
	Average	94.76	95.25	95.71	94.69	94.94
R8 Hole43-Hole48	TN243	TN244	TN245	TN246	TN247	TN248
	Max	95.84	95.87	95.44	95.72	95.65
	Min	95.05	95.10	94.60	94.95	94.87
	Average	95.45	95.48	95.02	95.34	95.26

Approved By: Boonchai Suriyawong

FM-L13 108/30-05-57



Metrological Center

SCI ECO Services Company Limited

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Certificate No. T250355

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Calibration Report

Measurement Results

Calibration Point		Average Standard Reading at each position (°C)					
R1 Hole1-Hole6		TN221	TN222	TN223	TN224	TN225	TN226
CAL POINT	Max	104.48	104.40	104.60	105.27	105.29	105.19
	Min	104.15	104.02	104.25	104.94	104.91	104.93
	Average	104.32	104.21	104.42	105.10	105.08	105.06
R2 Hole7-Hole12		TN227	TN228	TN229	TN230	TN231	TN232
	Max	105.30	105.45	105.58	105.96	105.51	106.03
	Min	104.92	105.14	105.29	105.64	105.53	105.79
	Average	105.06	105.29	105.43	105.80	105.67	105.91
R3 Hole13-Hole18		TN233	TN234	TN235	TN236	TN237	TN238
	Max	105.09	105.14	105.83	106.23	105.97	105.88
	Min	105.80	105.89	105.57	106.09	105.69	105.65
	Average	105.94	106.01	105.70	106.13	105.83	105.77
R4 Hole19-Hole24		TN239	TN240	TN241	TN242	TN243	TN244
	Max	105.87	105.75	105.30	105.07	105.22	105.66
	Min	105.62	105.52	105.13	104.99	105.05	105.49
	Average	105.74	105.63	105.21	105.03	105.14	105.57
R5 Hole25-Hole30		TN245	TN246	TN247	TN248	TN249	TN250
	Max	105.62	105.54	105.52	105.75	105.97	105.69
	Min	105.45	105.35	105.31	105.57	105.81	105.49
	Average	105.53	105.45	105.41	105.66	105.89	105.59
R6 Hole31-Hole36		TN251	TN252	TN253	TN254	TN255	TN256
	Max	106.19	106.34	106.47	105.96	105.76	105.35
	Min	106.02	106.16	106.21	105.77	105.58	105.18
	Average	106.10	106.25	106.39	105.87	105.67	105.27
R7 Hole37-Hole42		TN257	TN258	TN259	TN260	TN241	TN242
	Max	106.21	105.59	105.45	105.36	106.08	106.09
	Min	106.04	105.42	105.28	105.20	105.90	105.92
	Average	106.12	105.51	105.37	105.28	105.99	106.00
R8 Hole43-Hole48		TN243	TN244	TN245	TN246	TN247	TN248
	Max	106.54	106.33	105.78	105.38	105.42	105.69
	Min	106.38	106.16	105.60	105.20	105.23	105.52
	Average	106.46	106.25	105.69	105.29	105.33	105.61

Approved By:

FM-L15 108/30-05-27

FM-L15 108/30-05-27



Metrology

SCI ECO Services Company Limited

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



Certificate No. T232160

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cooling 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 : Laboratory

Date of Receipt : 29 November 2023

Calibrated By : Atiphong Rongrat (Technician)

Approved By : / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 09 JAN 2024

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrology.

FM-L15 118/18-08-65



Metrological Center

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Certificate No. T250355

Page 6 of 6

Calibration Report

Measurement Results:

HEATING BLOCK			Temperature Distribution	
Setting (°C)	Reading (°C)		Stability (±°C)	Uncertainty (±°C)
	Min, Max	Average		
102.0	-	102.0	0.43	0.85
107.0	-	107.0	0.20	0.70

* The quoted uncertainty exclude " uniformity "

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 %.

Approved By:



Metrology

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.



Certificate No. T232160

Page 2 of 4

Calibration Report

Equipment : Chamber (Cooling Room)

Date of Calibration : 6 December 2023

Environment : Temperature : 23.4-24.9 °C
Line Voltage : 221.4-230.2 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert 16 standard thermocouples type T into its chamber, the other one standard thermocouples type T use for ambient temperature measurement. The calibration was done in according to WF-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986).

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

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN161-TN170	T230773	10 April 2024
TC	TYPE T	TN171-TN180	T230773	10 April 2024
DATA LOGGER	34970A	T149	T230773	10 April 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 : 1 Hour 30 Minute At 3 °C

Fresh Air Damper : ☐ Open ☐ Min ☐ Medium ☐ Max

☐ Close ☒ Not Available

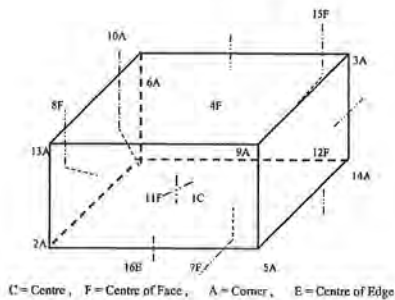
5. Adjustment :

(X) without adjustment () after adjustment

Approved By:

FM-L15 118/18-08-65

Calibration Report



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

Approved By:

FM-L15 118/18-08-66

Calibration Report

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)									
	TN161	TN162	TN163	TN164	TN165	TN166	TN167	TN168	TN169	TN170
3.0	2.83	3.34	2.95	3.46	3.45	3.76	3.25	3.46	3.39	3.50
	TN171	TN172	TN173	TN174	TN175	TN176				
	3.33	3.39	3.15	3.43						

Chamber (Cooling Room)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage Factor k
	Min	Max					
3.0	2.8	4.1	3.5	3.36	1.10	2.00	1.90

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 118/18-08-66

Certificate of Calibration

Equipment : Chamber (Cooling 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 : Laboratory Room
Date of Receipt : 28 May 2025
Calibrated By : Atiphong Rongrai (Technician)
Approved By : / Doonchai Suriyawang (Site Calibration Manager)
Date of Issue : 1 JUN 2025

REVIEW BY:

APPROVED BY:

NEXT CAL DATE: 04/12/26

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.

Calibration Report

Equipment : Chamber (Cooling Room)
Date of Calibration : 4 June 2025
Environment : Temperature : 23.4-24.9 °C
Line Voltage : 221.4-230.2 V
Relative Humidity : 55-65 %RH

Condition of this results of calibration :

- This equipment was calibrated by insert 16 standard thermocouples type T into its chamber, the other one standard thermocouples type T use for ambient temperature measurement. The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986). All data show below were final values and the initial data from customer request. The temperature scale used was based on ITS-90.
- Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN91-TN100	T242036	3 December 2025
TC	TYPE T	TN101-TN110	T242036	3 December 2025
DATA LOGGER	34970A	T121	T242036	3 December 2025
- This certificate is traceable to : National Institute of Metrology (Thailand) through Metrological Center (MSC-T18-T15 17025 CALIBRATION 0244).
- Condition of calibrated item : good
Equipment Description :
Time Constant : 2 Hour 20 Minute At 3 °C
Fresh Air Damper : ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available
- Adjustment :
(X) without adjustment () after adjustment

Approved By:



Certificate of Calibration

Cert. No.: 24LM142
Page.: 1 of 2

Equipment : pH Meter with Sensor
Manufacturer : Mettler Toledo
Model : SevenGo S2
Serial No. : C423217388
ID No. : RYG_FS0714
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 : 29 August 2024
Calibrated Date : 30 August 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V

Calibrated by : Warakorn Lemgagrakul

Approved by :

() Ponpan Palaim
() Suwit Imjai
(✓) Kunchit Promprat

Issue Date : 02 September 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.



Equipment : pH Meter with Sensor
Condition As-Received : Used Item
Reference : 2408-0988DSC-8
Procedure Used :-

Cert. No.: 24LM142
Page.: 2 of 2

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPT) 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	20410013	241851	TPA	08 Aug 2025

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (") Without Adjustment

Function : Temperature measurement.

This instrument was connected with temperature sensor, S/N: 4260858

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
25.0	100	25.004	25.0	-0.004	0.16	2.00
30.0	100	30.005	30.0	-0.005	0.16	2.00
40.0	100	40.003	40.0	-0.003	0.16	2.00
50.0	100	50.002	50.0	-0.002	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 %.

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Certificate of Calibration

Certificate No.: 23E3924
Page.: 1 of 2

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : SevenExcellence
Serial No. : B834291445
ID No. : RYG_ENB152
Condition As-Received : Used Item
Received Date : 08 December 2023
Calibration Date : 14 December 2023
Reference : 2312-015/DSC
Ambient Temperature : (23 ± 2) °C
Relative Humidity : (50 ± 10) %
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch
616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng,
Rayong 21140, Thailand

Procedure used : Calibration were conducted using calibration procedure No. CP-E17 according to EURAMET c1-15

Condition of this result of calibration

1. Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Multi-Product Calibrator	5502A	2435502	EE-001-122	26 Apr 2024

2. This result of calibration was made on requested at the point specified by customer.

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

4. This Certification is traceable to the International System of Unit maintained through-

-National Institute of Metrology Thailand (NIMT)

REVIEW BY *N. Benrat*
APPROVED BY *D. Kanchit*
EXPIRATION DATE *14 Dec 2024*
14106175 (Subm)

Calibrated by : Nattawong Pradomsoo
Issue Date : 15 December 2023

Approved Signatory :

() Nattawong Pradomsoo
(✓) Nattawat Kanchit
() Nattasagorn Boonayaporn



Cert. No.: 23E3924
Page.: 2 of 2

Result of calibration :- (") Without adjustment () After adjustment

Function: DC voltage measurement

Range: 2000 mV

Standard Value (mV)	UUC* Reading (mV)	Error (mV)	Uncertainty (± μV)
-200.0000	-199.9	0.1	68
-150.0000	-150.0	0.0	65
-100.0000	-100.0	0.0	63
-50.0000	-50.0	0.0	61
0.0000	0.0	0.0	58
50.0000	50.0	0.0	61
100.0000	100.0	0.0	63
150.0000	150.0	0.0	65
200.0000	199.9	-0.1	68

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor *k*=2, providing a level of confidence of approximately 95 %

UUC* = Unit Under Calibration.

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Cert.No.: 23CH1574
Page.: 1 of 3

Certificate of Calibration

Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: SevenExcellence
Serial No.: BR34291445
ID No.: RYG_EN0152
Condition As-Received: Used Item
Received Date: 08 December 2023
Calibration Date: 15 December 2023
Reference: 2312-0151DSC-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)
- CP-CH6 by comparison with standard thermometer

Calibrated by: Warakorn Lengagrakul

Approved by:
Approved Signatory

() Sathip Meangmai
() Warakorn Lengagrakul
(x) Pongpan Pelpim

Issue Date: 19 December 2023

The % uncertainties are for a confidence probability of approximately 95%.

