

ภาคผนวก ค

ผลการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม

ภาคผนวก ค-1

คุณภาพอากาศจากแหล่งกำเนิด



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 : 4510513811
Project Name : Environment : EIA
Project Location :

TESTING
No.0042

Lot ID: 24115931
Date Received : Oct 17, 2024
Date Reported : Oct 24, 2024
Report Number: 3131876-1

Page 1 of 1

Sample Number 24115931-1
Sample Date Oct 17, 2024
Sample Description Emission from Stationary Source
Location 129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
Date Analysis Commenced Oct 18, 2024
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description									
Ambient Pressure	753	mmHg	Diameter	0.94	m	Oxygen	20.9	%	
Ambient Temperature	29.2	°C	Shape	Circle		Carbon Dioxide	0.0	%	
Type of Process	Process		Stack Temperature	42.0	°C	Gas Velocity	12.8	m/s	
Type of Fuel	-		Moisture	3.27	%	Flow Rate (Actual O2)	29120	Nm3/hr	
Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location	

Air Testing
Total Suspended Particulate 11:20 AM - 12:02 PM mg/m3 - 0.5 <0.5
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 Chokpittan วสุฒรรัง ชกพิตตัน 3-323-9-0037

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

Thanitak.

Technical Management

Thanita Kulsriwong
Scientist (4)
วสุฒรรัง 3-323-9-0029

Approved by

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report be not reproduced except in full.

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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 : 4510513811
Project Name : Environment : EIA
Project Location :

TESTING
No.0042

Lot ID: 24115933
Date Received : Oct 17, 2024
Date Reported : Oct 24, 2024
Report Number: 3131903-1C1

Page 1 of 1

Sample Number 24115933-1
Sample Date Oct 17, 2024
Sample Description Emission from Stationary Source
Location 129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
Date Analysis Commenced Oct 17, 2024
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	5.8	%	
Ambient Temperature	29.2	°C	Shape	Circle		Carbon Dioxide	8.6	%	
Type of Process	Combustion		Stack Temperature	114	°C	Gas Velocity	1.8	m/s	
Type of Fuel	Natural Gas		Moisture	8.12	%	Flow Rate (Actual O2)	873	Nm3/hr	
Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result at 7 %O ₂	Guideline Limit	Method	Testing Location	

Air Testing
Oxides of Nitrogen * 10:20 AM - 10:30 AM ppm - 1.06 18.1 200
United States Environmental Protection Agency, EPA Method 7

Total Suspended Particulate 10:20 AM - 11 :08 AM mg/m3 - 0.5 <0.5 320
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 : Suddamrong Chokpittan

Remark :
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Analysis / Test Report

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 : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24115935

Date Received : Oct 17, 2024

Date Reported : Oct 24, 2024

Report Number: 3131904-IC1

TESTING
No.0042

Page 1 of 1

Sample Number 24115935-1

Sample Date Oct 16, 2024

Sample Description Emission from Stationary Source

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

Date Analysis Commenced Oct 17, 2024

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	3.4	%	Testing Location
Ambient Temperature	28.7	°C	Shape	Circle		Carbon Dioxide	10.0	%	
Type of Process	Combustion		Stack Temperature	112	°C	Gas Velocity	2.8	m/s	
Type of Fuel	Natural Gas		Moisture	8.25	%	Flow Rate (Actual O2)	1379	Nm3/hr	
Analyte									
LOQ (LOR)						Guideline Limit			
Result at 7 %O ₂									

Air Testing

Oxides of Nitrogen *	10:30 AM - 10:40 AM	ppm	-	1.06	17.7	United States Environmental Protection Agency, EPA Method 7	Rayong
Total Suspended Particulate	10:30 AM - 11:12 AM	mg/m3	-	0.5	<0.5	United States Environmental Protection Agency, EPA Method 5	Rayong

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

Sampled By : Sudamrong Chokpittan

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.

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Scientist (4)
โทรศัพท์ 323-0029

Dej Changchon
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โทรศัพท์ 323-0001

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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 : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24115939

Date Received : Dec 20, 2024

Date Reported : Dec 26, 2024

Report Number: 3131905-1

Page 1 of 1

Sample Number 24115939-1

Sample Date Dec 20, 2024

Sample Description Emission from Stationary Source

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

Date Analysis Commenced Dec 24, 2024

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	25.6	°C	Shape	Circle		Carbon Dioxide	0.0	%	
Type of Process	Process		Stack Temperature	33.0	°C	Gas Velocity	4.2	m/s	
Type of Fuel	-		Moisture	2.63	%	Flow Rate (Actual O2)	7067	Nm3/hr	
Analyte									
LOQ (LOR)						Guideline Limit			
Result									

Air Testing

Sulfuric acid	01:15 PM - 02:03 PM	ppm	-	0.01	<0.01	United States Environmental Protection Agency, EPA Method 8	Rayong
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Guideline : Notification of the Ministry of Industry 2006 (B.E. 2549) Published in the Royal Government Gazette, Vol.123 Special Part 125 D, dated December 4, 2006 (B.E. 2549)

Sampled By : Warawut Pulpia โทรศัพท์ 323-0033 , Mongkon Phalathip โทรศัพท์ 3204-0110

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

Technical Management

Approved by

Thanitak.

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โทรศัพท์ 323-0001

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S:Reports_Air Stack_GL.pdf (1.04PM)



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 : 4510513811
Project Name : Environment : EA
Project Location :

Lot ID: 24115939
Date Received : Dec 20, 2024
Date Reported : Dec 28, 2024
Report Number: 3131905-2

Page 1 of 1

Sample Number : 24115939-1
Sampled Date : Dec 20, 2024
Sample Description : Emission from Stationary Source
Location : สี่แยกประตู Poly propylene filter 1x1x1 1-4
Date Analysis Commenced : Dec 23, 2024
Condition of Sample : Extracted into two amber plastic bottles, refrigerated

Stack Description								
Ambient Pressure	754	mmHg	Diameter	0.80	m	Oxygen	20.9	%
Ambient Temperature	25.6	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	33.0	°C	Gas Velocity	4.2	m/s
Type of Fuel	-		Moisture	2.63	%	Flow Rate (Actual O2)	7067	Nm3/hr
Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location	

Air Testing
Phosphoric acid

01:15 PM - 01:45 PM

mg/m3

-

0.05

<0.05

United States Environmental Protection Agency, EPA Method 26

Bangkok

Sampling By : Warawut Puppa , Mongkon Phatthapip

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

Approved by

Sarenya C.
Saranya Chalermthamrong
Scientist (4)

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ภาคผนวก ค-2

คุณภาพอากาศในบรรยากาศ



Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Analysis / Test Report

Lot ID: 24115927
Date Received : Oct 18, 2024
Date Reported : Oct 24, 2024
Report Number: 3131828-1

Page 1 of 1

Sample Description		Air Quality									
Location	Parameter	สถานีตรวจวัดปริมาณ (A1) (GPS 47P 07429560, 14194532)									
Measurement Date	Measurement by	Nitrogen dioxide (ppm)									
Measurement by		Oct 11, 2024 - Oct 18, 2024									
Measurement by		Norranon Talhongsikham									
Time		24115927-1	24115927-2	24115927-3	24115927-4	24115927-5	24115927-6	24115927-7			
		Oct 11, 2024	Oct 12, 2024	Oct 13, 2024	Oct 14, 2024	Oct 15, 2024	Oct 16, 2024	Oct 17, 2024			
11:00 AM - 12:00 PM		0.0021	0.0042	0.0031	0.0030	0.0053	0.0053	0.0022	0.0022		
12:00 PM - 01:00 PM		0.0026	0.0037	0.0029	0.0040	0.0053	0.0046	0.0035	0.0035		
01:00 PM - 02:00 PM		0.0031	0.0046	0.0030	0.0038	0.0044	0.0082	0.0033	0.0033		
02:00 PM - 03:00 PM		0.0036	0.0043	0.0029	0.0056	0.0048	0.0091	0.0035	0.0035		
03:00 PM - 04:00 PM		0.0045	0.0048	0.0033	0.0054	0.0048	0.0074	0.0030	0.0030		
04:00 PM - 05:00 PM		0.0055	0.0058	0.0044	0.0048	0.0054	0.0067	0.0032	0.0032		
05:00 PM - 06:00 PM		0.0050	0.0051	0.0042	0.0051	0.0052	0.0077	0.0030	0.0030		
06:00 PM - 07:00 PM		0.0044	0.0049	0.0060	0.0059	0.0053	0.0083	0.0029	0.0029		
07:00 PM - 08:00 PM		0.0054	0.0047	0.0060	0.0064	0.0051	0.0068	0.0026	0.0026		
08:00 PM - 09:00 PM		0.0059	0.0042	0.0058	0.0064	0.0060	0.0064	0.0043	0.0043		
09:00 PM - 10:00 PM		0.0056	0.0041	0.0048	0.0055	0.0060	0.0061	0.0044	0.0044		
10:00 PM - 11:00 PM		0.0046	0.0040	0.0052	0.0051	0.0060	0.0055	0.0053	0.0053		
11:00 AM - 12:00 AM		0.0046	0.0045	0.0044	0.0048	0.0061	0.0056	0.0050	0.0050		
12:00 AM - 01:00 AM		0.0043	0.0040	0.0043	0.0049	0.0054	0.0054	0.0051	0.0051		
01:00 AM - 02:00 AM		0.0040	0.0038	0.0043	0.0046	0.0050	0.0055	0.0042	0.0042		
02:00 AM - 03:00 AM		0.0046	0.0038	0.0037	0.0049	0.0048	0.0051	0.0043	0.0043		
03:00 AM - 04:00 AM		0.0041	0.0040	0.0035	0.0047	0.0048	0.0047	0.0046	0.0046		
04:00 AM - 05:00 AM		0.0038	0.0036	0.0034	0.0045	0.0047	0.0043	0.0042	0.0042		
05:00 AM - 06:00 AM		0.0040	0.0035	0.0033	0.0042	0.0048	0.0044	0.0041	0.0041		
06:00 AM - 07:00 AM		0.0041	0.0035	0.0036	0.0041	0.0047	0.0048	0.0043	0.0043		
07:00 AM - 08:00 AM		0.0047	0.0036	0.0040	0.0050	0.0066	0.0052	0.0040	0.0040		
08:00 AM - 09:00 AM		0.0052	0.0035	0.0043	0.0054	0.0060	0.0058	0.0035	0.0035		
09:00 AM - 10:00 AM		0.0045	0.0033	0.0037	0.0054	0.0049	0.0045	0.0045	0.0045		
10:00 AM - 11:00 AM		0.0044	0.0031	0.0036	0.0057	0.0056	0.0036	0.0036	0.0036		
Average		0.0044	0.0041	0.0041	0.0050	0.0053	0.0059	0.0038	0.0038		
1hr - Maximum		0.0059	0.0058	0.0060	0.0064	0.0066	0.0091	0.0053	0.0053		
Standard 1hr - Average		0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170		
Standard		: Notification of the National Environment Board No. 33, 2009 (B.E. 2552).									
Reference Method		: US EPA Method Part 50 App. F (Chemiluminescence)									

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Approved by

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Orawan Rakyong
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Client : Michelin Siam Co., Ltd.
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P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Analysis / Test Report

Lot ID: 24115927
Date Received : Oct 18, 2024
Date Reported : Oct 24, 2024
Report Number: 3145786-1

Page 1 of 1

Sample Description		Air Quality											
Location	Parameter	nitrogen dioxide (A2) (GPS 47° 0742003, 1417397)											
Measurement Date	Measurement by	Nitrogen dioxide (ppm)											
		Oct 11, 2024 - Oct 18, 2024											
		Norranon Tathongkham											
Time		24115927-8	24115927-9	24115927-10	24115927-11	24115927-12	24115927-13	24115927-14					
		Oct 11, 2024	Oct 12, 2024	Oct 13, 2024	Oct 14, 2024	Oct 15, 2024	Oct 16, 2024	Oct 17, 2024					
12:00 PM - 01:00 PM		0.0054	0.0034	0.0022	0.0043	0.0046	0.0051	0.0031					
01:00 PM - 02:00 PM		0.0061	0.0030	0.0016	0.0034	0.0047	0.0044	0.0032					
02:00 PM - 03:00 PM		0.0051	0.0030	0.0020	0.0028	0.0039	0.0025	0.0027					
03:00 PM - 04:00 PM		0.0053	0.0025	0.0029	0.0036	0.0032	0.0024	0.0026					
04:00 PM - 05:00 PM		0.0054	0.0037	0.0046	0.0056	0.0044	0.0019	0.0024					
05:00 PM - 06:00 PM		0.0061	0.0038	0.0049	0.0046	0.0090	0.0056	0.0043					
06:00 PM - 07:00 PM		0.0051	0.0050	0.0055	0.0049	0.0077	0.0046	0.0075					
07:00 PM - 08:00 PM		0.0059	0.0048	0.0052	0.0050	0.0075	0.0060	0.0066					
08:00 PM - 09:00 PM		0.0045	0.0042	0.0056	0.0050	0.0086	0.0069	0.0057					
09:00 PM - 10:00 PM		0.0052	0.0041	0.0044	0.0057	0.0090	0.0083	0.0059					
10:00 PM - 11:00 PM		0.0056	0.0039	0.0036	0.0049	0.0061	0.0069	0.0060					
11:00 PM - 12:00 AM		0.0052	0.0038	0.0054	0.0050	0.0044	0.0065	0.0060					
12:00 AM - 01:00 AM		0.0029	0.0038	0.0052	0.0068	0.0060	0.0082	0.0068					
01:00 AM - 02:00 AM		0.0048	0.0039	0.0072	0.0066	0.0064	0.0053	0.0068					
02:00 AM - 03:00 AM		0.0039	0.0046	0.0061	0.0097	0.0082	0.0084	0.0069					
03:00 AM - 04:00 AM		0.0018	0.0042	0.0046	0.0058	0.0059	0.0084	0.0064					
04:00 AM - 05:00 AM		0.0004	0.0036	0.0047	0.0066	0.0050	0.0071	0.0063					
05:00 AM - 06:00 AM		0.0031	0.0050	0.0058	0.0095	0.0047	0.0064	0.0095					
06:00 AM - 07:00 AM		0.0055	0.0042	0.0052	0.0077	0.0046	0.0086	0.0092					
07:00 AM - 08:00 AM		0.0041	0.0042	0.0095	0.0076	0.0082	0.0057	0.0085					
08:00 AM - 09:00 AM		0.0044	0.0040	0.0087	0.0049	0.0094	0.0064	0.0081					
09:00 AM - 10:00 AM		0.0056	0.0045	0.0052	0.0049	0.0091	0.0055	0.0065					
10:00 AM - 11:00 AM		0.0054	0.0050	0.0055	0.0051	0.0063	0.0046	0.0054					
11:00 AM - 12:00 PM		0.0058	0.0033	0.0046	0.0046	0.0059	0.0046	0.0059					
Average		0.0047	0.0040	0.0050	0.0056	0.0064	0.0058	0.0059					
1hr - Maximum		0.0061	0.0050	0.0095	0.0097	0.0094	0.0086	0.0095					
Standard 1hr - Average		0.170	0.170	0.170	0.170	0.170	0.170	0.170					
Standard		: Notification of the National Environment Board No. 33, 2009 (B.E. 2552).											
Reference Method		: US EPA Method Part 50 App. F (Chemiluminescence)											

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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 : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24115927
Date Received : Oct 18, 2024
Date Reported : Oct 24, 2024
Report Number: 3145789-1