A 0061026



Cert.No.: 23CH1574
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 23E2602 27 Aug 2024
2) Ref. Standard Thermometer 4962054 110RC044 23B008 26 July 2024
This certification is traceable to the International System of Unit maintained through:-
- Technology Promotion Association (Thailand-Japan)

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1035

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	913508	14 July 2025
pH 6.988	CPA chem	931959	01 Oct 2024
pH 9.997	CPA chem	940104	02 Nov 2024

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

Calibration Results

Function: mV Measurement

Performing standard curve by Fluke at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement	Coverage factor
	pH	mV	mV	pH	(mV)	k
pH Meter	4.000	177.48	177.3	4.000	0.058	2.00
S/N: BR34291445	7.000	0.00	-0.1	7.000	0.058	2.00
	10.000	-177.48	-177.5	10.000	0.058	2.00

U 1183852



Cert.No.: 23CH1574
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 (±)	Coverage factor k
pH Electrode	4.008	4.013	184.1	0.0045	2.00
S/N: 3225368	6.988	6.998	8.7	0.0084	2.00
	9.997	10.002	-164.7	0.0088	2.11

Function: Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe:

- Model: InLab®Expert Pro-ISM
- Serial No.: 3225368

Dimension of probe:

- Length: 120 mm
- Diameter: 12 mm
- Immersion Depth: 100 mm

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.003	24.3	-0.703	0.13	2.00

Remark: - UUC* = Unit Under Calibration

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

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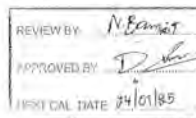
U 1103051



Cert.No.: 23TW168
Page.: 1 of 2

Certificate of Testing

Equipment: DO Meter
Manufacturer: YSI
Model: 5000-115V
Serial No.: 15E102796
ID No.: RYG_EN0032
Received Date: 21 July 2023
Test Date: 24 July 2023
Reference: 2307-0713DSC-1
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
Rayong Branch
616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng,
Rayong 21140, Thailand
Laboratory Condition: Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure: In-house method: CP-CH9
by Comparison Technique with Azide Modification Method
Tested by: Whutak Sirthean
Approved by:
Approved Signatory
() Malico Bulkruck
(x) Sathip Meangmai
() Warakorn Lengagrakul
Issue Date: 26 July 2023



U 0320211



Cert.No.: 23TW168
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1) Burette	-	130BU10	23CG1172	22 Mar 2025
2) Balance	1126143764	140RC004	22MM50	20 Sep 2023

2. Standard Material :-

Material	Manufacturer	Lot No.	Assay
Sodium Thiosulfate pentahydrate	Menc	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.

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534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3900-29 FAX. 0-2719-9404



Cert. No.: 23LM125
Page.: 1 of 2

Certificate of Calibration

Equipment : DO Meter with Sensor
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102796
ID No. : RYG_EN0032
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
Rayong Branch
616/10 Moo 5 T. Maenam Khu, A. Pluakdaeng,
Rayong 21140 Thailand
Location : TPA On Site Calibration Laboratory
Received Order : 25 July 2023
Calibrated Date : 27 July 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V

Calibrated by : Prascha Hahib

Approved by :
Approved Signatory

() Ponnitippa Tameyakul
() Mahoe Butkruas
(x) Suwit Injai

Issue Date : 31 July 2023

The Uncertainties are for a confidence probability of approximately 95%.

This certificate may not be reproduced other than in full, except with the prior written approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

0053618



Equipment : DO Meter With Sensor
Condition As-Received : Used Item
Reference : 2307-0713DSC-2
Procedure Used :-

Cert. No.: 23LM125
Page.: 2 of 2

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPR) into Temperature Bath.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Digital Thermometer	2188080	2211285	TPA	21 Oct 2023

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

3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function : Temperature measurement.

This instrument was connected with temperature sensor, S/N.: 1228475367

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
20.00	100	20.011	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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1159515



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Certificate of Calibration

Cert. No.: 25LM10
Page.: 1 of 2

Equipment : DO Meter with Sensor
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102796
ID No. : RYG_EN0032

Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
(Rayong Branch)
616/10 Moo 5 T. Maenam Khu, A. Pluakdaeng,
Rayong 21140 Thailand
Location : TPA On Site Calibration Laboratory

Received Order : 17 January 2025
Calibrated Date : 20 January 2025
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V

Calibrated by : Warakorn Lernagatrakul

Approved by :
Approved Signatory

() Chakrit Waewwanjui
(x) Suwit Injai
() Kunchit Promprat

Issue Date : 23 January 2025

The Uncertainties are for a confidence probability of approximately 95%.

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Equipment : DO Meter with Sensor
Condition As-Received : Used Item
Reference : 2501-0600DSC-2
Cert. No.: 25LM10
Page.: 2 of 2

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Digital Thermometer	2188080	2411022	TPA	17 Sep 2025

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration : (*) Without Adjustment

Function : Temperature measurement.

This instrument was connected with temperature sensor, S/N.: 15E100464

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor K
20.00	60	20.002	19.81	-0.192	0.15	2.00

UUC* : Unit Under Calibration

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

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TEL. 0-2717-3000 FAX. 0-2719-9484

Certificate of Testing

Cert.No.: 25TW15
Page.: 1 of 2

Equipment : DO Meter
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102796
ID No. : RYG_EN0032
Received Date : 17 January 2025
Test Date : 20 January 2025
Reference : 2501-0600DSC-1
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
(Rayong Branch)
616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng,
Rayong 21140, Thailand
Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In - house method : CP-CH9
by Comparison Technique with Azide Modification Method
Tested by : Watlak Sirinhean
Approved by :
Approved Signatory
() Pornthippa Tameyakul
() Ponpan Palpim
(✓) Sathip Meangmai
Issue Date : 21 January 2025



Cert.No.: 25TW15
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1. Burette	-	130BU10	23CG1172	22 Mar 2025
2. Balance	14233821	110RC001	24MM131	04 July 2025

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate 5-Hydrate AR	KEMAUS	2203162447	99.6%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No.: 15E100464

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.20	8.20	0.0084

This report was certified only for the instrument we tested. It is allowable to use for study
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TEL. 0-2717-3000/29 FAX. 0-2719-9484



Certificate of Calibration

Cert. No.: 24TM1663
Page : 1 of 3

Equipment : Low Temp. Incubator
Manufacturer : Memmert
Model : IPP750
Serial No. : V818.0084
ID No. : RYG_EN0154
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. Rayong Branch
616/10 Moo 5, T.Maenam Khu,
A.Pluakdaeng,
Rayong 21140, Thailand
Location : BOD Room
Received Order : 01 November 2024
Calibration Date : 01 November 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Krisda Malee
Approved by :
Approved Signatory
() Ponpan Palpim
() Suwit Imjai
(✓) Kunchit Promprat
Issue Date : 07 November 2024

REVIEW BY :	
APPROVED BY :	
NEXT CAL DATE :	01/05/26

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.



Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2411-0002OC-1
Procedure Used :-

Cert. No.: 24TM1663
Page : 2 of 3

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90.

Condition of this result of calibration

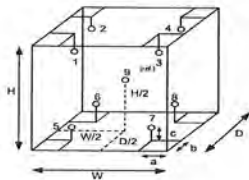
1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY44073381	24LM73	TPA	18 May 2025

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close



Probe Installation Details :

a = 10 cm
b = 10 cm
c = 10 cm

Dimension of Chamber :

D = 0.60 m
W = 1.0 m
H = 1.2 m
Capacity = 0.72 m³

Environment during calibration		
	Beginning	Finished
Temp. (°C)	24	25
REL.Humid. (%)	55	53
AC Supply (Volt)	220	221

Position :	Ref. Std. ID No.:
1	1RTD-2/1
2	1RTD-2/2
3	22-01RTD-03
4	1RTD-2/4
5	1RTD-2/5
6	1RTD-2/6
7	23-01RTD-07
8	1RTD-2/8
9 (ref.)	23-01RTD-09



Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2411-0002OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 24TM1663
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
20.0	20.0	20.0	0.026	0.26	0.53	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	20.071	19.915	20.273	20.179	19.977	19.782	20.056	20.026	20.033	0.30

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

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TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert.No.: 24CG3711
Page: 1 of 2

Equipment : Burette
Capacity : 50 mL
Serial No. :
ID. No. : RYG_EN0216
Manufacturer : Witeg
Made in : Germany
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
Rayong Branch
616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng
Rayong 21140, Thailand

Ambient Temperature : (20 ± 2.5) °C
Relative Humidity : (50 ± 10) %
Barometric Pressure : 756 mmHg
Calibration Procedure : ASTM E 542 - 01

Calibrated by : Sa-ngueurkam, Wongsu

Approved by :
(✓) Srisuda Khanitha
() Ponpan Palpim
() Unnopphol Harachai

Issue Date : 24 September 2024

REVIEW BY	Thanitak.
APPROVED BY	D. Khumdee
NEXT CAL. DATE	24/09/25



Equipment : Burette
Received Date : 19 September 2024
Condition As-Received : Used Item
Calibration Date : 24 September 2024
Reference : 2409-0756DSC-3

Cert.No.: 24CG3711
Page: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

Instruments	Model	Serial No.	ID. No.	Certificate No.	Traceability	Due date
1) Balance	XP205	B134206712	140RC007	24MM316	TPA	15 July 2025
2) Data Logger	HL-20D	20683159	140EC012	23H2174	TPA	10 Oct 2024
3) Thermometer	-	1594592	140EC010	24I175	TPA	20 Feb 2025

This thermometer is traceable to SI Unit

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

3. True value is converted to true volume at the standard temperature of 20 °C

Calibration result :

Nominal capacity (mL)	Reading (mL)	Uncertainty (± mL)	k Factor
10	10.0259	0.0082	2.00
20	20.0214	0.0085	2.00
30	30.0006	0.0089	2.00
40	40.0003	0.0094	2.00
50	49.9988	0.011	2.00

Remark mL = cm³

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

-o0o-

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Equipment: SPECTROPHOTOMETER
Model: DR6000
Serial No. (or ID.): 1627845 (RYG_EN0037)
Manufacturer: HACH
Condition: In Condition

Certificate No.: C06230441
Issued Date: 19 September 2023
Job No.: WO-0005382
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 23.8 °C ± 0.2
Humidity 65.3 %RH ± 1.4

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

Calibration By: Mr. Nattapat Rungrueang

Calibration Date: 18 September 2023

The Method used: In house method, CAL-WI-24, base on ASTM E 275-08 and ASTM E 367-04

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

The standard for Wavelength Certificate No. 111583 and 111584
The standard for Photometric Certificate No. 9114984 and 111588
The standard for Stray light Certificate No. 111586 and 111585
The standard for Spectral resolution Certificate No. 111587

REVIEW BY: *[Signature]*
APPROVED BY: *[Signature]*
NEXT CAL DATE: 18/12/25

(Mr. Nattapat Rungrueang)
Person in charge

(Mr. Nitinun Sthawan)
Authorized signatory

This certificate is issued for the unit 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 in the reported 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.
Unit: Bangkok and all other branches.
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2533 Sukhumvit Road, Bangkok, Thailand, 10110
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CAL-FM-C06-15: 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	
536.68	536.8	0.16	0.13	
637.89	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
	0.5188	0.519	-0.0022	0.0045
	1.0298	1.029	0.0008	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.2867	0.283	0.0037	0.0045
	0.5073	0.509	-0.0017	0.0045
	1.0083	1.007	0.0013	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.2516	0.250	0.0016	0.0045
	0.4595	0.462	-0.0025	0.0045
	0.9334	0.933	0.0004	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.2461	0.245	0.0011	0.0045
	0.4852	0.486	-0.0008	0.0045
	0.9468	0.946	0.0008	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.2594	0.259	0.0004	0.0045
	0.5040	0.505	-0.0010	0.0045
	1.0032	1.002	0.0012	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.2572	0.257	0.0009	0.0045
	0.4971	0.497	0.0001	0.0045
	0.9720	0.971	0.0010	0.0045

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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
267 nm	0.0000	0.000	0.0000	0.0080
	0.8574	0.857	0.0004	0.0080
313 nm	0.0000	0.000	0.0000	0.0080
	0.2864	0.280	-0.0038	0.0080
350 nm	0.0000	0.000	0.0000	0.0080
	0.8374	0.837	0.0004	0.0080

Stray light *			
Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%)	Absorbance (A)
260.62 +/- 0.11 nm	260.6	1.3	1.886
391.44 +/- 0.11 nm	391.4	1.3	1.886

Spectral Resolution *				
Nominal Concentration 0.02 % v/v	Peak	Trough	Ratio	SBW
Standard Wavelength (nm)	268.86	268.89	1.36	2.00
UUC: Wavelength (nm)	268.2	268.1		
Std Absorbance (A)	0.4568	0.2780		
Absorbance (A)	0.413	0.300		

* Calibration Marked * Not NIST Accredited * In this Certificate have been included for completeness.

The End of Certificate



ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: WO-0005382

ชนิดเครื่องมือ: SPECTROPHOTOMETER		รุ่น: DR6000		หมายเลขเครื่อง: 1627845		
ตรวจสอบ (วัน)		รายการตรวจสอบ		ตรวจสอบ (ถึง)		หมายเหตุ
18 Sep 2023				18 Sep 2023		
ปกติ	ไม่ปกติ			ปกติ	ไม่ปกติ	
General						
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายในเครื่อง)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ เปิด - ปิด เครื่อง (On-Off Switch)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Spectrophotometer						
<input type="checkbox"/>	<input type="checkbox"/>	6. แบตเตอรี่สำรอง (Battery Backup) >= 2.5 VDC		<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ควบคุมเลือกความยาวคลื่น (Wavelength Control)		<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ตรวจสอบความยาวคลื่น (Wavelength Check)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	9.2 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	741.5 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. ช่องใส่หลายตัวอย่าง (Carousel Module)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
pH Meter and Conductivity Meter						
<input type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)		<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับการละลายใน Electrode (Level KCl)		<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)		<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ภาชนะใส่อิเล็กโทรด (Stand)		<input type="checkbox"/>	<input type="checkbox"/>	
Turbidimeter						
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ใส่ (No Sample)		<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่องสว่างของแสง (>= 2.5 ไมล์ 3.0)		<input type="checkbox"/>	<input type="checkbox"/>	
Automatic titrator						
<input type="checkbox"/>	<input type="checkbox"/>	18. ภาพ Piston Burettes		<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing		<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายนำและอุปกรณ์ประกอบ		<input type="checkbox"/>	<input type="checkbox"/>	

เพิ่มเติมเรื่อง: *656.1nm=656.1nm
*488.0nm=485.5nm

Mr. Nattapat Rungrueang
Service Engineer

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CAL-FM-C06-15: 12 Sep 2022

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CAL-FM-C06-15: 26 Jul 2022



Certificate of Calibration

Certificate No.: C06250108 Page 2 of 3

Equipment: SPECTROPHOTOMETER Certificate No.: C06250108
Model: DR6000 Issued Date: 18 March 2025
Serial No. (or ID.): 1627845 (RYG_EN0037) Job No.: WO-00064378
Manufacturer: HACH Page: 1 of 3
Condition: In Condition

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

Environment Condition: Temperature 24.4 °C ± 0.3 °C
Humidity 60.8 %RH ± 3.5 %RH

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

Calibration By: Mr. Preecha Phoosai
Calibration Date: 18 March 2025
The Method used: In house method, CAL-WI-24, base on ASTM E 275-08 and ASTM E 387-04
Traceability: This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Starna Scientific Limited.

The standard for Wavelength Certificate No. 111583 and 111584
The standard for Photometric Certificate No. 9114984 and 111588
The standard for Stray light Certificate No. 111588 and 111585
The standard for Spectral resolution Certificate No. 111587

(Mr. Preecha Phoosai)

(Miss Kaewkan Suradech)

Person in charge

Authorized signatory

This certificate is issued to 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 variations 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.

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CAL-FM-C06-16: 11 Mar 2024

Calibration Results:
Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 2 nm and UUC at 2 nm

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.61	418.5	0.11	0.13
536.66	536.7	-0.04	0.13
637.98	638.3	-0.32	0.13
748.48	748.8	-0.32	0.13
867.03	867.5	-0.47	0.13

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.2930	0.291	0.0020	0.0045
	0.5168	0.518	-0.0012	0.0045
	1.0298	1.031	-0.0012	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.2867	0.285	0.0017	0.0045
	0.5073	0.508	-0.0007	0.0045
	1.0083	1.009	-0.0007	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.2516	0.250	0.0016	0.0045
	0.4595	0.461	-0.0015	0.0045
	0.9334	0.935	-0.0015	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.2461	0.246	0.0001	0.0045
	0.4652	0.466	-0.0008	0.0045
	0.9468	0.948	-0.0012	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.2594	0.259	0.0004	0.0045
	0.5040	0.505	-0.0010	0.0045
	1.0032	1.004	-0.0008	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.2579	0.258	-0.0001	0.0045
	0.4971	0.497	0.0001	0.0045
	0.9720	0.973	-0.0010	0.0045

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CAL-FM-C06-16: 11 Mar 2024

Certificate No.: C06250108 Page 3 of 3

Calibration Results:
Without Adjustment

Photometric Accuracy (Absorbance)				
Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0080
	0.7355	0.738	-0.0025	0.0080
257 nm	0.0000	0.000	0.0000	0.0080
	0.8574	0.857	0.0004	0.0080
313 nm	0.0000	0.000	0.0000	0.0080
	0.2864	0.290	-0.0036	0.0080
350 nm	0.0000	0.000	0.0000	0.0080
	0.6374	0.637	0.0004	0.0080
Stray light *				
Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%)	Absorbance (A)	
280.82 +/- 0.11 nm	260.6	1.7	1.770	
391.44 +/- 0.11 nm	391.4	1.4	1.854	
Spectral Resolution *				
Nominal Concentration 0.02 % v/v	Peak	Trough	Ratio	SRW
Standard Wavelength (nm)	268.65	268.69	1.38	2.00
UUC: Wavelength (nm)	268.2	266.2		
Std Absorbance (A)	0.4586	0.2780		
UUC: Absorbance (A)	0.413	0.299		

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

The End of Certificate

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: WO-00064379

ชนิดเครื่องมือ: SPECTROPHOTOMETER รุ่น DR6000 หมายเลขเครื่อง: 1627845

ตรวจสอบ (วัน)	รายการตรวจเช็ค	ตรวจสอบ (ส่ง)	หมายเหตุ
18 Mar 2025	18 Mar 2025	18 Mar 2025	
ปกติ	ไม่ปกติ	ปกติ	ไม่ปกติ
General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด-เปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>
Spectrophotometer			
<input type="checkbox"/>	<input type="checkbox"/>	6. แบตเตอรี่สำรอง (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวหมุนเลือกความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. ช่องใส่ตัวอย่าง (Carousel Module)	<input checked="" type="checkbox"/>
pH Meter and Conductivity Meter			
<input type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	13. วัสดุสารละลายอิเล็กโทรด (Level KCl)	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันฝุ่นอิเล็กโทรด (Dust Protection Hood)	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาตั้งอิเล็กโทรด (Stand)	<input type="checkbox"/>
Turbidimeter			
<input type="checkbox"/>	<input type="checkbox"/>	16. ความเข้มข้นตัวอย่าง (No Sample)	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	17. ขบวนการล้างช่องแสง (>= 2.5 ไร่ถึง 3.0)	<input type="checkbox"/>
Automatic titrator			
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาพ Piston Burettes	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>

เงื่อนไขข้อแนะนำ: * 666.1nm = 656.1nm

* 486.0nm = 485.7nm

Mr. Preecha Phoosai
Service Engineer

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CAL-FM-C06-16: 11 Mar 2024

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CAL-FM-C06-16: 11 Mar 2024



NSC-TISI-TIS 17025
CALIBRATION 0426

SARTORIUS

Certificate of Calibration

REVIEW BY: *Thantit*
APPROVED BY: *D. Kachon*
NEXT CAL. DATE: 02/02/2025

Model Number: MSE224S-100-DU
Description: Analytical Balance
Serial Number: 0026207038
ID No.: RYG_EN0002
Manufacturer: Sartorius
Certificate No.: 24BG0089
Issued Date: Friday, February 23, 2024
Reference No.: 229198
Page No.: 1 of 2

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

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

Metological data:
Capacity: 220 g Readability: 0.0001 g
Ambient Conditions:
Temperature: 24.2 °C ± 5.0 °C
Humidity: 67.0 % RH ± 10.0 % RH
Pressure: ±
Reasons for calibration:
☐ New Installation ☐ Service / Required ☒ 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 Metological Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 5000g E2:YCS011-522-00	TCS	M2306197S	23-Aug-2025
MHB-382SD	Humidity/Balanced Temp. Luton MHB-382SD	DKSH	C19231845	23-Aug-2024

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)
STAMP
SARTORIUS
INSPEC 17005-001

SOP FM 33 03 February 2022

SARTORIUS



NSC-TISI-TIS 17025
CALIBRATION 0426

Accredited by
NSC-TISI-TIS 17025
Calibration 0426

Calibration certificate

Calibration Certificate No: 25BKL0004

Object	Electronic non-automatic weighing instrument	This calibration certificate documents the traceability to national standards.
Manufacturer	Sartorius	Uncertainties of measurements are taken into account when only statements of compliance are made.
Type	MSE224S-100-DU	This certificate was prepared by Sartorius Corporation in accordance to the current ISO/IEC 17025:2017 standard and Sartorius Work Instruction (Method) SOP-WI-03.
Serial QM Ident. no.	25207038 RYG_EN0002	This certificate relate and apply this equipment only.
Customer	ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch) 616/10 Moo 5 T.Maenam Khu, A.Pluak Daeng, Rayong 21140, Thailand.	
Order no.	2230	
Number of pages	4	
Date of calibration	20 Feb 2025	

This calibration certificate may not be reproduced other than in full except with the permission of NSC-TISI-TIS-17025 and the issuing laboratory. Calibration certificates without signature are not valid.
The user is obliged to have the object recalibrated at appropriate intervals.