Page 1 of 1

Sample Description		Air Quality		Location	
Parameter		Nitrogen dioxide (ppm)		Measurement Date	
Measurement by		Norranon Takhongkham		Oct 11, 2024 - Oct 18, 2024	
Time	24115927-15	24115927-16	24115927-17	24115927-18	24115927-19
09:00 AM - 10:00 AM	0.0045	0.0066	0.0029	0.0051	0.0048
10:00 AM - 11:00 AM	0.0009	0.0029	0.0016	0.0034	0.0048
11:00 AM - 12:00 PM	0.0030	0.0016	0.0010	0.0015	0.0069
12:00 PM - 01:00 PM	0.0018	0.0010	0.0005	0.0011	0.0062
01:00 PM - 02:00 PM	0.0008	0.0008	0.0010	0.0037	0.0050
02:00 PM - 03:00 PM	0.0014	0.0008	0.0015	0.0083	0.0063
03:00 PM - 04:00 PM	0.0065	0.0042	0.0006	0.0047	0.0060
04:00 PM - 05:00 PM	0.0056	0.0063	0.0028	0.0070	0.0061
05:00 PM - 06:00 PM	0.0049	0.0057	0.0064	0.0100	0.0058
06:00 PM - 07:00 PM	0.0075	0.0064	0.0078	0.0065	0.0053
07:00 PM - 08:00 PM	0.0059	0.0057	0.0095	0.0049	0.0081
08:00 PM - 09:00 PM	0.0073	0.0047	0.0120	0.0056	0.0087
09:00 PM - 10:00 PM	0.0059	0.0034	0.0122	0.0085	0.0071
10:00 PM - 11:00 PM	0.0050	0.0045	0.0110	0.0097	0.0128
11:00 PM - 12:00 AM	0.0038	0.0041	0.0080	0.0058	0.0059
12:00 AM - 01:00 AM	0.0044	0.0055	0.0076	0.0059	0.0053
01:00 AM - 02:00 AM	0.0051	0.0051	0.0055	0.0067	0.0062
02:00 AM - 03:00 AM	0.0073	0.0041	0.0052	0.0061	0.0055
03:00 AM - 04:00 AM	0.0077	0.0049	0.0047	0.0056	0.0051
04:00 AM - 05:00 AM	0.0061	0.0052	0.0048	0.0062	0.0057
05:00 AM - 06:00 AM	0.0048	0.0073	0.0042	0.0028	0.0049
06:00 AM - 07:00 AM	0.0047	0.0051	0.0045	0.0042	0.0043
07:00 AM - 08:00 AM	0.0049	0.0036	0.0038	0.0034	0.0034
08:00 AM - 09:00 AM	0.0070	0.0040	0.0049	0.0037	0.0042
Average	0.0049	0.0046	0.0049	0.0062	0.0054
1hr - Maximum	0.0077	0.0084	0.0120	0.0122	0.0087
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170
Standard	0.170	0.170	0.170	0.170	0.170
Reference Method	: Notification of the National Environment Board No. 33, 2009 (B.E. 2552).				
Reference Method	: US EPA Method Part 50 App. F (Chemiluminescence)				

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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 : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24115927
Date Received : Oct 18, 2024
Date Reported : Oct 24, 2024
Report Number: 3145790-1

Page 1 of 1

Sample Description		Air Quality		Location	
Parameter		Nitrogen dioxide (ppm)		Measurement Date	
Measurement by		Norranon Takhongkham		Oct 11, 2024 - Oct 18, 2024	
Time	24115927-22	24115927-23	24115927-24	24115927-25	24115927-26
10:00 AM - 11:00 AM	0.0032	0.0035	0.0035	0.0032	0.0030
11:00 AM - 12:00 PM	0.0029	0.0033	0.0034	0.0034	0.0033
12:00 PM - 01:00 PM	0.0032	0.0036	0.0032	0.0031	0.0037
01:00 PM - 02:00 PM	0.0034	0.0033	0.0031	0.0036	0.0040
02:00 PM - 03:00 PM	0.0039	0.0041	0.0038	0.0038	0.0040
03:00 PM - 04:00 PM	0.0042	0.0037	0.0039	0.0048	0.0045
04:00 PM - 05:00 PM	0.0040	0.0041	0.0041	0.0038	0.0058
05:00 PM - 06:00 PM	0.0043	0.0044	0.0044	0.0044	0.0051
06:00 PM - 07:00 PM	0.0044	0.0048	0.0035	0.0033	0.0056
07:00 PM - 08:00 PM	0.0047	0.0042	0.0037	0.0034	0.0037
08:00 PM - 09:00 PM	0.0042	0.0039	0.0033	0.0034	0.0030
09:00 PM - 10:00 PM	0.0039	0.0045	0.0036	0.0036	0.0042
10:00 PM - 11:00 PM	0.0035	0.0043	0.0031	0.0043	0.0042
11:00 PM - 12:00 AM	0.0036	0.0034	0.0035	0.0035	0.0044
12:00 AM - 01:00 AM	0.0039	0.0034	0.0041	0.0048	0.0040
01:00 AM - 02:00 AM	0.0040	0.0037	0.0041	0.0044	0.0039
02:00 AM - 03:00 AM	0.0037	0.0040	0.0038	0.0049	0.0034
03:00 AM - 04:00 AM	0.0036	0.0055	0.0039	0.0049	0.0045
04:00 AM - 05:00 AM	0.0057	0.0050	0.0047	0.0046	0.0041
05:00 AM - 06:00 AM	0.0044	0.0046	0.0035	0.0040	0.0052
06:00 AM - 07:00 AM	0.0036	0.0039	0.0032	0.0042	0.0049
07:00 AM - 08:00 AM	0.0033	0.0029	0.0033	0.0039	0.0041
08:00 AM - 09:00 AM	0.0037	0.0026	0.0029	0.0030	0.0038
09:00 AM - 10:00 AM	0.0042	0.0020	0.0034	0.0027	0.0053
Average	0.0039	0.0039	0.0036	0.0038	0.0045
1hr - Maximum	0.0057	0.0055	0.0047	0.0049	0.0060
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170
Standard	0.170	0.170	0.170	0.170	0.170
Reference Method	: Notification of the National Environment Board No. 33, 2009 (B.E. 2552).				
Reference Method	: US EPA Method Part 50 App. F (Chemiluminescence)				

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Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :
TESTING
No.0042
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 1 of 28

Sample Number	24115928-1	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Sample Date	Oct 11, 2024								
Sample Description	Air Quality								
Location	ถนนพหลโยธิน (A1) (GPS 47P 0742960, 1419452)								
Date Analysis Commenced	Oct 21, 2024								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated								
Barometric Pressure	755 mmHg								
Atmospheric Temperature	32.5 °C								
Analyte									
Air Testing									
Phosphoric acid *	11/10/24 - 12/10/24	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	11/10/24 - 12/10/24	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	11/10/24 - 12/10/24	mg/m ³	-	0.002	0.047	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24/Rayong	

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

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Thanita Kulsuriwong
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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 : 4510513811
Project Name : Environment : EIA
Project Location :
TESTING
No.0042
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 2 of 28

Sample Number	24115928-2	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Sample Date	Oct 12, 2024								
Sample Description	Air Quality								
Location	ถนนพหลโยธิน (A1) (GPS 47P 0742960, 1419452)								
Date Analysis Commenced	Oct 21, 2024								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated								
Barometric Pressure	755 mmHg								
Atmospheric Temperature	31.8 °C								
Analyte									
Air Testing									
Phosphoric acid *	12/10/24 - 13/10/24	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	12/10/24 - 13/10/24	mg/m ³	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	12/10/24 - 13/10/24	mg/m ³	-	0.002	0.042	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24/Rayong	

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

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Analysis / Test Report

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P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24115928

Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

TESTING
No.0042

Page 3 of 28

Sample Number	24115928-3							
Sample Date	Oct 13, 2024							
Sample Description	Air Quality							
Location	พื้นที่ชุมชนบ้านนา (A1) (GPS 47P 0742960, 1419452)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.9 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	13/10/24 - 14/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Sulfuric acid *	13/10/24 - 14/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Total Suspended Particulate	13/10/24 - 14/10/24	mg/m3	-	0.002	0.042	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

Guideline :

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

Sampled By : Norranon Tathongkham

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P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24115928

Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

TESTING
No.0042

Page 4 of 28

Sample Number	24115928-4							
Sample Date	Oct 14, 2024							
Sample Description	Air Quality							
Location	พื้นที่ชุมชนบ้านนา (A1) (GPS 47P 0742960, 1419452)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.6 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	14/10/24 - 15/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Sulfuric acid *	14/10/24 - 15/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Total Suspended Particulate	14/10/24 - 15/10/24	mg/m3	-	0.002	0.054	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24-Rayong

Guideline :

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

Sampled By : Norranon Tathongkham

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P/O : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 5 of 28

Sample Number	Sample Date	Sample Description	Location	Date Analysis Commenced	Condition of Sample	Barometric Pressure	Atmospheric Temperature
24115928-5	Oct 15, 2024	Air Quality	สำนักงานอุตสาหกรรม (A1)	Oct 21, 2024	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated	755 mmHg	31.7 °C
Sample Number	Sample Date	Sample Description	Location	Date Analysis Commenced	Condition of Sample	Barometric Pressure	Atmospheric Temperature
24115928-6	Oct 16, 2024	Air Quality	สำนักงานอุตสาหกรรม (A1)	Oct 21, 2024	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated	755 mmHg	30.5 °C
Sample Number	Sample Date	Sample Description	Location	Date Analysis Commenced	Condition of Sample	Barometric Pressure	Atmospheric Temperature
24115928-7	Oct 17, 2024	Air Quality	สำนักงานอุตสาหกรรม (A1)	Oct 21, 2024	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated	755 mmHg	30.5 °C

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

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21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 6 of 28

Sample Number	Sample Date	Sample Description	Location	Date Analysis Commenced	Condition of Sample	Barometric Pressure	Atmospheric Temperature
24115928-6	Oct 16, 2024	Air Quality	สำนักงานอุตสาหกรรม (A1)	Oct 21, 2024	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated	755 mmHg	30.5 °C
Sample Number	Sample Date	Sample Description	Location	Date Analysis Commenced	Condition of Sample	Barometric Pressure	Atmospheric Temperature
24115928-7	Oct 17, 2024	Air Quality	สำนักงานอุตสาหกรรม (A1)	Oct 21, 2024	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated	755 mmHg	30.5 °C
Sample Number	Sample Date	Sample Description	Location	Date Analysis Commenced	Condition of Sample	Barometric Pressure	Atmospheric Temperature
24115928-8	Oct 18, 2024	Air Quality	สำนักงานอุตสาหกรรม (A1)	Oct 21, 2024	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated	755 mmHg	30.5 °C

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

Remark :
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21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 7 of 28

Sample Number	24115928-7							
Sampled Date	Oct 17, 2024							
Sample Description	Air Quality							
Location	สำนักงานอุตสาหกรรม (A1) (GPS 47P 0742960, 1419452)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	17/10/24 - 18/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	17/10/24 - 18/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	17/10/24 - 18/10/24	mg/m3	-	0.002	0.039	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

Sampled By : Norraon Tathongkham

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21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 6 of 28

Sample Number	24115928-8	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Sample Description	Air Quality							
Location	Air Quality Station (A2) (GPS 47P 0742003, 1417397)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	32.5 °C							
Analyte	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location	
Air Testing								
Phosphoric acid *	11/10/24 - 12/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	11/10/24 - 12/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	11/10/24 - 12/10/24	mg/m3	-	0.002	0.035	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

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21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 9 of 28

Sample Number	24115928-9							
Sampled Date	Oct 12, 2024							
Sample Description	Air Quality							
Location	พื้นที่ท่าเรือ (A2) (GPS 47P 0742003, 1417397)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.8 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	12/10/24 - 13/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	12/10/24 - 13/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	12/10/24 - 13/10/24	mg/m3	-	0.002	0.031	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24Rayong

Guideline :
NEB No.24 : Notification of the National Environmental Board, No.24, 2004 (B.E.2547) dated September '22, 2004
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21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 10 of 28

Sample Number	24115928-10							
Sampled Date	Oct 13, 2024							
Sample Description	Air Quality							
Location	ท่าเรือบริเวณ (A2) (GPS 47P 0742003, 1417397)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.9 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	13/10/24 - 14/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	13/10/24 - 14/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	13/10/24 - 14/10/24	mg/m3	-	0.002	0.030	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

Guideline :
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21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 11 of 28

Sample Number	24115928-11	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Sample Description	Air Quality							
Location	บ้านนาใหม่ (A2) (GPS 47P 0742003, 1417397)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.6 °C							
Analyte	Phosphoric acid *	14/10/24 - 15/10/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
	Sulfuric acid *	14/10/24 - 15/10/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
	Total Suspended Particulate	14/10/24 - 15/10/24	mg/m3	0.002	0.040	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24Rayong

Guideline :

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P/O : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 12 of 28

Sample Number	24115928-12	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Sample Description	Air Quality							
Location	บ้านนาใหม่ (A2) (GPS 47P 0742003, 1417397)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.7 °C							
Analyte	Phosphoric acid *	15/10/24 - 16/10/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
	Sulfuric acid *	15/10/24 - 16/10/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
	Total Suspended Particulate	15/10/24 - 16/10/24	mg/m3	0.002	0.041	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24Rayong

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P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24115928

Date Received : Oct 18, 2024

Date Reported : Oct 30, 2024

Report Number : 3131836-1

TESTING
No.0042

Page 13 of 28

Sample Number	24115928-13
Sampled Date	Oct 16, 2024
Sample Description	Air Quality
Location	ถนนสุขุมวิท (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced	Oct 21, 2024
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated
Barometric Pressure	755 mmHg
Atmospheric Temperature	30.5 °C

Analyte	Sampled Date/Time	Unit	LOD (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing							
Phosphoric acid *	16/10/24 - 17/10/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	16/10/24 - 17/10/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	16/10/24 - 17/10/24	mg/m3	0.002	0.033	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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Project Name : Environment : EIA

Project Location :

Lot ID: 24115928

Date Received : Oct 18, 2024

Date Reported : Oct 30, 2024

Report Number : 3131836-1

TESTING
No.0042

Page 14 of 28

Sample Number	24115928-14
Sampled Date	Oct 17, 2024
Sample Description	Air Quality
Location	ถนนสุขุมวิท (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced	Oct 21, 2024
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated
Barometric Pressure	755 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing							
Phosphoric acid *	17/10/24 - 18/10/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	17/10/24 - 18/10/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	17/10/24 - 18/10/24	mg/m3	0.002	0.031	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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P/O : 4510513811
Project Name : Environment : EIA
Project Location :

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Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

TESTING
No.0042

Page 15 of 28

Sample Number	24115928-15
Sample Date	Oct 11, 2024
Sample Description	Air Quality
Location	ท่าอากาศยาน (A3) (GPS 47P 0744066, 1420470)
Date Analysis Commenced	Oct 21, 2024
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated
Barometric Pressure	755 mmHg
Atmospheric Temperature	32.5 °C
Analyte	
Air Testing	
Phosphoric acid *	11/10/24 - 12/10/24 mg/m3 - 0.05 <0.05 No Standard Based on OSHA, ID-174-SG
Sulfuric acid *	11/10/24 - 12/10/24 mg/m3 - 0.05 <0.05 No Standard Based on OSHA, ID-174-SG
Total Suspended Particulate	11/10/24 - 12/10/24 mg/m3 - 0.002 0.029 0.33 US EPA 40 CFR Part 50, Appendix B

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Project Name : Environment : EIA
Project Location :

Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

TESTING
No.0042

Page 16 of 28

Sample Number	24115928-16
Sample Date	Oct 12, 2024
Sample Description	Air Quality
Location	ท่าอากาศยาน (A3) (GPS 47P 0744066, 1420470)
Date Analysis Commenced	Oct 21, 2024
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated
Barometric Pressure	755 mmHg
Atmospheric Temperature	31.8 °C
Analyte	
Air Testing	
Phosphoric acid *	12/10/24 - 13/10/24 mg/m3 - 0.05 <0.05 No Standard Based on OSHA, ID-174-SG
Sulfuric acid *	12/10/24 - 13/10/24 mg/m3 - 0.05 <0.05 No Standard Based on OSHA, ID-174-SG
Total Suspended Particulate	12/10/24 - 13/10/24 mg/m3 - 0.002 0.027 0.33 US EPA 40 CFR Part 50, Appendix B

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P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

TESTING
No.0042

Page 17 of 28

Sample Number	24115928-17							
Sampled Date	Oct 13, 2024							
Sample Description	Air Quality							
Location	ท่าเรือหลวง (A3) (GPS 47P 0744066, 1420470)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.9 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	13/10/24 - 14/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	13/10/24 - 14/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	13/10/24 - 14/10/24	mg/m3	-	0.002	0.027	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

Guideline :
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Project Location :

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Report Number : 3131836-1

TESTING
No.0042

Page 18 of 28

Sample Number	24115928-18							
Sampled Date	Oct 14, 2024							
Sample Description	Air Quality							
Location	ท่าเรือหลวง (A3) (GPS 47P 0744066, 1420470)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.6 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	14/10/24 - 15/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Sulfuric acid *	14/10/24 - 15/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Total Suspended Particulate	14/10/24 - 15/10/24	mg/m3	-	0.002	0.037	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :
TESTING
No.0042
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

TESTING
No.0042
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 19 of 28

Sample Number	24115928-19	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Sampled Date	Oct 15, 2024	Air Quality							
Location	ท่าเรือวัด (A3) (GPS 47P 0744066, 1420470)								
Date Analysis Commenced	Oct 21, 2024								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated								
Barometric Pressure	755 mmHg								
Atmospheric Temperature	31.7 °C								
Analyte									
Air Testing									
Phosphoric acid *	15/10/24 - 16/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	15/10/24 - 16/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	15/10/24 - 16/10/24	mg/m3	-	0.002	0.040	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

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

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

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Approved by

Thanita Kulsuriwong
Scientist (4)