Date: 08 Mar 2025
Approval of the Calibration Certificate: *Chonchai Inthana*
Person in charge: *Kachen*
Mr. Chonchai Inthana
Kachen Latsee

SARTORIUS

Certificate of Calibration

Model Number: MSE224S-100-DU
Description: Analytical Balance
Serial Number: 0026207038
ID No.: RYG_EN0002
Manufacturer: Sartorius
Certificate No.: 24BG0089
Issued Date: Friday, February 23, 2024
Reference No.: 229198
Page No.: 2 of 2

Calibration Results : Without Adjustment

Repeatability		Eccentricity (Off-center loading error)	
The reproducibility is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same test weight is measured repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.		The off-center loading error is yielded by the difference between the readout of the load, i.e. 102 or 104 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)	20.0000 g	199.9999 g	
Tolerance	0.0001 g	0.0004 g	
Nominal Value : (High Load)	200.0000 g	200.0000 g	
Tolerance	0.0001 g	0.0004 g	
Standard Deviation		0.00007	0.00006

Linearity

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

Tolerance	0.0002 g			
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
0.01	0.0100	0.0100	0.0000	0.00018
0.05	0.0500	0.0500	0.0000	0.00018
0.1	0.1000	0.1000	0.0000	0.00018
0.5	0.5000	0.5000	0.0000	0.00018
1	1.0000	1.0000	0.0000	0.00018
5	5.0000	5.0000	0.0000	0.00018
10	10.0000	10.0000	0.0000	0.00018
20	20.0000	20.0000	0.0000	0.00024
50	50.0000	49.9999	-0.0001	0.00019
100	100.0000	100.0000	0.0000	0.00023
200	200.0000	199.9999	-0.0001	0.00032

End of Report:

SOP FM 33 03 February 2022

Calibration certificate No.: 25BKL0004

Calibration Certificate

Calibration object

Single range instrument

Model: MSE224S-100-DU
Serial Number: 25207038
QM Ident. no | Inventory no.: RYG_EN0002 | —

Maximum capacity (Max. load): 220.0000 g
Measured range: 220.0000 g
Scale interval: 0.0001 g

Place of calibration

Address: According to page 1
Department | Cost center: Laboratory Department. | —
Building | Floor: — | 1st Floor.
Room: Balance Room.
Maximum temperature variation at place of calibration: 5 K

Calibration procedure

EURAMET cg-18, V4.0 - Guidelines on the Calibration of Non-Automatic Weighing Instruments

Test equipment

Test equipment type	Test equipment ID	Valid until
Thermometer	MHB-382SD s/nB011342 Traceable to SI unit through DKSH	21 Aug 2025
Test weight set OIML R111 E2	Certificate No.M2308197S_E2(Traceable to SI unit through TCS)	23 Aug 2025

Adjustment Status

The measuring device was internally adjusted before the calibration.

Environmental and measuring conditions

Date of calibration 20 Feb 2025

Temperature at place of calibration | Temp. diff. 24.4 °C | 0.6 K

Weights - T place

Measuring conditions

The installation site is suitable. The device was levelled. Balance was loaded up to Max before test.

Comments

Humidity 50.2 %RH.

Measurement results | Measurement uncertainties

Repeatability

Test load (nominal): 10 g 200 g	
10 g	200 g
1 10.0000 g	200.0000 g
2 10.0000 g	200.0001 g
3 10.0001 g	200.0001 g
4 10.0000 g	200.0000 g
5 10.0001 g	200.0000 g
6 10.0001 g	200.0001 g
7 10.0000 g	200.0000 g
8 10.0000 g	200.0001 g
9 10.0001 g	200.0000 g
10 10.0000 g	200.0000 g
s = 0.0005 g	s = 0.0005 g

Eccentricity

Test load (nominal): 100 g	
Center	100.0000 g
Front left	99.9998 g
Back left	100.0000 g
Back right	100.0000 g
Front right	100.0000 g
Maximum deviation from centric loading indication	
Δecc _{max} = 0.0002 g	

Error of indication

Testload	Indication	Error	Expansion factor	Uncertainty	Uncertainty relative
L	I	E	K	U(E)	U _{rel} (E)
0.0100 g	0.0100 g	0.0000 g	2.00	0.00013 g	1.3 %
0.1000 g	0.1000 g	0.0000 g	2.00	0.00013 g	0.13 %
0.5000 g	0.5000 g	0.0000 g	2.00	0.00013 g	0.027 %
1.0000 g	1.0000 g	0.0000 g	2.00	0.00013 g	0.013 %
5.0000 g	5.0000 g	0.0000 g	2.00	0.00014 g	0.0027 %
10.0000 g	10.0000 g	0.0000 g	2.00	0.00014 g	0.0014 %
20.0000 g	20.0000 g	0.0000 g	2.00	0.00014 g	0.00072 %
50.0000 g	50.0000 g	0.0000 g	2.00	0.00016 g	0.00032 %
100.0000 g	100.0001 g	0.0001 g	2.00	0.00021 g	0.00021 %
200.0000 g	200.0000 g	0.0000 g	2.00	0.00034 g	0.00017 %
220.0000 g	220.0000 g	0.0000 g	2.00	0.00039 g	0.00018 %

Maximum error of indication

|E|_{max} = 0.0001 g

U_{rel}(E) is the quotient of U(E) and test load I. The uncertainty of measurement U(E) is valid only if error E is considered. You will find reference notes on the uncertainty of measurement in use under: Appendix to the calibration certificate | Interpretation of measurement results.

Reference note: The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the documented Expansion factor, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

End of calibration certificate

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang
10310 BangkokVerical®
Version 5.5

Page 3 | 4

Uncertainty of measurement in use

Device adjusted before measurement

Yes

Temperature deviation considered

1.5 K (isoCAL active)

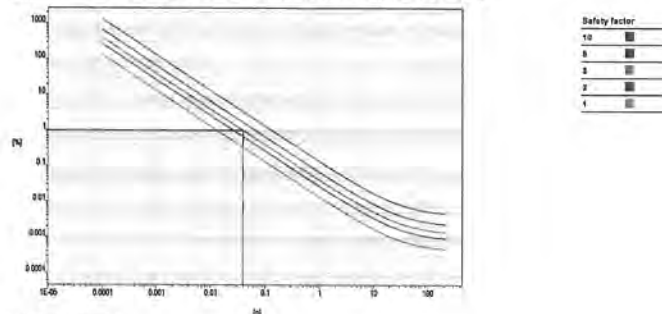
Temperature coefficient considered

1 · 10⁻⁴ /KUncertainty of the weighing result U₉₅(W)U₉₅(W) = 0.00013 g + 3.95 · 10⁻⁴ · R

Reference note: The current uncertainty of measurement is calculated by entering of the reading R into this formula. In relation to this, there is no need for a correction of the indication error. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied with an Expansion factor of 2, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

Indication in % from max load	Net Indication R	Uncertainty U ₉₅ (W)	Uncertainty relative U ₉₅ (W)/W
1 %	22000 g	0.00014 g	0.00063 %
25 %	55000 g	0.00035 g	0.00063 %
50 %	110000 g	0.00056 g	0.00051 %
75 %	165000 g	0.00078 g	0.00047 %
100 %	220000 g	0.00100 g	0.00045 %

Graphic realization of the relative uncertainty of measurement | process accuracy



Displayed example

Process accuracy 1.00 %
Safety factor 3
Minimum sample weight 0.0395 g



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL 0-2717-3000-29 FAX 0-2719-9484

ILAC-MRA



Certificate of Calibration

Cert. No.: 24TM632
Page: 1 of 3

Equipment: Hot Air Oven
Manufacturer: Memmert
Model: UFE 500
Serial No.: G511.1572
ID No.: RYG_EN0010
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5 T. Maenam Khu,
A. Phukdaeng,
Rayong 21140 Thailand
Location: Oven Room
Received Order: 21 March 2024
Calibration Date: 21 March 2024
Ambient Temperature: (26 ± 10) °C
Relative Humidity: (50 ± 30) %
Calibrated by: Man Pattanasongpaiboon

Approved by:
Approved Signatory
() Pornthipha Tameyakul
() Unnopphol Harachai
(✓) Suwit Imjai

Issue Date: 22 March 2024

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.



Equipment: Hot Air Oven
Condition As-Received: Used Item
Reference: 2403-0563OC-1
Procedure Used:-

Cert. No.: 24TM632
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) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

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

3. This certification is traceable to the International System of Unit.

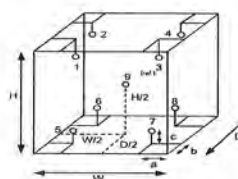
Remark: TPA: Technology Promotion Association (Thailand - Japan)

Result of Calibration:-

(°) Without Adjustment

Function of UUC*: Temperature Source

Fresh air setting: Close



Probe Installation Details: D = 0.40 m
W = 0.56 m
H = 0.48 m
Capacity = 0.11 m³

Environment during calibration		
	Beginning	Finished
Temp. (°C)	27	27
REL Humid. (%)	57	59
AC Supply (Volt)	222	224

Ref. Std. ID No.: @ Calibration Point		
Position:	(180) °C	(104) °C
1	18-18TC-01	18-18RTD-01
2	18-18TC-02	18-18RTD-02
3	18-18TC-03	18-18RTD-03
4	18-18TC-04	18-18RTD-04
5	18-18TC-05	18-18RTD-05
6	18-18TC-06	23-18RTD-06
7	18-18TC-07	18-18RTD-07
8	18-18TC-08	22-18RTD-08
9 (ref.)	18-18TC-09	18-18RTD-09



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2403-0563OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 24TM632
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
104.0	104.0	104.0	0.051	0.59	0.62	2
180.0	180.0	180.0	0.15	1.3	1.7	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	103.921	103.786	103.757	103.759	103.950	103.817	104.213	103.672	103.673	0.42
180.0	179.614	179.270	179.145	179.599	180.001	180.423	180.293	180.629	179.429	1.1

Average* : The average of 30 values in each position.
Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was included stability and excluded uniformity .
The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k , providing a level of confidence of approximately 95 %.

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TEL 0-2717-3000-29 FAX 0-2719-9484



Certificate of Calibration

Cert. No.: 24TM634
Page : 1 of 3

Equipment : Hot Air Oven
Manufacturer : Memmert
Model : UF 110
Serial No. : B423.0853
ID No. : RYG_EN0213
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5 T. Maenam Khu.
A. Pluakdaeng,
Rayong 21140 Thailand
Location : Oven Room
Received Order : 21 March 2024
Calibration Date : 21 - 22 March 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Man Pattansongpaiboon
Approved by :
() Pornthipap Tameyakul
() Unnopphol Harachai
✓ Suwit Imjai

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written approval of the Head of Corporate Services 3: Equipment Calibration and Testing Services.



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2403-0563OC-3

Cert. No.: 24TM634
Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-DT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

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

3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

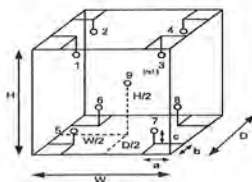
Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration	
	Beginning
Temp. (°C)	27
REL.Humid. (%)	59
AC Supply (Volt)	224

Ref. Std. ID No.: @
Calibration Point

Position :	(180) °C	(104) °C
1	18-18TC-01	18-18RTD-01
2	18-18TC-02	18-18RTD-02
3	18-18TC-03	18-18RTD-03
4	18-18TC-04	18-18RTD-04
5	18-18TC-05	18-18RTD-05
6	18-18TC-06	23-18RTD-06
7	18-18TC-07	18-18RTD-07
8	18-18TC-08	22-18RTD-08
9 (ref.)	18-18TC-09	18-18RTD-09



Probe Installation Details : Dimension of Chamber :
a = 5.0 cm D = 0.40 m
b = 5.0 cm W = 0.56 m
c = 5.0 cm H = 0.48 m
Capacity = 0.11 m³



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2403-0563OC-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 24TM634
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
104.0	104.0	104.0	0.065	0.52	0.90	2
180.0	180.0	180.0	0.20	1.2	2.0	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	104.169	103.506	103.808	103.712	103.772	103.730	104.280	103.805	103.798	0.42
180.0	180.701	179.239	179.935	179.999	180.127	180.138	180.895	179.313	180.211	1.1

Average* : The average of 30 values in each position.
Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was included stability and excluded uniformity .
The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k , providing a level of confidence of approximately 95 %.

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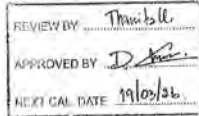


Certificate No. T250454

Page 1 of 3

Certificate of Calibration

Equipment : Chamber (Oven)
Manufacturer : MEMMERT
Model : UF 110
Serial No. : B423.0853
Customer Code : RVG_EN0213
ID No. : T5884A5
Customer : ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenam Khu,
A.Pluakdaeng, Rayong 21140
Customer Location : ENVIRONMENT LABORATORY
Date of Receipt : 12 March 2025
Calibrated By : Sujjar Naknakred (Site Calibration Manager)
Approved By : Boonchai Suriyawong (Site Calibration Manager)
Date of Issue : 21 MAR 2025



The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrology.

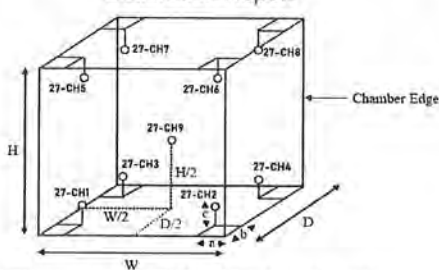
FM-L14 (18/18-08-66)



Certificate No. T250454

Page 3 of 3

Calibration Report



Remark : Internal Dimensions of Chamber : W (Width) = 58 cm., H (Height) = 48 cm and D (Depth) = 40 cm.
Size of installed Standard sensor number 27-CH1 to number 27-CH9 : a = 5 cm, b = 5 cm and c = 5 cm
Size of installed Standard sensor number 27-CH10 : W/2 = 29 cm, H/2 = 24 cm and D/2 = 20 cm

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)							
	27-CH1	27-CH2	27-CH3	27-CH4	27-CH5	27-CH6	27-CH7	27-CH8
104	103.84	104.10	104.30	104.48	103.73	104.14	103.95	104.22
180	179.41	179.92	180.80	181.37	179.54	179.52	179.62	180.31

Chamber (Oven)		Temperature Distribution				
Settling °C	Reading (°C)		Average (°C)	Stability (± °C)	Uniformity (°C)	Uncertainty (± °C)
	Min	Max				
104.0	103.9	104.1	104.0	0.08	0.65	0.42
180.0	-	180.0	180.01	0.17	1.26	0.49

* The quoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95%.

End of Certificate.

Approved By: Sujjar Naknakred

FM-L15 (18/18-08-66)



Certificate No. T250454

Page 2 of 3

Calibration Report

Equipment : Chamber (Oven)
Date of Calibration : 19 March 2025
Environment : Temperature : 26.5-26.9 °C
Line Voltage : 223.9-231.3 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

- This equipment was calibrated by insert nine resistance thermometer detectors into its chamber, the other one resistance thermometer detector use for ambient temperature measurement. The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2019) and AS2853-1986). All data show below were final values and the initial data from customer request. The temperature scale used was based on ITS - 90.
- Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
RTD	100 ohm	27-(CH1)-10	T240709	19 April 2025
DATA LOGGER	34970A	T149	T240709	19 April 2025
- This certificate is traceable to :
National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244)
- Condition of calibrated item : good
Equipment Description :

Time Constant	1	Hour	44	Minute	At	104 °C
Fresh Air Dampers	<input type="checkbox"/> Open	<input type="checkbox"/> Min	<input type="checkbox"/> Medium	<input type="checkbox"/> Max		
	<input checked="" type="checkbox"/> Close					
	<input type="checkbox"/> Not Available					
- Adjustment :
() without adjustment (X) after adjustment

Approved By: Boonchai Suriyawong

FM-L15 (18/18-08-66)



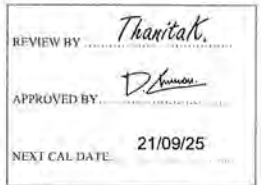
TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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534/4 PATTANAKARN ROAD SOI 16, SUAN LUANG, SUAN LUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert. No.: 24TM635
Page : 1 of 3

Equipment : Water Bath
Manufacturer : Mommert
Model : WNB22
Serial No.: L513.0648
ID No.: RVG_EN0061
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5, T. Maenam Khu,
A. Pluakdaeng,
Rayong 21140, Thailand
Location : Wet Chemistry Lab
Received Order : 21 March 2024
Calibration Date : 21 March 2024
Ambient Temperature : (26 ± 1) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Mani Pattanapongpaiboon
Approved by : Mani Pattanapongpaiboon
() Pornthipha Tameyakul
() Uruwaphol Harachai
(✓) Suwit Imjai



Issue Date : 23 March 2024

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2403-0563OC-4
Procedure Used :-

Cert. No.: 24TM635
Page : 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT04 Based on ASTM E715 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

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

3. This certification is traceable to the International System of Unit.

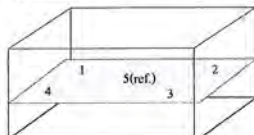
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	25	55	222
Finished of Calibration	25	57	223



Front

Position :	Ref. Std. ID No.:
1	4803988-001
2	4803988-002
3	4803988-003
4	4803988-004
5(ref.)	4803988-005



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2403-0563OC-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 24TM635
Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)					Uncertainty (± °C)
			1	2	3	4	5 (ref.)	
85.0	85.0	85.0	84.428	84.424	84.489	84.507	84.477	0.16

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
85.0	0.19	0.11	2

Average* : The average of 30 values in each position.

Uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

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

-000-

BKK_EL0043

Agilent Technologies

Agilent Technologies (Thailand) Limited
110 Sukhumvit Road, 22nd Floor, KJ
Siam Square Building, Siam Square
Bangkok 10500, Thailand
Tel : +662 611 1300
Fax : +662 632 4334
Email : agilent@agilent.com
Website : www.agilent.com/thailand

Service Confirmation Number: 695905441

Service Confirmation Date: 08.10.2024

Customer Contact:

ALS Laboratory Group (Thailand) Co., Ltd Head Office

106 Phatthanaburi 40 Phatthanaburi 40
Khaeng Phatthanaburi Khut Buri
TAX ID : 610556004659
chanatagarn.enchen@agilent.com
777158763

Invoice To:

ALS Laboratory Group (Thailand) Co., Ltd Head Office

106 Phatthanaburi 40 Phatthanaburi 40
Khaeng Phatthanaburi Khut Buri

Delivery Site:

ALS Laboratory Group (Thailand) Co., Ltd Head Office

106 Phatthanaburi 40 Phatthanaburi 40
Khaeng Phatthanaburi Khut Buri

Location:

Room
Bldg
Lab
Dept

SERVICE REPORT

Customer Purchase Order Number: 70371013

Service Request: Service Request Date:

Service Order: 4006676060 Service Confirmation: 695905441

REVIEW BY: *Chanatagarn C.*
APPROVED BY: *Chanatagarn C.*
NEXT CAL DATE: 24/10/2024

Direct Inquiries to:

Contact Name: *Chanatagarn C.*
Contact E-mail: *chanatagarn@agilent.com*
Contact Telephone: +662 632 4334
Contact Fax: +662 632 4334

Service Instrument:

Model Number	Model Description	Serial Number	System Handle	Parent Asset
SYS-IM-7900	ICPMS 7900 System			
G8410A	SPS 4 Autosampler	AU15430722	ICP MS 7900	SYS-IM-7900
G8411A	ISIS 3 for Agilent 7850/7900/8900	JP16510227	ICP MS 7900	SYS-IM-7900
G3292A	PSC 610ST Chiller	ZU16A1948	ICP MS 7900	SYS-IM-7900
G8403A	Agilent 7900 ICP-MS	JP15471109	ICP MS 7900	SYS-IM-7900

Service Items:

Item	Service/Part #	Description	Qty	Entitlement	Service Start	Service End
1000	EQO	Enterprise Operational Qualification	1.00	Agreement Entitlement 100 % covered	04.10.2024	04.10.2024
1010	S185-S850	ICP-MS Checkout Solutions	1.00	Agreement Entitlement 100 % covered		

Additional Information:

Agilent Technologies is a Special Offer. Products 2 years and our full range of accessories and consumables are included in the price. See our website for more details.

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Bangkok 10500, Thailand
Tax ID : 610556004659

Agilent Technologies (Thailand) Limited Head Office
110 Sukhumvit Road, 22nd Floor, KJ
Siam Square Building, Siam Square
Bangkok 10500, Thailand
Tax ID : 610556004659



Certificate of Calibration

Service Information:

Problem Description: *WU-EOQ-IM-7000-5001263656		
Service Provided: Perform CO Hardware Test CDS logon, auto sampler, Auto tune, BG and 20 Min stability. I calibrate the instrument No BKK_EL0043 test all pass.		
Service Overview Code: Reason Code: Scheduled Service Diagnosis Code: Scheduled Service Resolution Code: Scheduled Service		
Reported Hours: 7.0	Travel Hours: 2.0	
Customer Field Service Representative Name: Pantap Kurasathin	Customer Field Service Representative Signature: 	Date: 06 Oct 2024
Customer Name: Sopkwan Mak	Customer Signature: 	Date: 06 Oct 2024
Additional Comments:		

Page 3 of 3

Equipment: CONDUCTIVITY METER Certificate No.: C24240072
Model: Orion STAR A215 Issued Date: 25 March 2024
Serial No. (or ID.): X58821 (RYG_EN0200) Job No.: WO-00022235
Manufacturer: Thermo Scientific Page: 1 of 2
Electrode Serial No: YQ1-11982 Model: ORION 01300SMD Brand: Thermo Scientific
Condition: In Condition

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

Environment Condition: Temperature 22.6 °C ± 0.3 °C
Humidity 46.7 %RH ± 1.4 %RH
REVIEW BY:
APPROVED BY:
NEXT CAL DATE: 25/03/25

Calibration Place: ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
(Wet Chemistry Lab) 616/10 Moo 5 T.Meenam Khu,
A.Pluakdaeng, Rayong 21140, Thailand.

Calibration By: Mr. Atachai Ngamchanai
Calibration Date: 25 March 2024
The Method used: In house method, CAL-WI-49, base on ASTM D 1125-14 and D 5391-14
Traceability: This certificate is traceable to the SI Units maintained by CRM of NIST(SRM) through CPA chem Co., Ltd. (ISO/IEC 17034) Certificate No. 960753, 890590, 960754, 890592

(Mr. Atachai Ngamchanai)

Person in charge

(Mr. Nilinun Srihewan)

Authorized signatory

This certificate is issued for the purpose of measurement according to the International System of Units (SI) and is not a statement of conformity with any standard or other regulatory requirement.

The measurement uncertainty stated in the report is based on the current state of knowledge and is not a statement of conformity with any standard or other regulatory requirement.