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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 : 4510513811
Project Name : Environment : EIA
Project Location :
TESTING
No.0042
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

TESTING
No.0042
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 20 of 28

Sample Number	24115928-20	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Sampled Date	Oct 16, 2024	Air Quality							
Location	ท่าเรือวัด (A3) (GPS 47P 0744066, 1420470)								
Date Analysis Commenced	Oct 21, 2024								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated								
Barometric Pressure	755 mmHg								
Atmospheric Temperature	30.5 °C								
Analyte									
Air Testing									
Phosphoric acid *	16/10/24 - 17/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	16/10/24 - 17/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	16/10/24 - 17/10/24	mg/m3	-	0.002	0.030	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

Guideline :
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Sampled By : Noranon Tathongkham

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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 : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 21 of 28

Sample Number	24115928-21							
Sample Date	Oct 17, 2024							
Sample Description	Air Quality							
Location	ท่าอากาศยาน (A3) (GPS 47P 0744066, 1420470)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	17/10/24 - 18/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Sulfuric acid *	17/10/24 - 18/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Total Suspended Particulate	17/10/24 - 18/10/24	mg/m3	-	0.002	0.032	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24/Rayong

Guideline :
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Sampled By : Norranon Tathongkham

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
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21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 22 of 28

Sample Number	24115928-22							
Sampled Date	Oct 11, 2024							
Sample Description	Air Quality							
Location	พื้นที่ภายใน (A4) (GPS 47P 0747515, 1419157)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	32.5 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	11/10/24 - 12/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	11/10/24 - 12/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	11/10/24 - 12/10/24	mg/m3	-	0.002	0.039	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

Guideline :
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Sampled By : Norranon Tathongkham

Remark :
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2274-02/ENGL



Analysis / Test Report

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21120
P/O : 4510513811
Project Name : Environment : EA
Project Location :
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 23 of 28

Sample Number	24115928-23							
Sample Date	Oct 12, 2024							
Sample Description	Air Quality							
Location	พื้นที่บ้านใหม่ (A4) (GPS 47P 0747515, 1419157)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.8 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	12/10/24 - 13/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	12/10/24 - 13/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	12/10/24 - 13/10/24	mg/m3	-	0.002	0.042	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

Guideline :

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Analysis / Test Report

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21120
P/O : 4510513811
Project Name : Environment : EA
Project Location :
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 24 of 28

Sample Number	24115928-24																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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Guideline :

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

Sampled By : Norranon Tathongkham

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2278-62/ENAL



Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24115928

Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 25 of 28

Sample Number	24115928-25							
Sampled Date	Oct 14, 2024							
Sample Description	Air Quality							
Location	พื้นที่บริเวณ (A4) (GPS 47P 0747515, 1419157)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.6 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	14/10/24 - 15/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Sulfuric acid *	14/10/24 - 15/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Total Suspended Particulate	14/10/24 - 15/10/24	mg/m3	-	0.002	0.050	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

Guideline :

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

Sampled By : Norranon Tathongkham

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2272-62/ENAL



Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24115928

Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 26 of 28

Sample Number	24115928-26							
Sampled Date	Oct 15, 2024							
Sample Description	Air Quality							
Location	จันทราสถิต (A4) (GPS 47P 0747515, 1419157)							
Date Analysis Commenced	Oct 21, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.7 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	15/10/24 - 16/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Sulfuric acid *	15/10/24 - 16/10/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Total Suspended Particulate	15/10/24 - 16/10/24	mg/m3	-	0.002	0.052	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

Guideline :

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

Sampled By : Norranon Tathongkham

Remark :

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

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

TESTING
No.0042
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 27 of 28

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
24115928-27	Oct 16, 2024	Air Quality	พื้นที่บ้านใหม่ (A4) (GPS 47P 0747515, 1419157)	Oct 21, 2024	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated	755 mmHg	30.5 °C	Phosphoric acid *	16/10/24 - 17/10/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
								Sulfuric acid *	16/10/24 - 17/10/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
								Total Suspended Particulate	16/10/24 - 17/10/24	mg/m3	0.002	0.035	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

Remark :
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- "c" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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Life Sciences

NIGHT SOLUTIONS NIGHT PARTNER

2276-63/ENAL



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 : 4510513811
Project Name : Environment : EIA
Project Location :

TESTING
No.0042
Lot ID: 24115928
Date Received : Oct 18, 2024
Date Reported : Oct 30, 2024
Report Number : 3131836-1

Page 28 of 28

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
24115928-28	Oct 17, 2024	Air Quality	พื้นที่บ้านใหม่ (A4) (GPS 47P 0747515, 1419157)	Oct 21, 2024	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated	755 mmHg	31.0 °C	Phosphoric acid *	17/10/24 - 18/10/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
								Sulfuric acid *	17/10/24 - 18/10/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
								Total Suspended Particulate	17/10/24 - 18/10/24	mg/m3	0.002	0.033	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

Remark :
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Life Sciences

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2276-62/ENAL



Client : Michelin Siam Co., Ltd.

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

Lot ID: 24115929

Date Received :Oct 18, 2024

Date Reported :Oct 24, 2024

Report Number :3131846-1

P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Analysis / Test Report

Sample Number 24115929-1 to 7

Parameter Wind Speed / Wind Direction

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

Sampling Date Oct 11 - Oct 18, 2024

Sampling by Noranon Tattongkham

Page 1 of 2

Time	Oct 11 - Oct 12, 2024		Oct 12 - Oct 13, 2024		Oct 13 - Oct 14, 2024		Oct 14 - Oct 15, 2024		Oct 15 - Oct 16, 2024		Oct 16 - Oct 17, 2024		Oct 17 - Oct 18, 2024										
	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)									
11:00 AM - 12:00 PM	2.0	62.0	ENE	0.0	-	-	3.7	55.0	NE	0.6	188.0	S	0.0	-	0.4	149.0	SSE						
12:00 PM - 01:00 PM	0.4	98.0	E	0.0	-	0.3	247.0	WSW	1.6	88.0	E	0.0	-	0.5	312.0	NW	0.0	-	0.7	251.0	WSW		
01:00 PM - 02:00 PM	0.0	-	-	0.3	247.0	WSW	1.6	88.0	E	0.0	-	-	-	0.5	312.0	NW	0.0	-	0.0	-	-		
02:00 PM - 03:00 PM	1.1	174.0	S	1.0	317.0	NW	0.7	34.0	NE	0.0	-	-	-	0.0	-	0.2	-	0.0	-	-	-		
03:00 PM - 04:00 PM	0.2	-	-	0.3	331.0	NNW	1.1	323.0	NW	0.0	-	-	-	0.0	-	0.2	-	0.0	-	-	-		
04:00 PM - 05:00 PM	0.9	193.0	SSW	0.4	4.0	N	0.0	-	0.0	-	0.0	-	0.2	-	0.0	-	0.0	-	0.0	-	-		
05:00 PM - 06:00 PM	0.5	215.0	SW	0.6	7.0	N	0.0	-	0.0	-	0.0	-	0.3	232.0	SW	0.0	-	0.3	330.0	NNW	-		
06:00 PM - 07:00 PM	0.2	-	-	0.2	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.3	33.0	NNE	0.5	26.0	NNE		
07:00 PM - 08:00 PM	0.3	-	-	0.3	45.0	NE	0.0	-	0.0	-	0.0	-	0.3	230.0	SW	0.5	33.0	NNE	0.6	25.0	NNE		
08:00 PM - 09:00 PM	0.3	66.0	ENE	0.5	20.0	NNE	0.0	-	0.0	-	0.0	-	0.4	183.0	S	0.2	-	0.0	-	0.3	217.0	SW	
09:00 PM - 10:00 PM	0.2	-	-	0.5	20.0	NNE	0.0	-	0.0	-	0.0	-	0.3	183.0	S	0.0	-	0.0	-	0.0	-	-	
10:00 PM - 11:00 PM	0.2	-	-	0.2	-	0.0	-	0.0	-	0.0	-	0.0	-	0.3	183.0	S	0.0	-	0.0	-	-	-	
11:00 PM - 12:00 AM	0.4	336.0	NNW	0.2	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	-	
12:00 AM - 01:00 AM	0.3	336.0	NNW	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.3	33.0	NNE	0.0	-	
01:00 AM - 02:00 AM	0.5	336.0	NNW	0.6	20.0	NNE	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.3	33.0	NNE	0.0	-	-	
02:00 AM - 03:00 AM	0.3	336.0	NNW	0.5	20.0	NNE	0.0	-	0.0	-	0.0	-	0.2	-	0.2	-	0.0	-	0.3	17.0	NNE	-	
03:00 AM - 04:00 AM	0.3	336.0	NNW	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.3	44.0	NE	0.0	-	0.3	213.0	SSW	-	
04:00 AM - 05:00 AM	0.3	336.0	NNW	0.3	336.0	NNW	0.0	-	0.0	-	0.0	-	0.3	44.0	NE	0.3	33.0	NNE	0.0	-	-	-	
05:00 AM - 06:00 AM	0.3	336.0	NNW	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.3	44.0	NE	0.5	33.0	NNE	0.0	-	-	
06:00 AM - 07:00 AM	1.0	323.0	NW	0.3	358.0	N	0.0	-	0.0	-	0.0	-	0.0	-	0.5	45.0	NE	0.3	33.0	NNE	0.5	65.0	ENE
07:00 AM - 08:00 AM	0.6	311.0	NW	0.4	86.0	E	0.4	65.0	ENE	0.0	-	0.2	-	0.0	-	0.0	-	0.3	344.0	NNW	0.4	332.0	NNW
08:00 AM - 09:00 AM	1.8	39.0	NE	0.9	48.0	NE	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.1	-	-	-	-
09:00 AM - 10:00 AM	1.1	45.0	NE	0.3	172.0	S	0.4	76.0	ENE	0.0	-	0.0	-	0.0	-	0.0	-	0.2	-	0.2	-	-	-
10:00 AM - 11:00 AM	0.0	-	-	0.5	37.0	NE	0.0	-	0.0	-	0.0	-	1.2	226.0	SW	0.2	-	0.1	-	0.1	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by

Sarayuht Jitranont

Assistant General Manager

Approved by

Sarayuht Jitranont

Assistant General Manager



Client : Michelin Siam Co., Ltd.

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

Lot ID: 24115929

Date Received :Oct 18, 2024

Date Reported :Oct 24, 2024

Report Number :3131846-1

P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Analysis / Test Report

Page 2 of 2

Wind Rose



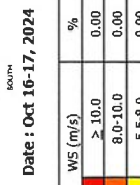
Date : Oct 11-12, 2024



Date : Oct 13-14, 2024



Date : Oct 15-16, 2024



Date : Oct 17-18, 2024

WS (m/s)	%
> 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	0.60
1.7-3.3	1.79
0.3-1.7	40.48
Calms	57.14

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Sarayuht Jitranont

Assistant General Manager



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P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Analysis / Test Report

Lot ID: 24115929

Date Received :Oct 18, 2024

Date Reported :Oct 24, 2024

Report Number :3131846-1

Page 1 of 2

Sample Number 24115929-8 to 14

Parameter Wind Speed / Wind Direction

Location บ้านท่าเรือ (A2) (GPS 47P 0742003, 1417397)

Oct 11 - Oct 18, 2024

Norranon Talhengkham

Time	Oct 11 - Oct 12, 2024		Oct 12 - Oct 13, 2024		Oct 13 - Oct 14, 2024		Oct 14 - Oct 15, 2024		Oct 15 - Oct 16, 2024		Oct 16 - Oct 17, 2024		Oct 17 - Oct 18, 2024								
	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)							
12:00 PM - 01:00 PM	1.8	149.0	SSE	1.1	205.0	SSW	2.0	154.0	SSE	0.9	49.0	NE	0.6	102.0	ESE	0.2	-	-	0.8	206.0	SSW
01:00 PM - 02:00 PM	1.1	155.0	SSE	1.0	255.0	WSW	0.8	168.0	SSE	1.0	3.0	N	2.3	84.0	E	0.8	171.0	S	1.1	252.0	WSW
02:00 PM - 03:00 PM	1.2	164.0	SSE	0.6	91.0	E	0.8	12.0	NNE	0.3	167.0	SSE	0.4	240.0	WSW	0.6	15.0	NNE	0.9	86.0	E
03:00 PM - 04:00 PM	0.5	150.0	SSE	1.5	105.0	ESE	0.8	62.0	ENE	1.4	149.0	SSE	0.9	194.0	SSW	0.3	61.0	ENE	0.3	106.0	ESE
04:00 PM - 05:00 PM	1.1	189.0	S	1.7	66.0	ENE	0.6	21.0	NNE	2.1	190.0	S	0.6	233.0	SW	1.3	22.0	NNE	1.5	65.0	ENE
05:00 PM - 06:00 PM	0.4	143.0	SE	0.7	112.0	ESE	3.2	39.0	NE	1.0	140.0	SE	0.9	219.0	SW	0.6	36.0	NE	1.2	115.0	ESE
06:00 PM - 07:00 PM	0.8	239.0	WSW	1.7	16.0	NNE	1.3	71.0	ENE	1.4	236.0	SW	1.9	187.0	S	0.7	68.0	ENE	2.0	19.0	NNE
07:00 PM - 08:00 PM	0.4	221.0	SW	1.6	34.0	NE	0.6	117.0	ESE	3.3	222.0	SW	0.7	137.0	SE	0.7	118.0	ESE	0.2	-	-
08:00 PM - 09:00 PM	0.3	252.0	WSW	0.2	-	-	2.3	84.0	E	2.5	255.0	WSW	2.3	168.0	SSE	1.4	87.0	E	0.7	0.0	N
09:00 PM - 10:00 PM	0.6	206.0	SSW	1.9	49.0	NE	2.6	102.0	ESE	2.3	205.0	SSW	0.5	154.0	SSE	1.0	101.0	E	0.4	50.0	NE
10:00 PM - 11:00 PM	0.6	229.0	SW	0.9	26.0	NNE	1.5	77.0	ENE	1.9	230.0	SW	1.6	177.0	S	0.4	78.0	ENE	1.8	25.0	NNE
11:00 PM - 12:00 AM	0.5	215.0	SW	0.0	-	-	2.3	127.0	SE	0.5	212.0	SSW	0.1	-	-	0.4	124.0	SE	0.6	43.0	NE
12:00 AM - 01:00 AM	0.8	179.0	S	0.9	228.0	SW	0.6	79.0	E	0.9	24.0	NNE	1.1	231.0	SW	0.4	176.0	S	0.8	49.0	NE
01:00 AM - 02:00 AM	0.9	129.0	SE	2.1	214.0	SW	0.6	25.0	SE	1.1	42.0	NE	0.4	213.0	SSW	0.6	130.0	SE	0.0	-	-
02:00 AM - 03:00 AM	0.9	170.0	S	0.1	-	-	0.3	86.0	E	0.4	1.0	N	0.6	254.0	WSW	0.3	169.0	S	0.5	40.0	NE
03:00 AM - 04:00 AM	0.0	-	-	0.1	-	-	0.4	100.0	E	0.0	-	-	0.2	-	-	0.5	155.0	SSE	0.2	-	-
04:00 AM - 05:00 AM	0.1	-	-	0.2	-	-	0.5	192.0	SSW	0.2	-	-	0.1	-	-	0.6	63.0	ENE	0.1	-	-
05:00 AM - 06:00 AM	0.2	-	-	0.0	-	-	0.6	242.0	WSW	0.3	165.0	SSE	0.2	-	-	0.8	13.0	NNE	0.4	140.0	SE
06:00 AM - 07:00 AM	0.0	-	-	0.3	114.0	ESE	0.4	217.0	SW	0.6	142.0	SE	0.3	113.0	ESE	0.1	-	-	0.5	167.0	SSE
07:00 AM - 08:00 AM	0.1	-	-	0.4	64.0	ENE	0.5	235.0	SW	0.0	-	-	0.4	67.0	ENE	0.1	-	-	0.3	149.0	SSE
08:00 AM - 09:00 AM	0.4	119.0	ESE	1.1	32.0	NNE	0.3	139.0	SE	0.1	-	-	0.5	35.0	NE	0.1	-	-	0.5	245.0	WSW
09:00 AM - 10:00 AM	0.5	69.0	ENE	0.5	18.0	NNE	0.4	185.0	S	0.9	238.0	WSW	0.3	17.0	NNE	0.5	70.0	ENE	0.5	233.0	SW
10:00 AM - 11:00 AM	0.6	212.0	SSW	0.8	131.0	SE	1.0	40.0	NE	0.5	127.0	SE	0.3	128.0	SE	1.9	215.0	SW	2.2	236.0	WSW
11:00 AM - 12:00 PM	1.9	230.0	SW	0.9	177.0	S	1.4	26.0	NNE	0.5	77.0	ENE	1.8	178.0	S	1.7	229.0	SW	1.5	242.0	WSW

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by

Sarayuht Jitranont
Assistant General Manager

Approved by

Sarayuht 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

P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24115929

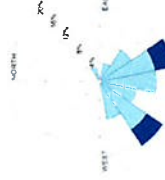
Date Received :Oct 18, 2024

Date Reported :Oct 24, 2024

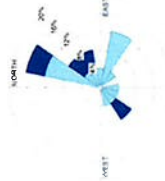
Report Number :3131846-1

Page 2 of 2

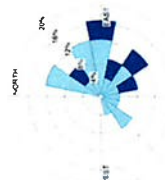
Wind Rose



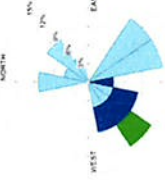
Date : Oct 11-12, 2024



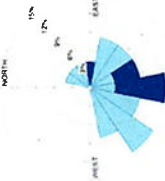
Date : Oct 12-13, 2024



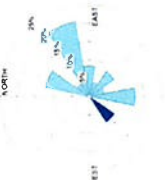
Date : Oct 13-14, 2024



Date : Oct 14-15, 2024



Date : Oct 15-16, 2024



Date : Oct 16-17, 2024

WS (m/s)	%
≥ 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	0.60
1.7-3.3	14.29
0.3-1.7	69.05
Calm	16.07

Date : Oct 17-18, 2024

Date : Oct 18-19, 2024

The above results are valid only for the wind speed and direction (as indicated in the report). The results are not valid for the wind speed and direction (as indicated in the report) without written consent from the Laboratory. ALS Laboratory Group (Thailand) Co., Ltd. strongly recommends that this report is not reproduced in full.