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EN-FM-C24-09, 12 Sep 2023

Certificate No.: C24240072

Page: 2 of 2

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

Calibration Results:

Before Adjustment

Standard	Unit Under Calibration	Correction	Coverage Factor	Uncertainty (±)
Conductivity Solution	Reading		(K)	
25.000 µS/cm	26.71 µS/cm	-4.710 µS/cm	2.00	0.26 µS/cm
84.000 µS/cm	86.66 µS/cm	-6.660 µS/cm	2.00	0.68 µS/cm
1413.1 µS/cm	1455 µS/cm	-41.9 µS/cm	2.00	1.1 µS/cm
12.880 mS/cm	13.34 mS/cm	-0.460 mS/cm	2.00	0.088 mS/cm

After Adjustment ; at 25 µS/cm, 84 µS/cm, 1413.0 µS/cm, 12.860 mS/cm

Standard	Unit Under Calibration	Correction	Coverage Factor	Uncertainty (±)
Conductivity Solution	Reading		(K)	
25.000 µS/cm	25.61 µS/cm	-0.610 µS/cm	2.00	0.26 µS/cm
84.000 µS/cm	84.57 µS/cm	-0.570 µS/cm	2.00	0.68 µS/cm
1413.1 µS/cm	1415 µS/cm	-1.9 µS/cm	2.00	1.1 µS/cm
12.880 mS/cm	12.89 mS/cm	-0.010 mS/cm	2.00	0.088 mS/cm

The End of Certificate

เลขที่ใบงาน: WO-00022235

ชื่อเครื่องวัด: CONDUCTIVITY METER รุ่น: Orion STAR A215 หมายเลขเครื่อง: X58821

ตรวจสอบ (วัน)	รายการตรวจสอบ	ตรวจสอบ (ผล)	หมายเหตุ
25 Mar 2024		25 Mar 2024	
ปกติ	ไม่ปกติ	ปกติ	ไม่ปกติ
General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Spectrophotometer			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
pH Meter and Conductivity Meter			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Turbidimeter			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Automatic titrator			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

ข้อเสนอแนะ:

Mr. Atachai Ngamchanai

Signature



Certificate of Calibration

Certificate No.: C15240347

Page: 2 of 2

Equipment: Digital Thermometer with Probe
Model: ORION STAR A215
Serial No.: X58821
Manufacturer: Thermo Scientific
Condition: In Condition

Certificate No.: C15240347
Issue Date: 25 March 2024
Job No.: WO-00022235
ID No.: RYG_EN0200
Page: 1 of 2

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

Environment Condition: Temperature: 30 °C ± 10 °C
Humidity: 55 %RH ± 25 %RH
Voltage: 220 VAC ± 10 %

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

Calibration By: Mr. Atthachai Ngamchanat
Calibration Date: 25 March 2024
The Method used: In house method, CAL-WI-69, by comparison with standard thermometer
Traceability: This certificate is traceable to the International System of Unit maintained by
Quality Reborn Co., Ltd. (QR) Certificate No. QR23 1953

REVIEW BY: *[Signature]*
APPROVED BY: *[Signature]*
NEXT CAL. DATE: 25/03/25

The End of Certificate

(Mr. Atthachai Ngamchanat)

Person in charge

This certificate is issued in accordance with the International System of Units (SI), it provides traceability of measurement to the International System of Units (SI) and is not subject to any other requirements. The measurement uncertainty stated in this certificate is based on the expanded uncertainty multiplied by the coverage factor (k=2) for a normal distribution of approximately 95%. It is determined in accordance with the Guide to the Expression of Uncertainty in Measurement (GUM). The results may be affected by deviations from specified conditions. The results may only be used for the intended purpose. The results shall not be reproduced except in full without approval of DKSH Technology Limited.

(Mr. Pramote Ramrong)

Authorized signatory

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CAL-MRA-1014-00-MH-2012

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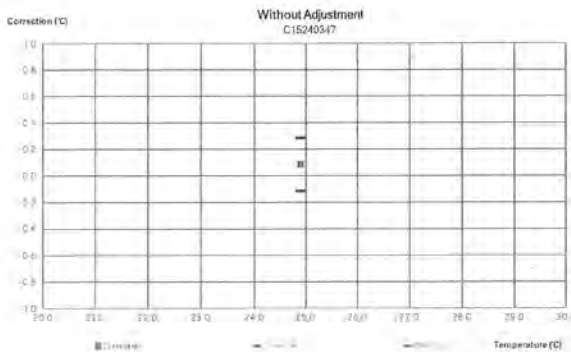
CAL-MRA-1014-00-MH-2012

ใบตรวจสอบสภาพเครื่องมือวัดอุณหภูมิ

Certificate No.: C15240347

Equipment: Digital Thermometer with Probe
Serial No.: X58821

Model: ORION STAR A215



ตรวจสอบ (ปี)	ตรวจสอบ (ปี)	ตรวจสอบ (ปี)
25-Mar-2024	25-Mar-2024	25-Mar-2024
ชื่อ	ชื่อ	ชื่อ
ชื่อ	ชื่อ	ชื่อ
General		
<input type="checkbox"/>	<input type="checkbox"/>	1. แหล่งจ่ายไฟ
<input type="checkbox"/>	<input type="checkbox"/>	2. Adapter / Power supply 220 / 110 VAC
<input type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์หลัก Main Switch
<input type="checkbox"/>	<input type="checkbox"/>	4. คีย์เลือกโหมด Selector Key
<input type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอแสดงผล Display
<input type="checkbox"/>	<input type="checkbox"/>	6. แบตเตอรี่ Battery
<input type="checkbox"/>	<input type="checkbox"/>	7. เซนเซอร์ Sensor (In / Ex)
<input type="checkbox"/>	<input type="checkbox"/>	8. เซนเซอร์ Sensor (In / Ex)

Issues:

Mr. Atthachai Ngamchanat
Service Engineer

DKSH Technology Limited
253 Sukhumvit Road, Bangkok, Thailand 10260
Phone: +66 2634 7020 Email: info@dksh.com

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Certificate of Calibration

Certificate No.: C24250077

Page: 2 of 2

Equipment: CONDUCTIVITY METER Certificate No.: C24250077
Model: Orion STAR A215 Issued Date: 21 March 2025
Serial No. (or ID): X58821 (RYG-EN0200) Job No.: WO-00064803
Manufacturer: Thermo Scientific Page: 1 of 2
Electrode Serial No: YQ1-11982 Model: ORION 013005MD Brand: Thermo Scientific
Condition: In Condition

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

Environment Condition: Temperature 23.5 °C ± 0.8
Humidity 52.4 %RH ± 1.3

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

Calibration By: Mr. Pongpisut Suebchantha
Calibration Date: 21 March 2025
The Method used: In house method, CAL-WI-49, base on ASTM D 1125-14 and D 5391-14
Traceability: This certificate is traceable to the SI Units maintained by CRM of NIST(SRM) through
CPA chem Co., Ltd. (ISO/IEC 17034) Certificate No. 1066605, 1066607, 1066608,
1066609

REVIEW BY: Pongpisut Suebchantha
APPROVED BY: Pongpisut Suebchantha
NEXT CAL DATE: 21/3/26

Person in charge

Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated in 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.
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CAL-FM-C14-02 12 Sep 2022

Calibration Results:

Before Adjustment

Standard	Unit Under Calibration	Correction	Coverage Factor	Uncertainty (±)
Conductivity Solution	Reading		(k)	
25.000 μS/cm	27.43 μS/cm	-2.430 μS/cm	2.00	0.76 μS/cm
84.003 μS/cm	90.76 μS/cm	-6.757 μS/cm	2.00	0.68 μS/cm
1413.1 μS/cm	1464 μS/cm	-50.9 μS/cm	2.00	11 μS/cm
12.881 mS/cm	13.41 mS/cm	-0.529 mS/cm	2.00	0.098 mS/cm

After Adjustment : at 25 µS/cm, 84 µS/cm, 1413 µS/cm, 12.88 mS/cm

Standard	Unit Under Calibration		Correction	Coverage Factor	Uncertainty (±)
Conductivity Solution	Reading			(k)	
25.000 μS/cm	25.63 μS/cm	-0.630 μS/cm	2.00	0.28 μS/cm	
84.003 μS/cm	84.53 μS/cm	-0.527 μS/cm	2.00	0.68 μS/cm	
1413.1 μS/cm	1415 μS/cm	-1.9 μS/cm	2.00	11 μS/cm	
12.881 mS/cm	12.92 mS/cm	-0.039 mS/cm	2.00	0.098 mS/cm	

The End of Certificate

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: WO-00064803

ชนิดเครื่องมือ: CONDUCTIVITY METER

รุ่น: Orion STAR A215

หมายเลขเครื่อง: X58821

ตรวจสอบ (วัน)	รายการตรวจเช็ค	ตรวจสอบ (ให้)	หมายเหตุ
21 Mar 2025		ปกติ	ไม่ปกติ
ปกติ	ไม่ปกติ		
	General		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายในเครื่อง)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิทช์เปิด-ปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>
	Spectrophotometer		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	7. ตัวกรองแสงความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	9. เวลาการเปิดแสง (UV < 3,000 hour)	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	10. เวลาการเปิดแสง (Visible < 5,000 hour)	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	11. ช่องวัดหลายตัวหมุน (Carousel Module)	<input type="checkbox"/>
	pH Meter and Conductivity Meter		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	13. วัสดุสารละลายใน Electrode (Level KCl)	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	14. ฝาปิดกันฝุ่น Electrode (Dust Protection Hood)	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	15. ฐานยึดอิเล็กโทรด (Stand)	<input checked="" type="checkbox"/>
	Turbidimeter		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	16. พลาสม่าเซลล์ (No Sample)	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	17. ระบบการส่องสว่างแสง (>= 2.5 ไมล์ 3.0)	<input type="checkbox"/>
	Automatic titrator		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	18. หลอด Piston Burettes	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	20. ระบบผสมยาและอุปกรณ์ประกอบ	<input type="checkbox"/>

ฉบับนี้

Mr. Pongpisut Suebchantha

Service Engineer

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Phone: +66 2039 7800 E-mail: info@dksh.com Website: www.dksh.com

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CAL-FM-C14-03 20 Jul 2022



Certificate of Calibration

Equipment: Digital Thermometer with Probe
Model: Orion STAR A215
Serial No.: X58821
Manufacturer: Thermo Scientific
ID No.: RYG-EN0200

Certificate No.: C15250430
Issued Date: 21 March 2025
Job No.: WO-00064803
Page: 1 of 2
Condition: In Condition

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

Environment Condition: Temperature: 30 °C ± 10 °C
Humidity: 55 %RH ± 25 %RH
Voltage: 220 VAC ± 10 %

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

Calibration By: Mr. Piyaipat Saidoung
Calibration Date: 21 March 2025
The Method used: In house method, CAL-WI-69, by comparison with standard thermometer
Traceability: This certificate is traceable to the International System of Unit maintained by
Quality Reborn Co., Ltd. (QR)

REVIEW BY: Piyaipat Saidoung
APPROVED BY: Piyaipat Saidoung
NEXT CAL DATE: 21/3/26

(Mr. Piyaipat Saidoung)

Person in charge

(Mr. Tiewwong Thaitiang)

Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated in 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.

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Phone: +66 2039 7800 E-mail: info@dksh.com Website: www.dksh.com

Delivering Growth - In Asia and Beyond

CAL-FM-C14-14 06 Dec 2022



Certificate No.: C15250430

Page: 2 of 2

Reference standard equipment:

Equipment	Certificate no	Cal. date	Next Cal. date
Digital Thermometer with Probe	QR24-2043	21 August 2024	21 August 2025

Calibration Results:

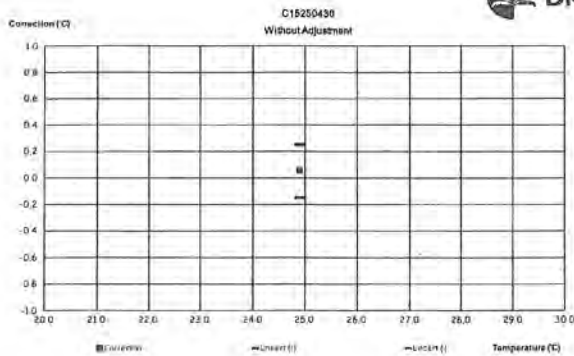
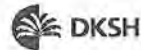
Without Adjustment

Sensor Type: RTD Electrode Serial No. CS1-11923 Channel: -

Diameter (mm): 15 Length (mm): 120 Immersion (mm): 110

Calibrate Point (°C)	STD. Reading (°C)	UUC. Reading (°C)	Correction of UUC (°C)	Uncertainty (± °C)
25.0	24.954	24.9	0.054	0.20

The End of Certificate



บริษัท ดีเคเอสเอช (เอเชีย) จำกัด
DKSH Technology Limited
25/25 ซอยสุขุมวิท 24 แขวงคลองเตย เขตคลองเตย กรุงเทพฯ 10110
Phone: +66 2639 7000 Email: info.asia@dksh.com Website: www.dksh.com/asia/thailand

Delivering Growth – in Asia and Beyond.