Approved by

Sarayuht Jitranont
Assistant General Manager

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Client : Michelin Siam Co., Ltd.

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

Lot ID: 24115929

Date Received :Oct 18, 2024

Date Reported :Oct 24, 2024

Report Number :3131846-1

P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Sample Number 24115929-15 to 21

Parameter Wind Speed / Wind Direction

Location จันทบุรี (A3) (GPS 0744066, 1420470)

Sampling Date Oct 11 - Oct 18, 2024

Sampling by Noranon Tathongkham

Analysis / Test Report



Client : Michelin Siam Co., Ltd.

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

Lot ID: 24115929

Date Received :Oct 18, 2024

Date Reported :Oct 24, 2024

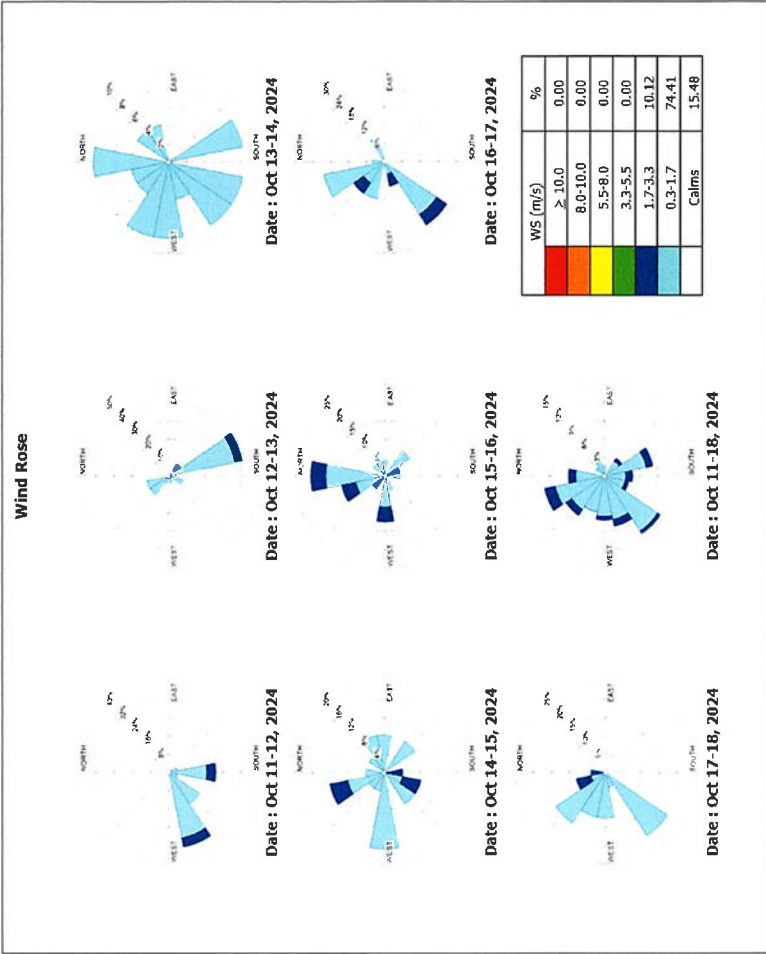
Report Number :3131846-1

P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Page 2 of 2



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Sarayuht Jitraront

Assistant General Manager

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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: 24115929

Date Received : Oct 18, 2024

Date Reported : Oct 24, 2024

Report Number : 3131846-1

P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Sample Number 24115929-22 to 28

Parameter Wind Speed / Wind Direction

Location หมู่บ้านบ้านใหม่ (A4) (GPS 47P 0747515, 1419157)

Sampling Date Oct 11 - Oct 18, 2024

Sampling by Noranont Tathongkham

Time	Oct 11 - Oct 12, 2024	Oct 12 - Oct 13, 2024	Oct 13 - Oct 14, 2024	Oct 14 - Oct 15, 2024	Oct 15 - Oct 16, 2024	Oct 16 - Oct 17, 2024	Oct 17 - Oct 18, 2024
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	1.1 123.0 ESE	1.2 160.0 SSE	1.8 62.0 ENE	0.9 320.0 NNW	2.0 116.0 ESE	1.3 104.0 S	1.2 82.0 E
11:00 AM - 12:00 PM	0.8 78.0 ENE	1.8 195.0 SSW	0.8 123.0 ESE	1.3 302.0 WNW	1.9 89.0 E	1.4 338.0 NNW	1.4 100.0 E
12:00 PM - 01:00 PM	1.1 50.0 NE	1.5 152.0 SSE	1.0 66.0 ENE	1.7 313.0 NW	1.5 100.0 E	1.0 255.0 WSW	0.7 86.0 E
01:00 PM - 02:00 PM	1.9 45.0 NE	1.7 95.0 E	1.6 258.0 WSW	1.2 312.0 NW	2.3 99.0 E	1.1 309.0 NW	1.1 80.0 E
02:00 PM - 03:00 PM	1.6 60.0 ENE	1.5 110.0 ESE	1.6 275.0 W	1.5 319.0 NW	1.5 106.0 ESE	1.3 314.0 NW	0.8 134.0 SE
03:00 PM - 04:00 PM	1.1 61.0 ENE	1.7 94.0 E	1.2 272.0 W	1.5 265.0 W	1.1 52.0 NE	1.6 307.0 NW	1.6 97.0 E
04:00 PM - 05:00 PM	1.0 47.0 NE	1.4 103.0 ESE	0.9 270.0 W	1.3 350.0 N	1.1 342.0 NNW	1.2 317.0 NW	2.8 97.0 E
05:00 PM - 06:00 PM	1.1 77.0 ENE	1.5 97.0 E	0.6 274.0 W	2.1 309.0 NW	1.3 301.0 WNW	1.3 324.0 NW	0.5 112.0 ESE
06:00 PM - 07:00 PM	2.3 337.0 NNW	1.0 50.0 NE	1.2 253.0 WSW	0.8 68.0 E	1.3 298.0 NNW	1.1 314.0 NW	0.4 95.0 E
07:00 PM - 08:00 PM	1.3 320.0 NW	0.4 66.0 ENE	1.8 269.0 W	1.2 43.0 NE	1.2 253.0 WSW	1.9 311.0 NW	0.7 340.0 N
08:00 PM - 09:00 PM	1.9 310.0 NW	1.2 58.0 ENE	2.0 317.0 NW	0.8 136.0 SE	1.1 346.0 NNW	1.8 302.0 WNW	1.7 336.0 NNW
09:00 PM - 10:00 PM	1.1 315.0 NW	0.7 58.0 ENE	1.6 263.0 W	1.7 116.0 ESE	0.6 326.0 NW	1.0 249.0 WSW	1.3 353.0 N
10:00 PM - 11:00 PM	2.0 324.0 NW	0.7 67.0 ENE	2.6 264.0 W	0.9 54.0 NE	0.9 249.0 WSW	0.7 234.0 SW	1.5 334.0 NNW
11:00 PM - 12:00 AM	1.0 317.0 NW	0.4 150.0 SE	1.3 281.0 W	0.8 71.0 ENE	0.3 249.0 WSW	1.1 253.0 WSW	0.9 332.0 NNW
01:00 AM - 02:00 AM	1.0 327.0 NNW	0.7 74.0 ENE	0.9 262.0 W	1.4 52.0 NE	0.4 110.0 ESE	1.1 238.0 WSW	0.8 334.0 NNW
02:00 AM - 03:00 AM	0.5 350.0 N	0.7 59.0 ENE	0.7 331.0 NNW	1.6 51.0 NE	0.6 118.0 ESE	0.8 262.0 W	0.8 335.0 NNW
03:00 AM - 04:00 AM	1.1 226.0 SW	0.4 58.0 ENE	0.7 310.0 NW	0.4 30.0 NNE	0.8 96.0 E	1.0 241.0 WSW	0.8 335.0 NNW
04:00 AM - 05:00 AM	1.0 140.0 SE	0.4 70.0 ENE	1.2 317.0 NW	0.7 37.0 NE	0.4 84.0 E	0.5 108.0 ESE	0.9 334.0 NNW
05:00 AM - 06:00 AM	2.1 152.0 SSE	1.4 71.0 ENE	1.6 305.0 NW	1.0 25.0 NNE	0.4 111.0 ESE	0.8 94.0 E	1.1 358.0 N
06:00 AM - 07:00 AM	1.8 154.0 SSE	0.4 73.0 ENE	1.6 329.0 NNW	1.2 49.0 NE	0.5 119.0 ESE	0.9 86.0 E	0.8 330.0 NNW
07:00 AM - 08:00 AM	2.1 123.0 ESE	0.7 64.0 ENE	1.3 340.0 NNW	0.9 60.0 ENE	0.7 157.0 SSE	0.6 163.0 SSE	1.3 351.0 N
08:00 AM - 09:00 AM	2.0 137.0 SE	0.7 101.0 E	1.2 346.0 NNW	1.7 71.0 ENE	1.4 111.0 ESE	1.2 90.0 E	1.3 331.0 NNW
09:00 AM - 10:00 AM	2.2 145.0 SE	0.7 101.0 E	1.4 331.0 NNW	2.0 56.0 NE	1.5 134.0 SE	1.1 88.0 E	1.2 343.0 NNW

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

The above results are valid only for the analyzed sample(s) as indicated in this report. For other sample(s) or other test method(s), the results may vary without written consent from the Laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by

Sarayuht Jitraront
Assistant General Manager

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Approved by

Sarayuht Jitraront
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: 24115929

Date Received : Oct 18, 2024

Date Reported : Oct 24, 2024

Report Number : 3131846-1

P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Wind Rose



Date : Oct 11-12, 2024



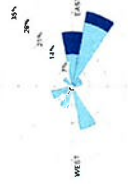
Date : Oct 12-13, 2024



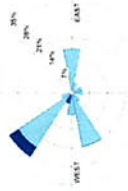
Date : Oct 13-14, 2024



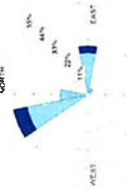
Date : Oct 14-15, 2024



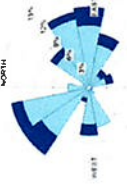
Date : Oct 15-16, 2024



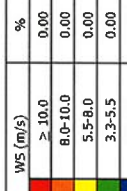
Date : Oct 16-17, 2024



Date : Oct 17-18, 2024



Date : Oct 18-19, 2024



Date : Oct 19-20, 2024

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	17.86
0.3-1.7	82.14
Calms	0.00

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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: 24139579
Date Received : Dec 23, 2024
Date Reported : Dec 28, 2024
Report Number: 3205309-1

Page 1 of 1

Sample Description		Air Quality	
Location	พื้นที่ถนนในซอย (A1) (GPS 47P 0742560, 1419452)	Parameter	Nitrogen dioxide (ppm)
Measurement Date	Dec 20, 2024 - Dec 21, 2024	Measurement by	Salicha Phetsawaeng
24139579-1			
Dec 20, 2024			
Time			
09:00 AM - 10:00 AM	0.0052	-	-
10:00 AM - 11:00 AM	0.0076	-	-
11:00 AM - 12:00 PM	0.0111	-	-
12:00 PM - 01:00 PM	0.0161	-	-
01:00 PM - 02:00 PM	0.0174	-	-
02:00 PM - 03:00 PM	0.0220	-	-
03:00 PM - 04:00 PM	0.0162	-	-
04:00 PM - 05:00 PM	0.0182	-	-
05:00 PM - 06:00 PM	0.0156	-	-
06:00 PM - 07:00 PM	0.0126	-	-
07:00 PM - 08:00 PM	0.0151	-	-
08:00 PM - 09:00 PM	0.0132	-	-
09:00 PM - 10:00 PM	0.0136	-	-
10:00 PM - 11:00 PM	0.0104	-	-
11:00 PM - 12:00 AM	0.0105	-	-
12:00 AM - 01:00 AM	0.0087	-	-
01:00 AM - 02:00 AM	0.0090	-	-
02:00 AM - 03:00 AM	0.0095	-	-
03:00 AM - 04:00 AM	0.0097	-	-
04:00 AM - 05:00 AM	0.0092	-	-
05:00 AM - 06:00 AM	0.0088	-	-
06:00 AM - 07:00 AM	0.0084	-	-
07:00 AM - 08:00 AM	0.0083	-	-
08:00 AM - 09:00 AM	0.0082	-	-
Average	0.0118	-	-
1hr - Maximum	0.0220	-	-
Standard 1hr - Average	0.170	-	-
Standard	-	-	-
Standard : Notification of the National Environment Board No. 33, 2009 (B.E. 2552).			
Reference Method : US EPA Method Part 50 App. F (Chemiluminescence)			

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by

Saranya C.
Saranya Chalermthamrong
Scientist (4)

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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: 24139579
Date Received : Dec 23, 2024
Date Reported : Dec 28, 2024
Report Number: 3205310-1

Page 1 of 1

Sample Description		Air Quality	
Location	พื้นที่ถนนในซอย (A2) (GPS 47P 0742003, 1417397)	Parameter	Nitrogen dioxide (ppm)
Measurement Date	Dec 20, 2024 - Dec 21, 2024	Measurement by	Salicha Phetsawaeng
24139579-2			
Dec 20, 2024			
Time			
09:00 AM - 10:00 AM	0.0018	-	-
10:00 AM - 11:00 AM	0.0094	-	-
11:00 AM - 12:00 PM	0.0072	-	-
12:00 PM - 01:00 PM	0.0082	-	-
01:00 PM - 02:00 PM	0.0066	-	-
02:00 PM - 03:00 PM	0.0071	-	-
03:00 PM - 04:00 PM	0.0075	-	-
04:00 PM - 05:00 PM	0.0094	-	-
05:00 PM - 06:00 PM	0.0215	-	-
06:00 PM - 07:00 PM	0.0268	-	-
07:00 PM - 08:00 PM	0.0231	-	-
08:00 PM - 09:00 PM	0.0232	-	-
09:00 PM - 10:00 PM	0.0172	-	-
10:00 PM - 11:00 PM	0.0170	-	-
11:00 PM - 12:00 AM	0.0136	-	-
12:00 AM - 01:00 AM	0.0115	-	-
01:00 AM - 02:00 AM	0.0132	-	-
02:00 AM - 03:00 AM	0.0172	-	-
03:00 AM - 04:00 AM	0.0171	-	-
04:00 AM - 05:00 AM	0.0096	-	-
05:00 AM - 06:00 AM	0.0080	-	-
06:00 AM - 07:00 AM	0.0099	-	-
07:00 AM - 08:00 AM	0.0127	-	-
08:00 AM - 09:00 AM	0.0140	-	-
Average	0.0130	-	-
1hr - Maximum	0.0268	-	-
Standard 1hr - Average	0.170	-	-
Standard	-	-	-
Standard : Notification of the National Environment Board No. 33, 2009 (B.E. 2552).			
Reference Method : US EPA Method Part 50 App. F (Chemiluminescence)			

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Saranya Chalermthamrong
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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 :

Lot ID: 24139579
Date Received : Dec 23, 2024
Date Reported : Dec 28, 2024
Report Number: 3205311-1

Page 1 of 1

Sample Description		Air Quality	
Location	ท่าอากาศยาน (A3) (GPS 47P 0744066, 1420470)	Parameter	Nitrogen dioxide (ppm)
Measurement Date	Dec 20, 2024 - Dec 21, 2024	Measurement by	Satcha Phitsawaeng
24139579-3			
Time	Dec 20, 2024		

09:00 AM - 10:00 AM	0.0055	-	-	-	-
10:00 AM - 11:00 AM	0.0072	-	-	-	-
11:00 AM - 12:00 PM	0.0066	-	-	-	-
12:00 PM - 01:00 PM	0.0051	-	-	-	-
01:00 PM - 02:00 PM	0.0050	-	-	-	-
02:00 PM - 03:00 PM	0.0075	-	-	-	-
03:00 PM - 04:00 PM	0.0088	-	-	-	-
04:00 PM - 05:00 PM	0.0069	-	-	-	-
05:00 PM - 06:00 PM	0.0075	-	-	-	-
06:00 PM - 07:00 PM	0.0065	-	-	-	-
07:00 PM - 08:00 PM	0.0080	-	-	-	-
08:00 PM - 09:00 PM	0.0112	-	-	-	-
09:00 PM - 10:00 PM	0.0120	-	-	-	-
10:00 PM - 11:00 PM	0.0112	-	-	-	-
11:00 PM - 12:00 AM	0.0114	-	-	-	-
12:00 AM - 01:00 AM	0.0091	-	-	-	-
01:00 AM - 02:00 AM	0.0072	-	-	-	-
02:00 AM - 03:00 AM	0.0069	-	-	-	-
03:00 AM - 04:00 AM	0.0067	-	-	-	-
04:00 AM - 05:00 AM	0.0058	-	-	-	-
05:00 AM - 06:00 AM	0.0068	-	-	-	-
06:00 AM - 07:00 AM	0.0060	-	-	-	-
07:00 AM - 08:00 AM	0.0063	-	-	-	-
08:00 AM - 09:00 AM	0.0081	-	-	-	-
Average	0.0077	-	-	-	-
1hr - Maximum	0.0120	-	-	-	-
Standard 1hr - Average	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)				

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. This report is not reproduced except in full.

Approved by

Saranya Chalermthamrong
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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 :

Lot ID: 24139579
Date Received : Dec 23, 2024
Date Reported : Dec 28, 2024
Report Number: 3205312-1

Page 1 of 1

Sample Description		Air Quality	
Location	ท่าอากาศยาน (A4) (GPS 47P 0747515, 1419157)	Parameter	Nitrogen dioxide (ppm)
Measurement Date	Dec 20, 2024 - Dec 21, 2024	Measurement by	Satcha Phitsawaeng
24139579-4			
Time	Dec 20, 2024		

09:00 AM - 10:00 AM	0.0002	-	-	-	-
10:00 AM - 11:00 AM	0.0034	-	-	-	-
11:00 AM - 12:00 PM	0.0037	-	-	-	-
12:00 PM - 01:00 PM	0.0033	-	-	-	-
01:00 PM - 02:00 PM	0.0034	-	-	-	-
02:00 PM - 03:00 PM	0.0033	-	-	-	-
03:00 PM - 04:00 PM	0.0045	-	-	-	-
04:00 PM - 05:00 PM	0.0076	-	-	-	-
05:00 PM - 06:00 PM	0.0131	-	-	-	-
06:00 PM - 07:00 PM	0.0150	-	-	-	-
07:00 PM - 08:00 PM	0.0105	-	-	-	-
08:00 PM - 09:00 PM	0.0084	-	-	-	-
09:00 PM - 10:00 PM	0.0090	-	-	-	-
10:00 PM - 11:00 PM	0.0103	-	-	-	-
11:00 PM - 12:00 AM	0.0087	-	-	-	-
12:00 AM - 01:00 AM	0.0071	-	-	-	-
01:00 AM - 02:00 AM	0.0065	-	-	-	-
02:00 AM - 03:00 AM	0.0066	-	-	-	-
03:00 AM - 04:00 AM	0.0080	-	-	-	-
04:00 AM - 05:00 AM	0.0073	-	-	-	-
05:00 AM - 06:00 AM	0.0076	-	-	-	-
06:00 AM - 07:00 AM	0.0069	-	-	-	-
07:00 AM - 08:00 AM	0.0064	-	-	-	-
08:00 AM - 09:00 AM	0.0030	-	-	-	-
Average	0.0068	-	-	-	-
1hr - Maximum	0.0150	-	-	-	-
Standard 1hr - Average	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)				

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Approved by

Saranya Chalermthamrong
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S:\Report\Air SON\Ox ppt (1050AM)



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: 24139580
Date Received : Dec 21, 2024
Date Reported : Jan 03, 2025
Report Number : 3189300-1

Page 1 of 4

Sample Number	24139580-1
Sampled Date	Dec 20, 2024
Sample Description	Air Quality
Location	สำนักงานโครงการ (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced	Dec 23, 2024
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated
Barometric Pressure	758 mmHg
Atmospheric Temperature	29.7 °C
Analyte	
Air Testing	
Phosphoric acid *	20/12/24 - 21/12/24 mg/m ³ - 0.05 <0.05 No Standard Based on OSHA, ID-174-SG - Bangkok
Sulfuric acid *	20/12/24 - 21/12/24 mg/m ³ - 0.05 <0.05 No Standard Based on OSHA, ID-174-SG - Bangkok
Total Suspended Particulate	20/12/24 - 21/12/24 mg/m ³ - 0.002 0.078 0.33 US EPA 40 CFR Part 50, Appendix B NEB No.24Rayong
Guideline :	
NEB No.24 : Notification of the National Environmental Board. No.24, 2004 (B.E.2547) dated September 22, 2004	
Sampled By : Satcha Phetsawaeng	
Remark :	
- LOD : Limit of Detection	
- "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.	
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21120
P/O :
Project Name : Environment : EIA
Project Location :

TESTING
No.0042
Lot ID: 24139580
Date Received : Dec 21, 2024
Date Reported : Jan 03, 2025
Report Number : 3189300-1

Page 2 of 4

Sample Number	24139580-2
Sampled Date	Dec 20, 2024
Sample Description	Air Quality
Location	สำนักงานโครงการ (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced	Dec 23, 2024
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated
Barometric Pressure	758 mmHg
Atmospheric Temperature	29.7 °C
Analyte	
Air Testing	
Phosphoric acid *	20/12/24 - 21/12/24 mg/m ³ - 0.05 <0.05 No Standard Based on OSHA, ID-174-SG - Bangkok
Sulfuric acid *	20/12/24 - 21/12/24 mg/m ³ - 0.05 <0.05 No Standard Based on OSHA, ID-174-SG - Bangkok
Total Suspended Particulate	20/12/24 - 21/12/24 mg/m ³ - 0.002 0.056 0.33 US EPA 40 CFR Part 50, Appendix B NEB No.24Rayong
Guideline :	
NEB No.24 : Notification of the National Environmental Board. No.24, 2004 (B.E.2547) dated September 22, 2004	
Sampled By : Satcha Phetsawaeng	
Remark :	
- LOD : Limit of Detection	
- "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.	
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Thanitak.

Approved by

Thanita Kulsuriwong
Scientist (4)

Thanitak.

Approved by

Thanita Kulsuriwong
Scientist (4)



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: 24139580
Date Received : Dec 21, 2024
Date Reported : Jan 03, 2025
Report Number : 3189300-1

Page 2 of 4

Sample Number	24139580-3							
Sampled Date	Dec 20, 2024							
Sample Description	Air Quality							
Location	หน้าสวนยาง (A3) (GPS 47P 0744066, 1420470)							
Date Analysis Commenced	Dec 23, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	758 mmHg							
Atmospheric Temperature	29.7 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	20/12/24 - 21/12/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	20/12/24 - 21/12/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	20/12/24 - 21/12/24	mg/m3	-	0.002	0.106	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

Guideline :

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

Sampled By : Satcha Phetsawaeng

Remark :

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

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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: 24139580
Date Received : Dec 21, 2024
Date Reported : Jan 03, 2025
Report Number : 3189300-1

Page 4 of 4

Sample Number	24139580-4							Page 1 of 1
Sample Date	Dec 20, 2024							
Sample Description	Air Quality							
Location	หน้าสวนยาง (A4) (GPS 47P 0747515, 1419157)							
Date Analysis Commenced	Dec 23, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated							
Barometric Pressure	758 mmHg							
Atmospheric Temperature	29.7 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	20/12/24 - 21/12/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Sulfuric acid *	20/12/24 - 21/12/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	- Bangkok
Total Suspended Particulate	20/12/24 - 21/12/24	mg/m3	-	0.002	0.060	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

Guideline :

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

Sampled By : Satcha Phetsawaeng

Remark :

- LOD : Limit of Detection
- "c" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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Lot ID: 24139581

Date Received :Dec 21, 2024

Date Reported :Dec 25, 2024

Report Number :3189303-1

P/O :

Project Name : Environment : EIA

Project Location :

Sample Number 24139581-1

Parameter Wind Speed / Wind Direction
Location กรุงเทพมหานคร (AI) (GPS 47P 0742960, 1419452)

Sampling Date Dec 20 - Dec 21, 2024

Sampling by Satcha Phetsawaeng

Page 1 of 2



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: 24139581

Date Received :Dec 21, 2024

Date Reported :Dec 25, 2024

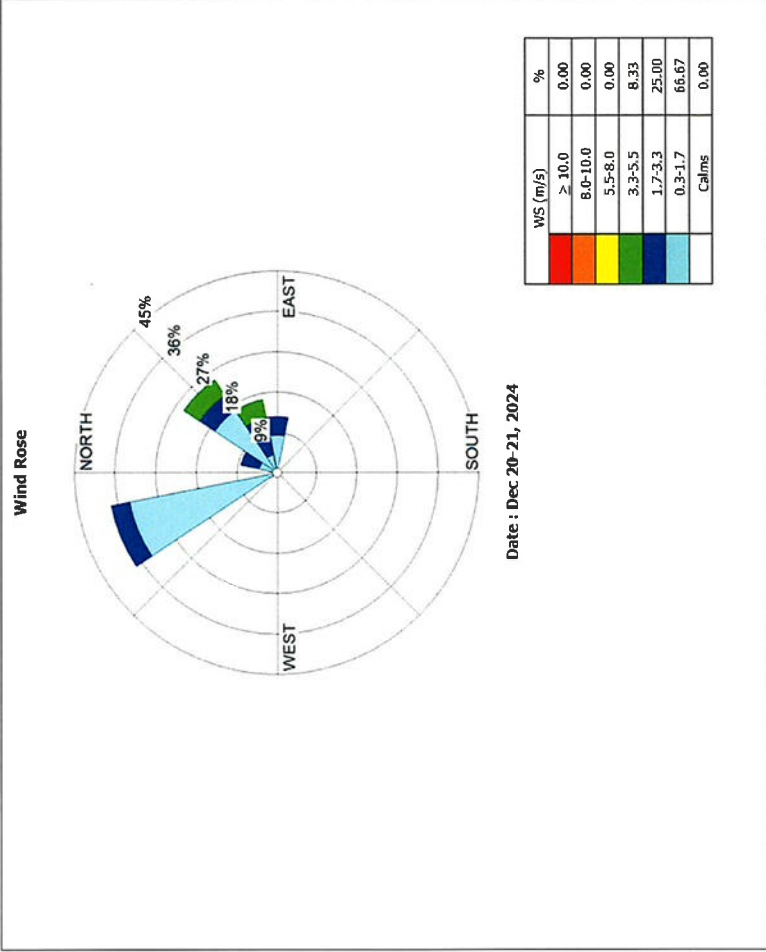
Report Number :3189303-1

P/O :

Project Name : Environment : EIA

Project Location :

Page 2 of 2



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Sarayuth Jitranont
Assistant General Manager

Approved by

Sarayuth Jitranont
Assistant General Manager

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P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 24139581

Date Received :Dec 21, 2024

Date Reported :Dec 25, 2024

Report Number :3189303-1

Sample Number 24139581-2

Parameter Wind Speed / Wind Direction

Location บ้านท่าเรือ (A2) (GPS 47P 0742003, 1417397)

Sampling Date Dec 20 - Dec 21, 2024

Sampling by Salicha Phetsawaeng

Page 1 of 2

Time	Dec 20 - Dec 21, 2024															
	WS (m/s)	WD (deg)														
09:00 AM - 10:00 AM	3.9	350.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	3.6	286.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	3.2	17.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	2.1	319.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	3.6	331.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	4.0	24.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	1.8	269.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	1.4	18.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	0.7	21.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.3	359.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	1.2	329.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.4	325.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	1.4	324.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	1.3	341.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	1.5	349.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	1.6	346.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	0.4	345.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	0.6	359.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	1.4	347.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	2.1	349.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	1.3	353.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	2.4	356.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	0.6	10.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	0.4	12.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Assistant General Manager

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P/O :

Project Name : Environment : EIA

Project Location :

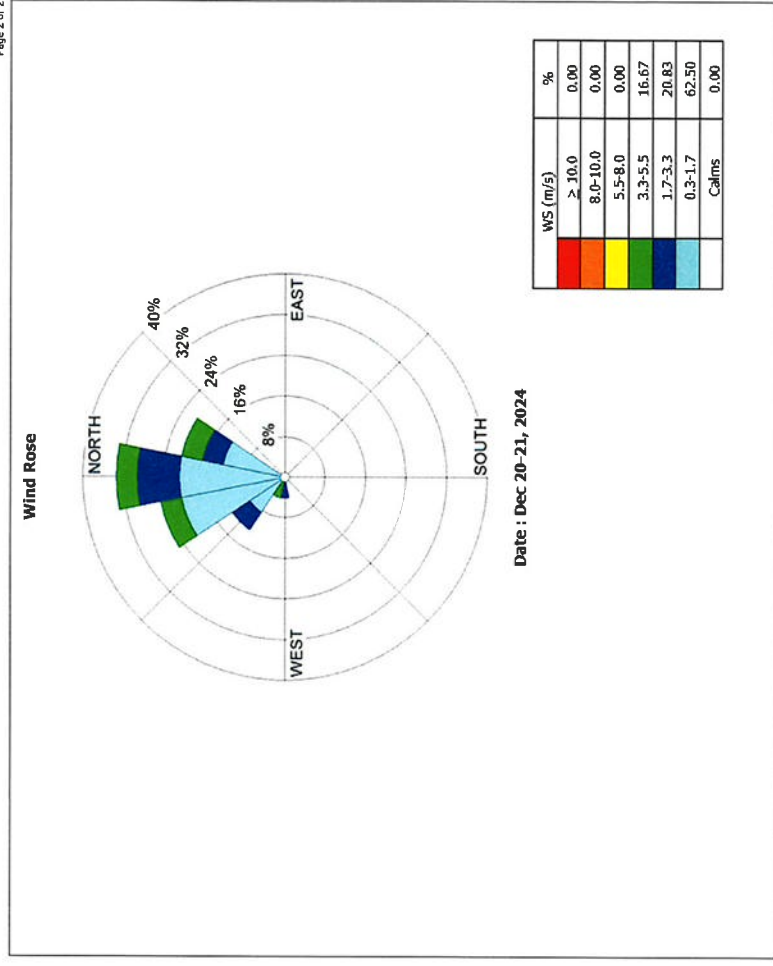
Lot ID: 24139581

Date Received :Dec 21, 2024

Date Reported :Dec 25, 2024

Report Number :3189303-1

Page 2 of 2



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Lot ID: 24139581

Date Received :Dec 21, 2024

Date Reported :Dec 25, 2024

Report Number :3189303-1

P/O :

Project Name : Environment : EIA

Project Location :

Sample Number 24139581-3

Parameter Wind Speed / Wind Direction

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

Sampling Date Dec 20 - Dec 21, 2024

Sampling by Salcha Phetsawaeng

Page 1 of 2

Time	Dec 20 - Dec 21, 2024																			
	WS (m/s)	WD (deg)																		
09:00 AM - 10:00 AM	2.3	350.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	2.4	355.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	4.3	54.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	4.7	91.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	2.6	46.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	4.8	0.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	4.0	0.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	1.5	0.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	2.1	69.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	2.1	73.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	0.6	74.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	1.7	73.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	1.7	75.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	1.6	71.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	1.6	71.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	2.4	71.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	1.5	70.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	1.6	71.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	2.3	78.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	1.6	77.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	1.6	66.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	2.5	9.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	1.2	45.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	1.6	20.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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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