CAL-FM-C15-14: 05 Dec 2022

Delivering Growth – in Asia and Beyond.



ใบตรวจสอบสภาพเครื่องมือวัดอุณหภูมิ

Equipment : Digital Thermometer with Probe

Certificate No. : C15250430

Serial No. : X58821

Model : Orion STAR A215

ตรวจสอบ (ข้อ)		รายการตรวจสอบ	ตรวจสอบ (ข้อ)		หมายเหตุ
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. Adapter / Power supply 220 / 110 VAC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การแสดง Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	6. Battery	<input type="checkbox"/>	<input checked="" type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาพ Sensor (In / Ex)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

เขียนโดย: _____

Mr. Piyapat Seldoung
Service Engineer

บริษัท ดีเคเอสเอช (เอเชีย) จำกัด
DKSH Technology Limited
25/25 ซอยสุขุมวิท 24 แขวงคลองเตย เขตคลองเตย กรุงเทพฯ 10110
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ภาคผนวก จ

สำเนาหนังสือใบอนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

ลำดับที่	สารเคมี	วิธีวิเคราะห์
19	Copper	1) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾
20	Cyanide	Distillation, Colorimetric Method ⁽³⁾
21	2,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
22	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
23	2,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
24	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
25	2,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
26	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
27	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
28	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
29	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
30	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
31	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
32	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
33	Formaldehyde	Distillation, Colorimetric Method ⁽⁵⁾
34	Free Chlorine	1) DPD Ferrous Titrimetric Method ⁽⁶⁾ 2) DPD Colorimetric Method ⁽⁷⁾
35	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
36	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
37	Hexavalent Chromium	Colorimetric Method ⁽⁸⁾
38	3-Hydroxycarbofuran	High-Performance Liquid Chromatographic Method ⁽⁹⁾
39	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾

40 Manganese...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
40	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾
41	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽³⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
42	Methiocarb	High-Performance Liquid Chromatographic Method ⁽⁵⁾
43	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
44	Methomyl	High-Performance Liquid Chromatographic Method ⁽⁵⁾
45	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾
46	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ⁽⁶⁾ 2) Soxhlet Extraction Method ⁽⁷⁾
47	Oxamyl	High-Performance Liquid Chromatographic Method ⁽⁵⁾
48	Propoxur	High-Performance Liquid Chromatographic Method ⁽⁵⁾
49	pH	Electrometric Method ⁽⁸⁾
50	Phenols	1) Distillation, Chloroform Extraction Method ⁽⁹⁾ 2) Distillation, Direct Photometric Method ⁽¹⁰⁾
51	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾
52	Sulfide	Iodometric Method ⁽¹¹⁾
53	Temperature	Laboratory and Field Methods ⁽¹²⁾
54	Total Dissolved Solids	Dried at 180 °C ⁽¹³⁾
55	Total Kjeldahl Nitrogen	Semi-Micro Kjeldahl Method ⁽¹⁴⁾
56	Total Phosphorous	Digestion, Colorimetric Method ⁽¹⁵⁾
57	Total Suspended Solids	Dried from 103-105 °C ⁽¹⁶⁾
58	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
59	Trivalent Chromium	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽¹⁷⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ⁽¹⁸⁾
60	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾

วิธีวิเคราะห์...

วิธีวิเคราะห์ จำนวน 126 รายการ

ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
5	Aniliny	1) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
8	Barium	1) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾
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	Benzobifluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
12	Benzofluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
13	Benzoic Acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
14	Benzolaprene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
15	Benzolghiperylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾
17	Bis(2-chloroethoxy)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

18 Bis(2-ethoxyethyl)phthalate...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
18	Bis(2-ethoxyethyl)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 ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾
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 ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾
34	Chromium (II)	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽¹⁹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ⁽²⁰⁾
35	Chromium (VI)	Colorimetric Method ⁽²¹⁾

36 Chrysene...

ลำดับที่	สารเคมี	วิธีการตรวจ
36	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
37	Cyanide	Distillation, Colorimetric Method ⁽⁶⁾
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
39	DDO	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
40	DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
41	DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
42	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
43	Di-n-Butyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
47	3,3-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾

55 1,3-Dichloropropane...

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

76 γ-HCH...

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

94 N-Nitrosodiphenylamine...

ลำดับที่	สารเคมี	วิธีการตรวจ
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
95	N-Nitrosodi-n-Propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB 1242 - PCB 1268 - PCB 1254 - PCB 1260	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
98	pH	Electrometric Method ⁽⁶⁾
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
100	Phenol	1) Distillation, Chloroform Extraction Method ⁽¹⁾ 2) Distillation, Direct Photometric Method ⁽¹⁾ 3) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
102	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽¹⁾
103	Silver	1) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽¹⁾
104	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
105	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
106	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
107	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
108	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
109	TPH (C ₉ -C ₁₀)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾

110 TPH (C₉-C₁₀)...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
110	TPH (C ₁₀ -C ₁₆)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,22)
111	TPH (C ₁₀ -C ₃₅)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,22)
112	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
113	1,1,1-Trichloroethene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
114	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
115	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
118	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
119	Vanadium	1) Digestion, Inductively Coupled Plasma Method ⁽²⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁶⁾
120	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
121	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
122	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
123	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
124	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
125	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
126	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽²⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁶⁾

รายการอื่น...

รายการอื่น (ต่อเนื่องจาก) จำนวน 28 รายการ

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

15 Lead...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	Lead	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁶⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁶⁾
16	Manganese	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁶⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁶⁾
17	Mercury	1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽³⁾ 2) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽³⁾
18	Nickel	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁶⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁶⁾
19	Opacity	Ringelmann's Method ⁽²⁾
20	Oxides of Nitrogen	1) Adsorption Sampling, Phenoldisulfonic Acid Method ⁽³⁾ 2) Adsorption Sampling, Alkaline Permanganate/Colorimetric Method ⁽³⁾ 3) Instrumental Analyzer Method ⁽⁶⁾
21	Selenium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁶⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁶⁾
22	Sulfur Dioxide	1) Adsorption Sampling, Barium-Thioin Titrimetric Method ⁽³⁾ 2) Instrumental Analyzer Method ⁽⁶⁾
23	Sulfuric Acid	Isokinetic Sampling, Barium-Thioin Titrimetric Method ⁽³⁾
24	Tellurium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁶⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁶⁾
25	Tin	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁶⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁶⁾
26	Total Suspended Particulate	1) Isokinetic Sampling, Gravimetric Method ⁽³⁾ 2) Paired Train, Isokinetic Sampling, Gravimetric Method ⁽³⁾

27 Vanadium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Vanadium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁶⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁶⁾
28	Xylene	Absorption Sampling, Gas Chromatographic Method ⁽³⁾

สิ่งมีชีวิตที่ย่อยสลายได้ในตัว จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,2,14) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(2,15) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,2,15)
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,15) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,15)
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,15) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,15)
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,15) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,15)

5 Beryllium...

ลำดับที่	สารเคมี	วิธีการตรวจ
28	- 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5-Trichlorobiphenyl - 2,4',5-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',3,5'-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',3,4,5'-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',5,6-Heptachlorobiphenyl - 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,5,26) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28) Electrometric Method ^(23,24) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14) 5) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 6) Digestion, Inductively Coupled Plasma Method ^(7,18) 7) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
29	pH	
30	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,18) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)

31 Silver...

ลำดับที่	สารเคมี	วิธีการตรวจ
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,18) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,18) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,5,26) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,18) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
35	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,18) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)

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ลำดับที่	สารเคมี	วิธีการตรวจ
1	Acenaphthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)
2	Acetone	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,5,29) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(7,18)
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)
4	Anthracene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ^(7,18) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^(7,18) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)
8	Barium	1) Digestion, Inductively Coupled Plasma Method ^(7,18) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
9	Benz(a)anthracene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,5,29)

11 Benzo(b)fluoranthene

ลำดับที่	สารเคมี	วิธีการตรวจ
11	Benzo(b)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)
12	Benzo(b)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)
13	Benzoic acid	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)
14	Benzo(a)pyrene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)
15	Benzo(g,h,i)perylene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ^(7,18) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
17	Bis(2-chloroethyl)ether	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)
18	Bis(2-ethylhexyl)phthalate	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,5,29)
20	Bromoforn	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,5,29)
21	Butanol	Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(7,18)
22	Butyl Benzyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,29) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,28)

23 Cadmium...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^(7,11) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,11)
24	Carbazole	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
28	p-Chloroaniline	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
32	2-Chlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ^(7,11) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,11)
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method/ Alkaline Digestion, Colorimetric Method, Calculation Method ^(7,11,12) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method, Calculation Method ^(7,11,12)
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^(7,12)

36 Chrysene...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
36	Chrysene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
37	Cyanide	Extraction, Distillation, Colorimetric Method ^(7,25,26)
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
39	DDD	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
40	DDE	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
41	DDT	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
42	Dibenz(a,h)anthracene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
43	Di-n-Butyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
47	3,3-Dichlorobenzidine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)

49 1,2-Dichloroethane...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
53	2,4-Dichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
58	Diethyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
59	2,4-Dimethylphenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
60	2,4-Dinitrophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
61	2,4-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
62	2,6-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)

63 Di-n-Octyl Phthalate.

ลำดับที่	สารเคมี	วิธีวิเคราะห์
63	Di-n-Octyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
67	Fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
68	Fluorene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
70	Heptachlor epoxide	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)
73	n-Hexane	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11,20) 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(11,20)

73 n-Hexane...

ลำดับที่	สารเคมี	วิธีการตรวจ
74	α -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
75	β -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
76	γ -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
77	Hexachlorocyclopentadiene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
78	Hexachloroethane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
79	Indeno[1,2,3-cd]pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
80	Isophorone	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
81	Lead	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁸⁹⁾ 2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry ⁽²³⁾ 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽⁹⁰⁾

B4 Methanol...

ลำดับที่	สารเคมี	วิธีการตรวจ
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,28) 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(13,28)
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,28)
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,28)
88	2-methylphenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
89	2-Methylnaphthalene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
90	Methyl, tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,28)
91	Naphthalene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
93	Nitrobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
94	N-Nitrosodiphenylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
95	N-Nitrosodi-n-propylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)

96 Polychlorinated biphenyls (PCBs)

ลำดับที่	สารเคมี	วิธีการตรวจ
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,2',3,5-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3',3,4,6-Pentachlorobiphenyl - 2,2',3,4,4',5-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,3',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 - Pentachlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
97	Phenanthrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)

99 Phenol...

ลำดับที่	สารเคมี	วิธีการตรวจ
99	Phenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
100	Pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
101	Selenium	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
102	Silver	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
103	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,28)
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,28)
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,28)
106	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,28)
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(18,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,28)
108	TPH (C ₉ -C ₁₁)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,28)
109	TPH (C ₁₂ -C ₁₄)	1) Automated Extraction, Gas Chromatographic Method ^(11,28) 2) Solvent Extraction, Gas Chromatographic Method ^(11,28) 3) Ultrasonic Extraction, Gas Chromatographic Method ^(11,28)
110	TPH (C ₁₅ -C ₁₇)	1) Automated Extraction, Gas Chromatographic Method ^(11,28) 2) Solvent Extraction, Gas Chromatographic Method ^(11,28) 3) Ultrasonic Extraction, Gas Chromatographic Method ^(11,28)
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,28)
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,28)
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,28)
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,28)

115 2,4,5-Trichlorophenol...