Lot ID: 24139581

Date Received :Dec 21, 2024

Date Reported :Dec 25, 2024

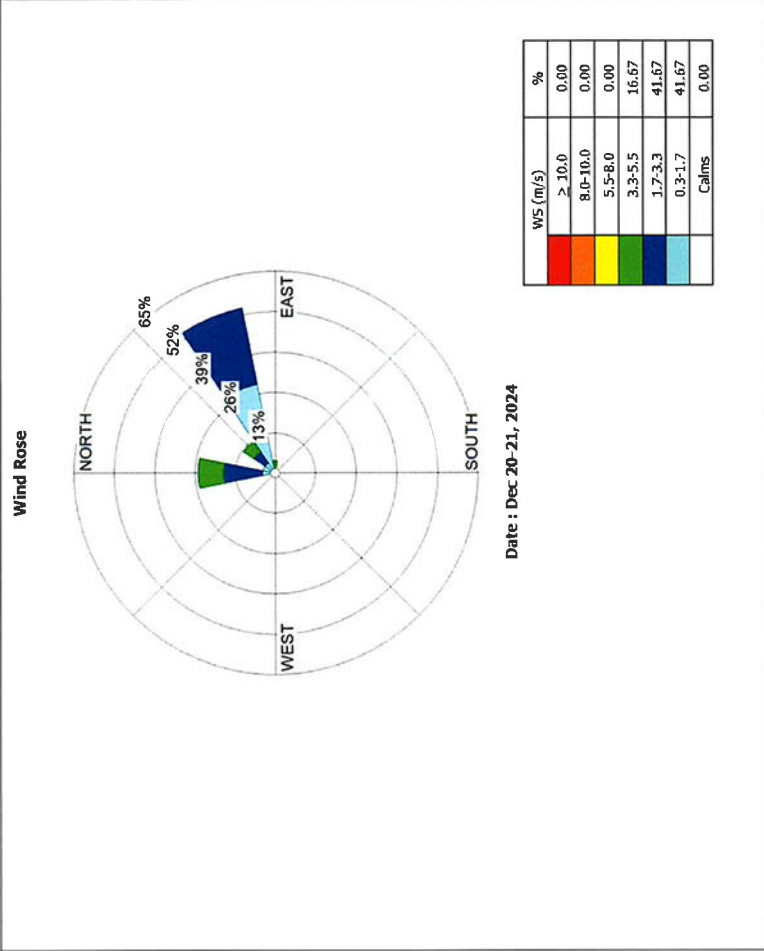
Report Number :3189303-1

P/O :

Project Name : Environment : EIA

Project Location :

Page 2 of 2



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Assistant General Manager

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Life Sciences

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RIGHT SOLUTIONS RIGHT PARTNER



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: 24139581

Date Received :Dec 21, 2024

Date Reported :Dec 25, 2024

Report Number :3189303-1

Sample Number 24139581-4

Parameter Wind Speed / Wind Direction

Location บ้านนาเกลือ (A4) (GPS 47P 0747515, 1419157)

Sampling Date Dec 20 - Dec 21, 2024

Sampling by Saticha Phatsawaeng

Page 1 of 2

Time	Dec 20 - Dec 21, 2024																			
	WS (m/s)	WD (deg)																		
09:00 AM - 10:00 AM	2.3	46.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	2.1	73.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	2.6	24.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	3.5	19.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	2.3	13.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	2.4	357.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	2.1	61.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	1.5	137.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	4.9	182.0	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	1.4	181.0	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	1.6	183.0	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.4	311.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.9	338.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.8	331.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	1.3	331.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	2.4	331.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	2.5	334.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	3.1	318.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	2.6	304.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	2.5	332.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	2.7	16.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	2.9	7.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	2.1	12.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	1.8	45.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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

Approved by

Sarayuth Jitranont
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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 :

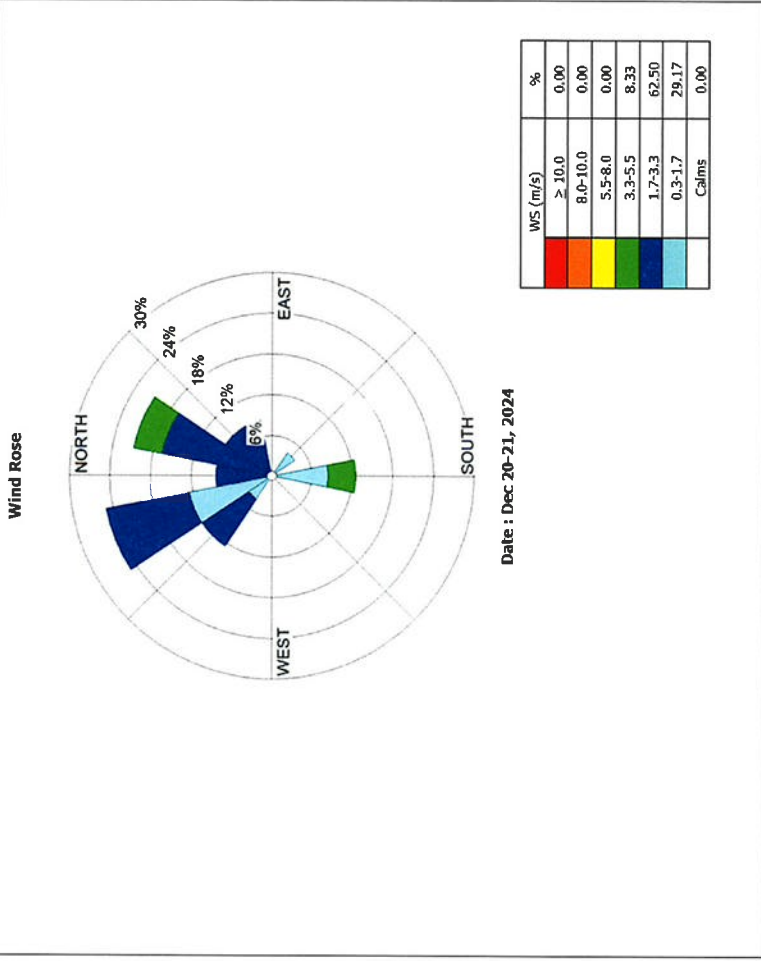
Lot ID: 24139581

Date Received :Dec 21, 2024

Date Reported :Dec 25, 2024

Report Number :3189303-1

Page 2 of 2



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

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Sarayuth Jitranont
Assistant General Manager

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ภาคผนวก ค-3

ระดับเสียงโดยทั่วไป



TESTING
No.0042

Lot ID: 24115930

Date Received : Oct 18, 2024
Date Reported : Oct 24, 2024
Report Number: 3146004-1

Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Page 1 of 1

Sample Number	24115930-1
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณทางเข้าพื้นที่ขุด (GPS 47P 0743667, 1419318)
Measurement Date	Oct 11 - Oct 12, 2024
Measurement by	Norranon Tahtongkham
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	56.3	60.6	54.6
01:00 PM - 02:00 PM	53.2	76.7	51.0
02:00 PM - 03:00 PM	54.8	80.0	52.0
03:00 PM - 04:00 PM	54.0	71.5	52.0
04:00 PM - 05:00 PM	54.7	74.4	52.7
05:00 PM - 06:00 PM	63.9	93.0	53.3
06:00 PM - 07:00 PM	56.0	73.5	54.3
07:00 PM - 08:00 PM	56.9	75.8	54.7
08:00 PM - 09:00 PM	64.8	73.7	54.9
09:00 PM - 10:00 PM	59.7	64.7	54.6
10:00 PM - 11:00 PM	61.6	65.9	59.9
11:00 PM - 12:00 AM	61.2	65.8	57.8
12:00 AM - 01:00 AM	60.5	66.5	56.1
01:00 AM - 02:00 AM	60.0	65.4	57.1
02:00 AM - 03:00 AM	61.1	67.3	59.1
03:00 AM - 04:00 AM	60.9	67.6	58.0
04:00 AM - 05:00 AM	58.4	65.8	56.1
05:00 AM - 06:00 AM	56.3	62.8	53.2
06:00 AM - 07:00 AM	55.3	78.7	53.6
07:00 AM - 08:00 AM	56.5	77.2	53.2
08:00 AM - 09:00 AM	53.0	64.0	51.6
09:00 AM - 10:00 AM	51.4	67.4	50.0
10:00 AM - 11:00 AM	51.7	62.1	50.3
11:00 AM - 12:00 PM	51.7	63.6	50.1
Leq Average 24 hrs. (dB(A))	58.9		
Lmax (dB(A))	93.0		
L90 (dB(A))			53.6
Ldn (dB(A))	66.1		
Standard (dB(A))	70		115

Reference Method : ISO1996-1 and 1996-2
Standard : 1. ใช้มาตรฐานการประเมินผลกระทบสิ่งแวดล้อม พ.ศ. 2540 (พ.ศ. 2540) สำหรับการประเมินผลกระทบสิ่งแวดล้อม
2. ใช้มาตรฐานการวัดผลกระทบสิ่งแวดล้อม พ.ศ. 2548 (พ.ศ. 2548) สำหรับการวัดผลกระทบสิ่งแวดล้อม
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkloch
Scientist (3)

Approved by

Supt S.

Supot Salameh
Section Head

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2272-62/BMAL

S:\Report\Air Noise rpt (10.04AM)



TESTING
No.0042

Lot ID: 24115930

Date Received : Oct 18, 2024
Date Reported : Oct 24, 2024
Report Number: 3146005-1

Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Page 1 of 1

Sample Number	24115930-2
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณทางเข้าพื้นที่ขุด (GPS 47P 0743667, 1419318)
Measurement Date	Oct 12 - Oct 13, 2024
Measurement by	Norranon Tahtongkham
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	52.3	62.3	50.8
01:00 PM - 02:00 PM	62.9	93.4	51.8
02:00 PM - 03:00 PM	54.3	66.3	53.3
03:00 PM - 04:00 PM	54.2	74.4	52.5
04:00 PM - 05:00 PM	54.3	68.4	52.2
05:00 PM - 06:00 PM	53.4	64.4	52.1
06:00 PM - 07:00 PM	59.0	66.5	54.8
07:00 PM - 08:00 PM	63.8	68.7	61.3
08:00 PM - 09:00 PM	63.6	67.5	61.0
09:00 PM - 10:00 PM	64.1	68.5	61.7
10:00 PM - 11:00 PM	64.8	68.2	62.6
11:00 PM - 12:00 AM	63.8	68.7	59.7
12:00 AM - 01:00 AM	62.1	65.7	59.2
01:00 AM - 02:00 AM	62.0	71.3	59.4
02:00 AM - 03:00 AM	61.0	66.7	59.2
03:00 AM - 04:00 AM	60.3	65.2	59.4
04:00 AM - 05:00 AM	58.2	63.7	56.5
05:00 AM - 06:00 AM	55.3	74.1	53.2
06:00 AM - 07:00 AM	54.8	70.5	53.7
07:00 AM - 08:00 AM	55.0	74.4	52.7
08:00 AM - 09:00 AM	52.1	73.7	50.2
09:00 AM - 10:00 AM	51.7	71.7	49.4
10:00 AM - 11:00 AM	50.9	72.6	48.4
11:00 AM - 12:00 PM	50.5	74.0	47.6
Leq Average 24 hrs. (dB(A))	60.1		
Lmax (dB(A))		93.4	
L90 (dB(A))			53.3
Ldn (dB(A))	67.5		
Standard (dB(A))	70		115

Reference Method : ISO1996-1 and 1996-2
Standard : 1. ใช้มาตรฐานการประเมินผลกระทบสิ่งแวดล้อม พ.ศ. 2540 (พ.ศ. 2540) สำหรับการประเมินผลกระทบสิ่งแวดล้อม
2. ใช้มาตรฐานการวัดผลกระทบสิ่งแวดล้อม พ.ศ. 2548 (พ.ศ. 2548) สำหรับการวัดผลกระทบสิ่งแวดล้อม
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Chontichak

Chonticha Subongkloch
Scientist (3)

Approved by

Supt S.

Supot Salameh
Section Head

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S:\Report\Air Noise rpt (10.04AM)



Analysis / Test Report

TESTING
No.0042

Lot ID: 24115930

Date Received : Oct 18, 2024
Date Reported : Oct 24, 2024
Report Number: 3146006-1

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Page 1 of 1

Sample Number	24115930-3
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่โรงงานหินยี่งดา (GPS 47P 0743667, 1419318)
Measurement Date	Oct 13 - Oct 14, 2024
Measurement by	Noranon Tathongkham
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	47.6	62.1	45.6
01:00 PM - 02:00 PM	52.6	76.7	45.7
02:00 PM - 03:00 PM	50.0	74.5	45.6
03:00 PM - 04:00 PM	52.5	76.5	48.5
04:00 PM - 05:00 PM	51.9	67.1	50.1
05:00 PM - 06:00 PM	52.5	79.3	49.9
06:00 PM - 07:00 PM	56.8	78.1	53.6
07:00 PM - 08:00 PM	57.7	73.3	55.9
08:00 PM - 09:00 PM	56.3	71.8	55.0
09:00 PM - 10:00 PM	56.5	76.7	54.8
10:00 PM - 11:00 PM	57.3	76.7	53.5
11:00 PM - 12:00 AM	57.3	66.6	52.8
12:00 AM - 01:00 AM	54.3	66.0	53.4
01:00 AM - 02:00 AM	54.8	63.8	53.8
02:00 AM - 03:00 AM	55.0	79.3	53.9
03:00 AM - 04:00 AM	55.1	72.3	54.0
04:00 AM - 05:00 AM	53.2	76.0	51.6
05:00 AM - 06:00 AM	53.3	77.6	51.1
06:00 AM - 07:00 AM	54.6	73.9	52.8
07:00 AM - 08:00 AM	54.1	75.5	51.3
08:00 AM - 09:00 AM	51.9	66.5	50.5
09:00 AM - 10:00 AM	51.5	74.9	49.9
10:00 AM - 11:00 AM	50.5	67.8	48.4
11:00 AM - 12:00 PM	51.8	78.3	48.4

Leq Average 24 hrs. (dB(A))	54.4
Lmax (dB(A))	79.3
L90 (dB(A))	51.3
Ldn (dB(A))	61.5
Standard (dB(A))	70
Standard (dB(A))	115
Reference Method : ISO1996-1 and 1996-2	
Standard : 1. ประกาศกระทรวงมหาดไทย เรื่องเสียง (พ.ศ. 2540) ข้อกำหนดมาตรฐานระดับเสียงภายใน	
2. ประกาศกระทรวงสาธารณสุข เรื่องกำหนดระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการ	
3. มาตรฐาน พ.ศ. 2548	
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.	

Technical Management

Chontichak
Chonticha Subongkoch
Scientist (3)

Approved by

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Supot Salamteah
Section Head

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S:\Report\Air Noise rpt (1004AM)



Analysis / Test Report

TESTING
No.0042

Lot ID: 24115930

Date Received : Oct 18, 2024
Date Reported : Oct 24, 2024
Report Number: 3146007-1

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Page 1 of 1

Sample Number	24115930-4
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่โรงงานหินยี่งดา (GPS 47P 0743667, 1419318)
Measurement Date	Oct 14 - Oct 15, 2024
Measurement by	Noranon Tathongkham
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	52.8	74.0	51.1
01:00 PM - 02:00 PM	52.9	77.1	51.4
02:00 PM - 03:00 PM	52.4	69.0	51.2
03:00 PM - 04:00 PM	53.0	80.1	51.4
04:00 PM - 05:00 PM	53.0	68.0	51.5
05:00 PM - 06:00 PM	53.3	74.0	52.4
06:00 PM - 07:00 PM	55.1	71.7	53.1
07:00 PM - 08:00 PM	55.9	68.8	54.6
08:00 PM - 09:00 PM	54.2	61.9	53.4
09:00 PM - 10:00 PM	54.7	83.9	53.3
10:00 PM - 11:00 PM	53.9	76.9	52.4
11:00 PM - 12:00 AM	54.2	72.8	52.6
12:00 AM - 01:00 AM	54.5	66.4	53.1
01:00 AM - 02:00 AM	54.4	67.8	52.9
02:00 AM - 03:00 AM	55.1	73.4	53.6
03:00 AM - 04:00 AM	56.0	65.9	53.7
04:00 AM - 05:00 AM	53.9	69.1	52.8
05:00 AM - 06:00 AM	52.7	73.2	51.6
06:00 AM - 07:00 AM	55.4	72.3	52.0
07:00 AM - 08:00 AM	55.6	72.4	52.9
08:00 AM - 09:00 AM	54.0	75.3	52.0
09:00 AM - 10:00 AM	54.2	79.0	52.0
10:00 AM - 11:00 AM	52.8	73.0	50.6
11:00 AM - 12:00 PM	56.9	85.5	50.7

Leq Average 24 hrs. (dB(A))	54.4
Lmax (dB(A))	85.5
L90 (dB(A))	52.4
Ldn (dB(A))	60.9
Standard (dB(A))	70
Standard (dB(A))	115
Reference Method : ISO1996-1 and 1996-2	
Standard : 1. ประกาศกระทรวงมหาดไทย เรื่องเสียง (พ.ศ. 2540) ข้อกำหนดมาตรฐานระดับเสียงภายใน	
2. ประกาศกระทรวงสาธารณสุข เรื่องกำหนดระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการ	
3. มาตรฐาน พ.ศ. 2548	
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.	

Technical Management

Chontichak
Chonticha Subongkoch
Scientist (3)

Approved by

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S:\Report\Air Noise rpt (1005AM)



TESTING
No.0042

Lot ID: 24115930

Date Received : Oct 18, 2024
Date Reported : Oct 24, 2024
Report Number: 3146008-1

Page 1 of 1



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 : 4510513811
Project Name : Environment : EIA
Project Location :

Sample Number	24115930-5
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่โครงการท่าเรือ (GPS 47P 0743667, 1419318)
Measurement Date	Oct 15 - Oct 16, 2024
Measurement by	Norranon Tathongkham
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	55.1	73.8	52.3
01:00 PM - 02:00 PM	55.0	75.0	52.7
02:00 PM - 03:00 PM	53.1	70.2	51.7
03:00 PM - 04:00 PM	53.9	68.4	52.0
04:00 PM - 05:00 PM	54.4	75.6	51.9
05:00 PM - 06:00 PM	53.6	69.1	51.8
06:00 PM - 07:00 PM	61.0	67.9	55.0
07:00 PM - 08:00 PM	65.9	77.3	63.9
08:00 PM - 09:00 PM	60.7	75.8	54.4
09:00 PM - 10:00 PM	58.6	75.3	54.8
10:00 PM - 11:00 PM	60.1	70.9	54.9
11:00 PM - 12:00 AM	58.8	72.2	52.8
12:00 AM - 01:00 AM	58.3	75.0	52.8
01:00 AM - 02:00 AM	54.0	70.7	52.8
02:00 AM - 03:00 AM	55.1	70.1	53.6
03:00 AM - 04:00 AM	58.9	77.2	54.4
04:00 AM - 05:00 AM	58.5	63.8	53.6
05:00 AM - 06:00 AM	52.4	72.4	51.0
06:00 AM - 07:00 AM	55.6	78.2	52.0
07:00 AM - 08:00 AM	54.8	67.9	52.5
08:00 AM - 09:00 AM	53.5	70.5	51.9
09:00 AM - 10:00 AM	53.3	70.6	51.5
10:00 AM - 11:00 AM	61.3	94.5	50.4
11:00 AM - 12:00 PM	68.5	97.7	54.0
Leq Average 24 hrs. (dB(A))	59.8	97.7	52.7
Lmax (dB(A))			
L90 (dB(A))			
Ldn (dB(A))	64.5		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2
Standard : 1. ใช้มาตรฐานการประเมินผลกระทบสิ่งแวดล้อม (พ.ร.บ. 2540) ใช้กำหนดค่ามาตรฐานระดับเสียงในเวลากลางคืน
2. ใช้มาตรฐานการประเมินผลกระทบสิ่งแวดล้อม (พ.ร.บ. 2540) ใช้กำหนดค่ามาตรฐานระดับเสียงในเวลากลางวันและกลางคืน

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

Supt S.

Supot Salameth
Section Head

Chonticha

Chonticha Subongkoch
Scientist (3)

Approved by

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S:\Reports_Air Noise rpt (10.05AM)



TESTING
No.0042

Lot ID: 24115930

Date Received : Oct 18, 2024
Date Reported : Oct 24, 2024
Report Number: 3146009-1

Page 1 of 1



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 : 4510513811
Project Name : Environment : EIA
Project Location :

Sample Number	24115930-6
Parameter	Noise (Leq 24 hrs.)
Location	พื้นที่โครงการท่าเรือ (GPS 47P 0743667, 1419318)
Measurement Date	Oct 16 - Oct 17, 2024
Measurement by	Norranon Tathongkham
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	62.8	92.5	53.7
01:00 PM - 02:00 PM	55.9	71.5	54.2
02:00 PM - 03:00 PM	54.0	74.7	51.3
03:00 PM - 04:00 PM	53.5	70.9	51.0
04:00 PM - 05:00 PM	55.2	72.2	52.5
05:00 PM - 06:00 PM	55.7	80.7	53.5
06:00 PM - 07:00 PM	58.3	69.3	55.5
07:00 PM - 08:00 PM	61.0	77.7	57.7
08:00 PM - 09:00 PM	59.8	76.7	55.0
09:00 PM - 10:00 PM	61.1	79.1	58.9
10:00 PM - 11:00 PM	57.2	77.1	54.8
11:00 PM - 12:00 AM	58.4	79.2	54.4
12:00 AM - 01:00 AM	56.0	75.3	53.9
01:00 AM - 02:00 AM	57.7	68.8	55.4
02:00 AM - 03:00 AM	59.2	68.4	56.1
03:00 AM - 04:00 AM	60.9	69.5	59.0
04:00 AM - 05:00 AM	60.5	64.9	58.5
05:00 AM - 06:00 AM	55.0	68.7	53.0
06:00 AM - 07:00 AM	56.1	75.2	53.4
07:00 AM - 08:00 AM	55.6	77.9	53.0
08:00 AM - 09:00 AM	53.7	73.8	52.0
09:00 AM - 10:00 AM	52.8	76.2	50.7
10:00 AM - 11:00 AM	53.4	82.3	50.2
11:00 AM - 12:00 PM	51.4	62.0	49.9
Leq Average 24 hrs. (dB(A))	57.9	92.5	53.7
Lmax (dB(A))			
L90 (dB(A))			
Ldn (dB(A))	64.6	115	
Standard (dB(A))	70		

Reference Method : ISO1996-1 and 1996-2
Standard : 1. ใช้มาตรฐานการประเมินผลกระทบสิ่งแวดล้อม (พ.ร.บ. 2540) ใช้กำหนดค่ามาตรฐานระดับเสียงในเวลากลางคืน
2. ใช้มาตรฐานการประเมินผลกระทบสิ่งแวดล้อม (พ.ร.บ. 2540) ใช้กำหนดค่ามาตรฐานระดับเสียงในเวลากลางวันและกลางคืน

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

Chonticha

Chonticha Subongkoch
Scientist (3)

Approved by

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2272-62/BWAL

S:\Reports_Air Noise rpt (10.05AM)



Analysis / Test Report



TESTING
No.0042

Lot ID: 24115930

Date Received : Oct 18, 2024

Date Reported : Oct 24, 2024

Report Number: 3146010-1

Client : Michelin Siam Co., Ltd.

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

P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Page 1 of 1

Sample Number	24115930-7
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณทางเข้าพื้นที่ (GPS 477 0743667, 1419318)
Measurement Date	Oct 17 - Oct 18, 2024
Measurement by	Norranon Tathongkham
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	53.8	79.6	50.9
01:00 PM - 02:00 PM	53.7	81.8	51.0
02:00 PM - 03:00 PM	53.1	74.6	51.1
03:00 PM - 04:00 PM	54.0	70.3	52.1
04:00 PM - 05:00 PM	55.0	73.7	52.5
05:00 PM - 06:00 PM	55.7	77.7	52.9
06:00 PM - 07:00 PM	65.4	75.3	60.8
07:00 PM - 08:00 PM	66.9	70.5	64.6
08:00 PM - 09:00 PM	64.7	68.8	63.9
09:00 PM - 10:00 PM	64.1	76.2	63.4
10:00 PM - 11:00 PM	59.0	75.0	55.1
11:00 PM - 12:00 AM	58.4	72.8	54.0
12:00 AM - 01:00 AM	59.0	70.7	55.2
01:00 AM - 02:00 AM	60.5	71.9	55.0
02:00 AM - 03:00 AM	61.5	73.6	56.0
03:00 AM - 04:00 AM	57.3	74.4	56.0
04:00 AM - 05:00 AM	56.5	61.7	55.0
05:00 AM - 06:00 AM	53.4	63.7	52.1
06:00 AM - 07:00 AM	56.1	75.9	53.1
07:00 AM - 08:00 AM	55.7	74.1	52.4
08:00 AM - 09:00 AM	54.0	74.0	51.3
09:00 AM - 10:00 AM	52.8	69.4	50.5
10:00 AM - 11:00 AM	53.2	74.9	50.1
11:00 AM - 12:00 PM	53.4	72.7	51.3

Leq Average 24 hrs. (dB(A))	59.8
Lmax (dB(A))	81.8
L90 (dB(A))	52.9
Ldn (dB(A))	
Standard (dB(A))	70

Reference Method : ISO1996-1 and 1996-2
Standard : 1. ประกาศกระทรวงมหาดไทย เรื่อง ค่าระดับเสียงแวดล้อมในชุมชน (พ.ศ. 2540) และกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงมหาดไทย เรื่อง กำหนดระดับเสียงการจราจร และระดับเสียงที่เกิดจากการประกอบกิจการ
ตามกฎหมาย พ.ศ. 2548

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

Technical Management : Chontichak Chonticha Subongkoch Scientist (3)
Approved by : Supt S. Supot Salamteh Section Head

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 : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 2469152
Date Received : Jul 23, 2024
Date Reported : Jul 31, 2024
Report Number : 3068948-1

Page 1 of 2

Sample Number	2469152-2
Sampled Date	Jul 23, 2024 9:20 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m ³)
Date Analysis Commenced	Jul 23, 2024
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, 23rd ed., 2017, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	6	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	6	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C		-	-	7.3	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Rayong
Temperature *	Degree C	-	-	32.0	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1040	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong

Technical Management
Chonticha Subongkotch
Scientist (3)
โทรศัพท์ ๐-๒๓๒-๐๙๔๔

Approved by
Dej Changchon
Senior Manager
โทรศัพท์ ๐-๒๓๒-๐๙๔๔

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

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 2469152
Date Received : Jul 23, 2024
Date Reported : Jul 31, 2024
Report Number : 3068948-1

Page 2 of 2

Sample Number	2469152-2
Sampled Date	Jul 23, 2024 9:20 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m ³)
Date Analysis Commenced	Jul 23, 2024
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	8	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2510 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 Athomprommarat โทรศัพท์ ๐-๒๓๒-๐๙๐๐๖, Samart Krumphee โทรศัพท์ ๐-๒๐๔-๐๐๘๔

Remark :
- LOD : Limit of Detection
- < : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * figure 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
Chonticha Subongkotch
Scientist (3)
โทรศัพท์ ๐-๒๓๒-๐๙๔๔

Approved by
Dej Changchon
Senior Manager
โทรศัพท์ ๐-๒๓๒-๐๙๔๔

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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 : Water Testing
Project Location :
TESTING
No.0009
Lot ID: 2469152
Date Received : Jul 23, 2024
Date Reported : Jul 31, 2024
Report Number : 3068948-2

Page 1 of 1

Sample Number	2469152-2
Sample Date	Jul 23, 2024 9:20 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Jul 24, 2024
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	0.06	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.50	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

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

Sampling By : Netawut Atthomprommarat รหัสประจำตัว 7-204-4-0084

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.
- 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

Kanokorn Anek

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

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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 : Water Testing
Project Location :
TESTING
No.0009
Lot ID: 2469152
Date Received : Jul 23, 2024
Date Reported : Jul 31, 2024
Report Number : 3068948-3

Page 1 of 1

Sample Number	2469152-2
Sample Date	Jul 23, 2024 9:20 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Jul 24, 2024
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	0.30	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	micromhos/cm	-	0.5	1432	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	6.4	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Rayong

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

Sampling By : Netawut Atthomprommarat , Sanart Khumpluee

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

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Approved by

Savitree N.

Savitree Nolsangiam
Manager

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Analysis / Test Report

TESTING
No.0042
Lot ID: 2489966

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Water Testing
Project Location :
Date Received : Aug 15, 2024
Date Reported : Aug 22, 2024
Report Number : 3089773-1

Page 1 of 2

Sample Number	2489966-2
Sampled Date	Aug 15, 2024 9:15 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Aug 15, 2024
Condition of Sample	Contained in two BOD bottles, 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, 23rd ed., 2017, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	8	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	8	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	4	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C		-	-	7.4	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-CI (F)	Rayong
Temperature *	Degree C	-	-	33.0	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1120	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong

Technical Management

Photchanas S.

Photchanas Seeda
Scientist (4)
โทรศัพท์ ๓-323-๓-0028

Approved by

D. Phum

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

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Analysis / Test Report

TESTING
No.0042
Lot ID: 2489966

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Water Testing
Project Location :
Date Received : Aug 15, 2024
Date Reported : Aug 22, 2024
Report Number : 3089773-1

Page 2 of 2

Sample Number	2489966-2
Sampled Date	Aug 15, 2024 9:15 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Aug 15, 2024
Condition of Sample	Contained in two BOD bottles, 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	13	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).
Sampling By : Nattawut Abhompramarat โทรศัพท์ ๓-323-๓-0006, Pattarapol Sawangjalam โทรศัพท์ ๓-204-๓-0002

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

Technical Management

Photchanas S.

Photchanas Seeda
Scientist (4)
โทรศัพท์ ๓-323-๓-0028

Approved by

D. Phum

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

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Life Sciences

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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 : Water Testing
Project Location :
Sample Number : 2489966-2
Sampled Date : Aug 15, 2024 9:15 AM
Sample Description : Wastewater
Location : Effluent (Holding pond 5,000 m3)
Date Analysis Commenced : Aug 16, 2024
Condition of Sample : Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

TESTING
No.0009
Lot ID: 2489966
Date Received : Aug 15, 2024
Date Reported : Aug 22, 2024
Report Number : 3089773-2

Page 1 of 1

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, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.63	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

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

Sampling By : Nattawut Athompornmarat วิสณุวานิช 7-323-4-0006 , Pattarapol Sawangjalarn วิสณุวานิช 7-204-4-0002

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

Technical Management

Chanatt L.
Chanatagarn Inthom
Section Head
วิสณุวานิช 7-204-4-0008

Approved by

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

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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 : Water Testing
Project Location :
Sample Number : 2489966-2
Sampled Date : Aug 15, 2024 9:15 AM
Sample Description : Wastewater
Location : Effluent (Holding pond 5,000 m3)
Date Analysis Commenced : Aug 16, 2024
Condition of Sample : Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

TESTING
No.0009
Lot ID: 2489966
Date Received : Aug 15, 2024
Date Reported : Aug 22, 2024
Report Number : 3089773-3

Page 1 of 1

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.28	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	micromhos/cm	-	0.5	1483	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	8.0	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5500-C (C)	Rayong

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

Sampling By : Nattawut Athompornmarat , Pattarapol Sawangjalarn

Remark :
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Approved by

Chanatt L.
Chanatagarn Inthom
Section Head

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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 : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 24103797
Date Received : Sep 16, 2024
Date Reported : Sep 23, 2024
Report Number : 3119104-1

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 24103797
Date Received : Sep 16, 2024
Date Reported : Sep 23, 2024
Report Number : 3119104-1

Sample Number	24103797-2	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Sample Description	Sep 16, 2024 9:35 AM Wastewater							
Location	Effluent (Holding pond 5,000 m3)							
Date Analysis Commenced	Sep 16, 2024							
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)							
Analyte								
Water Testing								
BOD (5 days at 20 Degree C)	mg/L	-	2.0	<2.0		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		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		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		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		Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5520 B		Rayong
pH at 25 degree C		-	-	6.9		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		Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500-CI (F)		Rayong
Temperature *	Degree C	-	-	32.4		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	1000		Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 2540 C		Rayong

Technical Management
Photchanas S.
Phochana Seeda
Scientist (4)
vstduanawt 3-323-a-0028
Approved by
Dej Changchon
Senior Manager
vstduanawt 3-323-a-0001

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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 : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 24103797
Date Received : Sep 16, 2024
Date Reported : Sep 23, 2024
Report Number : 3119104-1

Sample Number	24103797-2	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Sample Description	Sep 16, 2024 9:35 AM Wastewater							
Location	Effluent (Holding pond 5,000 m3)							
Date Analysis Commenced	Sep 16, 2024							
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)							
Analyte								
Water Testing								
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	17		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 Khuyoksul vstduanawt 3-323-a-0005, Samart Khumphlee vstduanawt 3-204-a-0084
Remark :
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- "C" : Lower than LOQ (Unit of Quantification) / LOB (Unit of Reporting)
- Analyte(s) marked "N/A" 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.
Phochana Seeda
Scientist (4)
vstduanawt 3-323-a-0028
Approved by
Dej Changchon
Senior Manager
vstduanawt 3-323-a-0001

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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 : Water Testing

Project Location :

Page 1 of 1

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- LOD : Limit of Detection
- "c" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked "1" 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.

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).