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๐๔ สิงหาคม ๒๕๖๓

เรื่อง คัดเลือกหน่วยงานขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้ทรงคุณวุฒิ (ประเทศไทย) เจ้าพนักงาน

สืบเนื่อง จากขอขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน และขอขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
เอกสาร เลขที่ ๒๗ พฤษภาคม ๒๕๖๓

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือขอขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอมแอล แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด จำนวน ๓ ฉบับ

ตามที่ขอขึ้นทะเบียน บริษัท เอมแอล แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอขึ้นทะเบียน
หนังสือขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขที่ ๒๖๖/๒๐๖๓ วันที่ ๒๖
กันยายน ๒๕๖๓ สำนักงานคณะกรรมการอาหารและยา กระทรวงสาธารณสุข

กรมทรัพยากรธรรมชาติและสิ่งแวดล้อม ได้แจ้งให้ บริษัท เอมแอล แลบบอราทอรี กรุ๊ป (ประเทศไทย)
เจ้าพนักงานขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีเงื่อนไขการขึ้นทะเบียนดังนี้

๑. ผู้เข้ารับการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

- ๑) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๒) นายวิวัฒน์ ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๓) นายสุพรรณ ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๔) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๕) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๖) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๗) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๘) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๙) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๑๐) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๑๑) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๑๒) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๑๓) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๑๔) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๑๕) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๑๖) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๑๗) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๑๘) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๑๙) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓
- ๒๐) นายสมชาย ใจงาม พ.ศ. ๒๕๖๓-๒๕๖๓

๑๖) นายสมชาย ใจงาม

๑๖) นายสมชาย ใจงาม

เอกสารแนบท้ายหนังสือขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอมแอล แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขที่ ๒๖๖/๒๐๖๓
ที่ ๑๓-๐๒๖๐-๗ ๗ ๕๓ ๘ ลงวันที่ ๐๔ สิงหาคม ๒๕๖๓

ขอขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๒๕ รายการ
ภายใต้ จำนวน ๒๕ รายการ

ลำดับ ที่	สารเคมี	วิธีการตรวจ
1	Biochemical Oxygen Demand	1) 5-Day BOD Test, Membrane Electrode Method ¹⁾
2	Chemical Oxygen Demand	2) 5-Day BOD Test, Azide Modification Method ¹⁾
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	ADMT Weighted-Average Spectrophotometric Method ³⁾
7	Oil and Grease	Distillation, Colorimetric Method ⁴⁾
8	pH	Distillation, Colorimetric Method ⁴⁾
9	Phenols	Distillation, Colorimetric Method ⁴⁾
10	Sulfide	Distillation, Colorimetric Method ⁴⁾
11	Temperature	Field Method ⁵⁾
12	Total Dissolved Solids	Distillation, Colorimetric Method ⁴⁾
13	Total Hardness	Distillation, Colorimetric Method ⁴⁾
14	Total Suspended Solids	Distillation, Colorimetric Method ⁴⁾

น้ำใต้ดิน จำนวน ๓ รายการ

ลำดับ ที่	สารเคมี	วิธีการตรวจ
1	Cyanide	Distillation, Colorimetric Method ⁴⁾
2	pH	Field Method ⁵⁾
3	Phenols	Distillation, Colorimetric Method ⁴⁾

นายสมชาย ใจงาม

ศูนย์วิจัยและพัฒนาระบบบริหารงานด้านสิ่งแวดล้อม
โทร. ๐ ๒๖๖๓ ๒๐๖๓ ต่อ ๕๐๐๐๐
โทรสาร ๐ ๒๖๖๓ ๒๐๖๓ ต่อ ๕๐๐๐๐



เอกสารแนบท้ายหนังสือขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน



ตารางเทียบ (ปล่องระบาย) จำนวน 7 ระบาย

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

เอกสารอ้างอิง

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4. กระทรวงอุตสาหกรรม, ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2549, เรื่อง กำหนดค่าปริมาณหน่วยวัดที่เจือปนในอากาศที่ระบายออกจากปล่องของหม้อน้ำของโรงงาน, ราชกิจจานุเบกษา, 4 ธันวาคม 2549, เล่มที่ 123 ตอนพิเศษ 1254.
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6. United States Environmental Protection Agency, Standards of Performance for New Stationary Sources, 40 CFR 60, Appendix A, 2019.

7. United States

7. United States Environmental Protection Agency, Standards of Performance for New Stationary Sources, 40 CFR 60, Appendix A, 2020.

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9. United States Environmental Protection Agency, Determination of Carbon Monoxide Emission from Stationary Sources; Instrumental Analyzer Procedure, 40 CFR 60, Appendix A Method 10, 2017.

10. United States Environmental Protection Agency, Determination of Oxide of Nitrogen Emission from Stationary Sources; Instrumental Analyzer Procedure, 40 CFR 60, Appendix A Method 7E, 2023.

11. United States Environmental Protection Agency, Determination of Sulfur dioxide Emission from Stationary Sources; Instrumental Analyzer Procedure, 40 CFR 60, Appendix A Method 6C, 2017.

OK

ที่ นก ๐๑๐๐๙/ ๑๐ ๐๕ ๕๖



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงปทุมวัน
กรุงเทพฯ 10329

๐๘ ตุลาคม ๒๕๖๕

เรื่อง เพิกถอนใบอนุญาตประกอบกิจการโรงงาน

เรียน กรรมการผู้จัดการ บริษัท เอนเอเอส แลบริเอทอรี่ กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง หนังสือ บริษัท เอนเอเอส แลบริเอทอรี่ กรุ๊ป (ประเทศไทย) จำกัด เลขที่ นก ๐๐๒๔/๐๐๑
ลงวันที่ ๓๐ สิงหาคม ๒๕๖๓

ตามที่บริษัทได้แจ้ง บริษัท เอนเอเอส แลบริเอทอรี่ กรุ๊ป (ประเทศไทย) จำกัด ที่ประกอบกิจการ
โรงงานเอกชน เลขทะเบียน ๖๓๒๑ สถานที่ตั้งเลขที่ ๖๓๖/๓๐ หมู่ที่ ๕ ตำบลบึงน้ำเต้า อำเภอปลวกแดง
จังหวัดระยอง ขอเปิดใช้โรงงานเพื่อประกอบกิจการโรงงานเพื่อประกอบกิจการตามคำขอ ความละเอียด
ดังนี้แล้ว นั้น

กระทรวงอุตสาหกรรม (กรม) ได้รับทราบและดำเนินการแก้ไขข้อบกพร่องที่ผู้ประกอบการ
โรงงานเอกชน จำนวน ๕ ราย ๑๖ แห่งเรียบร้อยแล้ว เสร็จสิ้น

คำสั่งที่ ๒๓ นายพงษ์ภาว สีดา
คำสั่งที่ ๒๔ นายสุภาวดี งามสุวรรณ
คำสั่งที่ ๒๕ นายสุภาวดี งามสุวรรณ
คำสั่งที่ ๒๖ นายสุภาวดี งามสุวรรณ
คำสั่งที่ ๒๗ นายสุภาวดี งามสุวรรณ
คำสั่งที่ ๒๘ นายสุภาวดี งามสุวรรณ

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายพงษ์ภาว สีดา)
รองอธิบดีกรมโรงงาน
อุตสาหกรรม

ศูนย์วิจัยและพัฒนาสิ่งแวดล้อมโรงงานภาคตะวันออก

โทร. ๐ ๓๖๒๓ ๖๖๕๔ ต่อ ๕๖๐๐๑-๑๕

เว็บไซต์: www.ewp.go.th

Green Industry "อุตสาหกรรมก้าวหน้า ไร้มลพิษ" มุ่งสู่การพัฒนาที่ยั่งยืน



ที่ นก ๐๑๐๐๙/ ๑๐ ๐๕ ๕๖



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงปทุมวัน
กรุงเทพฯ 10329

๒๐ พฤษภาคม ๒๕๖๕

เรื่อง ยกเลิกประกาศของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอนเอเอส แลบริเอทอรี่ กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง หนังสือกรมโรงงานอุตสาหกรรม/เปลี่ยนแปลงบุคลากร และชนิดความถี่ของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๓๐ เมษายน ๒๕๖๔

ตามที่ขอตั้งห้องปฏิบัติการวิเคราะห์ เอนเอเอส แลบริเอทอรี่ กรุ๊ป (ประเทศไทย) จำกัด ที่ประกอบกิจการ
โรงงานเอกชน เลขทะเบียน ๖๓๒๑ สถานที่ตั้งเลขที่ ๖๓๖/๓๐ หมู่ที่ ๕ ตำบลบึงน้ำเต้า อำเภอปลวกแดง
จังหวัดระยอง ขอเปิดใช้โรงงานเพื่อประกอบกิจการโรงงานเพื่อประกอบกิจการตามคำขอ ความละเอียด
ดังนี้แล้ว นั้น

กรมโรงงานอุตสาหกรรมได้รายงานแล้ว ให้ยกเลิกเจ้าภาพที่ห้องปฏิบัติการวิเคราะห์เอกชน
จำนวน ๑ ราย ได้แก่ นายปรเมศ ด้วงบุญ ทะเบียนเลขที่ ๖๓๒๑-๑-๐๐๕๓

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

J-C สีดา

(นายประจักษ์ อัครมณี)

ผู้อำนวยการสำนักงานสิ่งแวดล้อมภาค
ปทุมธานี

ศูนย์วิจัยและพัฒนาสิ่งแวดล้อมโรงงานภาคตะวันออก

โทร. ๐ ๓๖๒๓ ๖๖๕๔ ต่อ ๕๖๐๐๑-๒

เว็บไซต์: ewp.go.th

Green Industry

"อุตสาหกรรมก้าวหน้า ไร้มลพิษ" มุ่งสู่การพัฒนาที่ยั่งยืน





๒๗ พฤษภาคม ๒๕๖๕

เรื่อง เปลี่ยนแปลงชื่อ สกูลบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอนด์เอส แลบริวารไทย จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขออนุญาตใช้ชื่อห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑๕ พฤษภาคม ๒๕๖๔

ตามคำขอที่อ้างถึง บริษัท เอแอนด์เอส แลบริวารไทย จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๖๒๓ สถานที่ตั้งเลขที่ ๖๑๖/๓๐ หมู่ที่ ๕ ตำบลแม่ไม้ อำเภอลำดวน
จังหวัดสุราษฎร์ธานี ขอเปลี่ยนแปลงชื่อ-สกุลบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้เปลี่ยนแปลงชื่อ-สกุลบุคลากร จำนวน ๗ ราย
จากนายธนสิทธิ์ วงศ์หาญ เป็น นายอัครวิทย์ วงศ์หาญ

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายประจักษ์ ทรัพย์)

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ปฏิบัติงานตามพระราชบัญญัติโรงงานอุตสาหกรรม

ศูนย์วิจัยและพัฒนาทรัพยากรทางทะเลและชายฝั่งภาคใต้ฝั่งอันดามัน

โทร. ๐ ๓๓๓๓ ๖๐๕๕ ต่อ ๕๖๖๖-๖

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