Remark :
 - LOD : Limit of Detection
 - " < " : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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 - The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Case 1: Δ

Approved by

Sawitree Noisangiam
Manager

Sawitree Noisangiam
Manager

ADDRESS 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng
AUS LABORAT

[illegible]



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 : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 24105577
Date Received : Oct 15, 2024
Date Reported : Oct 22, 2024
Report Number : 3142811-1

Page 1 of 2

Sample Number	24105577-2							
Sample Date	Oct 15, 2024 10:05 AM							
Sample Description	Wastewater							
Location	Effluent (Holding pond 5,000 m3)							
Date Analysis Commenced	Oct 15, 2024							
Condition of Sample	Contained in two BOD bottles, 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	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		-	-	7.2	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500 - H (F)	Rayong	
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500-CI (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	888	≤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)
โทรศัพท์ ๓-323-๓-0028

Approved by

Photchanas S.

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

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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 : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 24105577
Date Received : Oct 15, 2024
Date Reported : Oct 22, 2024
Report Number : 3142811-1

Page 2 of 2

Sample Number	24105577-2							
Sample Date	Oct 15, 2024 10:05 AM							
Sample Description	Wastewater							
Location	Effluent (Holding pond 5,000 m3)							
Date Analysis Commenced	Oct 15, 2024							
Condition of Sample	Contained in two BOD bottles, 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	14	≤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 : Natnawut Abthongprommarat โทรศัพท์ ๓-323-๓-0006 , Pattarapol Sawangjittam โทรศัพท์ ๓-204-๓-0002

Remark :
- LOD : Limit of Detection
- <LOD : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Photchanas S.

Photchanas Seeda
Scientist (4)
โทรศัพท์ ๓-323-๓-0028

Approved by

Photchanas S.

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

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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 : Water Testing
Project Location :
TESTING
No.0009
Lot ID: 24105577
Date Received : Oct 15, 2024
Date Reported : Oct 22, 2024
Report Number : 3142811-2

Page 1 of 1

Sample Number	24105577-2
Sample Date	Oct 15, 2024 10:05 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Oct 16, 2024
Condition of Sample	Contained in two BOD bottles, 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	0.10	≤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	1.43	≤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 Athomprommarat รหัสประจำตัว 3-523-4-0006 ; Pattarapol Sawangjalarn รหัสประจำตัว 3-204-3-0002

Remark :
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Technical Management

Savitree N.

Savitree Nongsiam
Manager

โทรศัพท์ 3-204-3-0007

Approved by

Kanokorn Anek

Kanokorn Anek
Assistant General Manager

โทรศัพท์ 3-204-3-0004

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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 : Water Testing
Project Location :
TESTING
No.0009
Lot ID: 24105577
Date Received : Oct 15, 2024
Date Reported : Oct 22, 2024
Report Number : 3142811-3

Page 1 of 1

Sample Number	24105577-2
Sample Date	Oct 15, 2024 10:05 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Oct 16, 2024
Condition of Sample	Contained in two BOD bottles, 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	0.70	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	1279	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-O (C)	Rayong

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

Sampling By : Nattawut Athomprommarat , Pattarapol Sawangjalarn

Remark :
- LOD : Limit of Detection
- "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.
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Approved by

Savitree N.

Savitree Nongsiam
Manager

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TESTING
No.0042

Lot ID: 24118728
Date Received : Nov 14, 2024
Date Reported : Nov 21, 2024
Report Number : 3173102-1

Page 1 of 2

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 : 4510558328
Project Name : Water Testing
Project Location :

Sample Number	24118728-2							
Sampled Date	Nov 14, 2024 9:55 AM							
Sample Description	Wastewater							
Location	Effluent (Holding pond 5,000 m3)							
Date Analysis Commenced	Nov 14, 2024							
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	7.7	≤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	28	≤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	6	≤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		-	-	7.2	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500 - H (B)	Rayong	
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	-	-	31.1	≤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	1140	≤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)
หน้าตลับ 323-0-0028

Approved by

Dej Changchon
Senior Manager
หน้าตลับ 323-0-0001

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

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510558328
Project Name : Water Testing
Project Location :

Page 2 of 2

TESTING
No.0042

Lot ID: 24118728
Date Received : Nov 14, 2024
Date Reported : Nov 21, 2024
Report Number : 3173102-1

Sample Number	24118728-2							
Sampled Date	Nov 14, 2024 9:55 AM							
Sample Description	Wastewater							
Location	Effluent (Holding pond 5,000 m3)							
Date Analysis Commenced	Nov 14, 2024							
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	32	≤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 : Sansen Khuyokul หน้าตลับ 323-0-0005 , Patrapol Sawangjalam หน้าตลับ 3204-0-0002

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

Technical Management

Photchanas S.
Photchanas Seeda
Scientist (4)
หน้าตลับ 323-0-0028

Approved by

Dej Changchon
Senior Manager
หน้าตลับ 323-0-0001

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhal Road, Nong-Lak-Lok, Bankhal, Rayong Thailand 21120
P/O : 4510558328
Date Received : Nov 14, 2024
Date Reported : Nov 21, 2024
Report Number : 3173102-2

Project Name : Water Testing

Project Location :

Page 1 of 1

Sample Number	24118728-2
Sampled Date	Nov 14, 2024 9:55 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Nov 15, 2024
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	0.94	≤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 Khuyoksuil วิสณุสาร วัชรกุลสุขุส วิสณุสาร วัชรกุลสุขุส วิสณุสาร วัชรกุลสุขุส

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

Technical Management

Savitree N.

Savitree Nolsangiam
Manager
โทรศัพท์ ๖-204-๙-0007

Approved by

Kanokorn Anek

Kanokorn Anek
Assistant General Manager
โทรศัพท์ ๖-204-๙-0004

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhal Road, Nong-Lak-Lok, Bankhal, Rayong Thailand 21120
P/O : 4510558328
Date Received : Nov 14, 2024
Date Reported : Nov 21, 2024
Report Number : 3173102-3

Project Name : Water Testing

Project Location :

Page 1 of 1

Sample Number	24118728-2
Sampled Date	Nov 14, 2024 9:55 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Nov 15, 2024
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	1.56	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	1560	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	6.5	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 4500-O (C)	Rayong

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

Sampling By : Sansoen Khuyoksuil วิสณุสาร วัชรกุลสุขุส วิสณุสาร วัชรกุลสุขุส วิสณุสาร วัชรกุลสุขุส

Remark :

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- "c" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Savitree N.

Savitree Nolsangiam
Manager

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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 : Water Testing
Project Location :

TESTING
No.0042
Lot ID: 24136810
Date Received : Dec 13, 2024
Date Reported : Dec 20, 2024
Report Number : 3198440-1

Page 1 of 2

Sample Number	24136810-2							
Sample Date	Dec 13, 2024 10:00 AM							
Sample Description	Wastewater							
Location	Effluent (Holding pond 5,000 m3)							
Date Analysis Commenced	Dec 13, 2024							
Condition of Sample	Contained in one amber glass bottle, two BOD bottles 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	6	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, part 5520 B	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 (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-CI (F)	Rayong	
Temperature *	Degree C	-	-	30.8	≤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

Approved by

Chontichak

Chonticha Subongkotch
Scientist (3)
เวตมนูนาฬ 3-323-0-0031

Dej Changchon
Senior Manager
เวตมนูนาฬ 3-323-0-0001

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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 : Water Testing
Project Location :

TESTING
No.0042
Lot ID: 24136810
Date Received : Dec 13, 2024
Date Reported : Dec 20, 2024
Report Number : 3198440-1

Page 2 of 2

Sample Number	24136810-2							
Sample Date	Dec 13, 2024 10:00 AM							
Sample Description	Wastewater							
Location	Effluent (Holding pond 5,000 m3)							
Date Analysis Commenced	Dec 13, 2024							
Condition of Sample	Contained in one amber glass bottle, two BOD bottles and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)							
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location	
Water Testing								
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	15	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 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 : Natnawut Athomprommarat เวตมนูนาฬ 3-323-0-0006 , Thanasoun Namakurua เวตมนูนาฬ 3-204-0-0101

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

Approved by

Chontichak

Chonticha Subongkotch
Scientist (3)
เวตมนูนาฬ 3-323-0-0031

Dej Changchon
Senior Manager
เวตมนูนาฬ 3-323-0-0001

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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 : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 24136810
Date Received : Dec 13, 2024
Date Reported : Dec 20, 2024
Report Number : 3198440-2

Page 1 of 1

Sample Number	24136810-2
Sample Date	Dec 13, 2024 10:00 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Dec 16, 2024
Condition of Sample	Contained in one amber glass bottle, two BOD bottles 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	1.99	≤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 Atthomprommarat รหัสประจำตัว 7-323-4-0006 , Thanasoun Namakunna รหัสประจำตัว 7-204-4-0101

Remark :
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- 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

Kanokorn Anek

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

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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 : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 24136810
Date Received : Dec 13, 2024
Date Reported : Dec 20, 2024
Report Number : 3198440-3

Page 1 of 1

Sample Number	24136810-2
Sample Date	Dec 13, 2024 10:00 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Dec 14, 2024
Condition of Sample	Contained in one amber glass bottle, two BOD bottles 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	0.72	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	1521	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	5.8	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 4500-O (C)	Rayong

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

Sampling By : Nattawut Atthomprommarat , Thanasoun Namakunna

Remark :
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- "C" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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ภาคผนวก ค-5

คุณภาพดิน



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lu-Lok-Bankhai Road, Nong-Lu-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24126849
Date Received : Nov 14, 2024
Date Reported : Nov 25, 2024
Report Number : 3174207-1

Page 1 of 1

Sample Number	24126849-6
Sample Date	Nov 14, 2024 11:10 AM
Sample Description	Soil
Location	52 ไร่สวน ลำไยหน้าวัด 2
Date Analysis Commenced	Nov 15, 2024
Condition of Sample	Packed in one plastic bag, one glass bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	Result	Guideline / Specification	Method	Testing Location
Metals Testing						
Zinc	mg/kg	-	1.00	356	1000	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 : Pattarapol Sawangjalarn vst004-a-0002

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

Technical Management

Savitree N.
Savitree Naisangiam
Manager
vst004-a-0007

Approved by

Kanokkom Anek
Assistant General Manager
vst004-a-0004

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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 : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24126849
Date Received : Nov 14, 2024
Date Reported : Nov 25, 2024
Report Number : 3174207-2

Page 1 of 1

Sample Number	24126849-6
Sample Date	Nov 14, 2024 11:10 AM
Sample Description	Soil
Location	52 ไร่สวน ลำไยหน้าวัด 2
Date Analysis Commenced	Nov 15, 2024
Condition of Sample	Packed in one plastic bag, one glass bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	Result	Guideline / Specification	Method	Testing Location
Metals Testing						
Copper	mg/kg	-	1.00	69.6	No Standard	Bangkok
Iron	mg/kg	-	1.00	9519	No Standard	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 : Pattarapol Sawangjalarn

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

Approved by

Savitree N.
Savitree Naisangiam
Manager

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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 : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24126849
Date Received : Nov 14, 2024
Date Reported : Nov 25, 2024
Report Number : 3174209-1

Page 1 of 1

Sample Number 24126849-8
Sampled Date Nov 14, 2024 11:20 AM
Sample Description Soil
Location S2 ตัดหน้า 30 เมตรด้านซ้ายทางฟ 2
Date Analysis Commenced Nov 15, 2024
Condition of Sample Packed in one plastic bag, one glass bottle, 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	275	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 : Patrapol Sawangjittam โทร 09-0002

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

Technical Management

Savitree N.

Savitree Nosingiam
Manager
โทร 09-0007

Approved by

Kanokorn Anek

Kanokorn Anek
Assistant General Manager
โทร 09-0004

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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 : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24126849
Date Received : Nov 14, 2024
Date Reported : Nov 25, 2024
Report Number : 3174209-2

Page 1 of 1

Sample Number 24126849-8
Sampled Date Nov 14, 2024 11:20 AM
Sample Description Soil
Location S2 ตัดหน้า 30 เมตรด้านซ้ายทางฟ 2
Date Analysis Commenced Nov 15, 2024
Condition of Sample Packed in one plastic bag, one glass bottle, 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	34.9	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	9339	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok

Physical Parameters
Moisture % - 0.1 9.8
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

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 : Patrapol Sawangjittam

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

Approved by

Savitree N.

Savitree Nosingiam
Manager

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P/O : 4510513811
Date Received : Nov 14, 2024
Date Reported : Nov 25, 2024
Report Number : 3174211-1
Project Name : Environment : EIA
Project Location :

Lot ID: 24126849
Date Received : Nov 14, 2024
Date Reported : Nov 25, 2024
Report Number : 3174211-2
Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Page 1 of 1

Sample Number 24126849-10
Sampled Date Nov 14, 2024 10:20 AM
Sample Description Soil
Location S3 หน้าดิน ๕๓๖๗ 2
Date Analysis Commenced Nov 15, 2024
Condition of Sample Packed in one plastic bag, one glass bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	Result	Guideline / Specification	Method	Testing Location
Metals Testing						
Zinc	mg/kg	-	1.00	67.6	1000	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D

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 : Pattarapol Sawangjalarn รหัสประจำตัว ๖-204-๖-0002

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

Technical Management Sawitree N. Manager
Approved by Kanokkorn Anek Assistant General Manager รหัสประจำตัว ๖-204-๖-0004

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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 : 4510513811
Date Received : Nov 14, 2024
Date Reported : Nov 25, 2024
Report Number : 3174211-2
Project Name : Environment : EIA
Project Location :

Sample Number 24126849-10
Sampled Date Nov 14, 2024 10:20 AM
Sample Description Soil
Location S3 หน้าดิน ๕๓๖๗ 2
Date Analysis Commenced Nov 15, 2024
Condition of Sample Packed in one plastic bag, one glass bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	Result	Guideline / Specification	Method	Testing Location
Metals Testing						
Copper	mg/kg	-	1.00	26.9	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D
Iron	mg/kg	-	1.00	13080	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D

Physical Parameters

Moisture % - 0.1 23.9 No Standard

Method
In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2013, part 2540 G

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 : Pattarapol Sawangjalarn

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

Approved by Sawitree N. Manager
Manager

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
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P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24126849
Date Received : Nov 14, 2024
Date Reported : Nov 25, 2024
Report Number : 3174213-1

Page 1 of 1

Sample Number 24126849-12
Sampled Date Nov 14, 2024 10:40 AM
Sample Description Soil
Location S3 ตรางลึก 30 เมตรในเขต สี่ทางหลัก 2
Date Analysis Commenced Nov 15, 2024
Condition of Sample Packed in one plastic bag, one glass bottle, 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	72.8	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 : Pattarapol Sawangjallam รหัสประจำตัว 7-204-a-0002

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

Technical Management

Savitree N.
Savitree Noisangiam
Manager
รหัสประจำตัว 7-204-a-0007

Approved by

Kanokkorn Anek
Assistant General Manager
รหัสประจำตัว 7-204-b-0004

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Analysis / Test Report

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P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24126849
Date Received : Nov 14, 2024
Date Reported : Nov 25, 2024
Report Number : 3174213-2

Page 1 of 1

Sample Number 24126849-12
Sampled Date Nov 14, 2024 10:40 AM
Sample Description Soil
Location S3 ตรางลึก 30 เมตรในเขต สี่ทางหลัก 2
Date Analysis Commenced Nov 15, 2024
Condition of Sample Packed in one plastic bag, one glass bottle, 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	25.6	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	8221	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok

Physical Parameters

Moisture

%

-

0.1

25.4

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

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 : Pattarapol Sawangjallam

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

Approved by

Savitree N.
Savitree Noisangiam
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 :
Project Name : Environment : EIA
Project Location :

Lot ID: 24142384
Date Received : Dec 23, 2024
Date Reported : Jan 02, 2025
Report Number : 3206292-1

Page 1 of 1

Sample Number 24142384-2
Sampled Date Dec 23, 2024 9:45 AM
Sample Description Soil
Location S1 หน้าดิน ด้านหน้าท่ง 2
Date Analysis Commenced Dec 25, 2024
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	590	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 : Pattarapol Sawangjalarn ๖๓๐๙๖๖๖ ๖๓๐๙๖๖๖ ๖๓๐๙๖๖๖

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

Technical Management

Sawitree N.
Sawitree Nongsangiam
Manager
๖๓๐๙๖๖๖ ๖๓๐๙๖๖๖ ๖๓๐๙๖๖๖

Approved by

Kanokkorn Anek
Assistant General Manager
๖๓๐๙๖๖๖ ๖๓๐๙๖๖๖ ๖๓๐๙๖๖๖

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Analysis / Test Report

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

Lot ID: 24142384
Date Received : Dec 23, 2024
Date Reported : Jan 02, 2025
Report Number : 3206292-2

Page 1 of 1

Sample Number 24142384-2
Sampled Date Dec 23, 2024 9:45 AM
Sample Description Soil
Location S1 หน้าดิน ด้านหน้าท่ง 2
Date Analysis Commenced Dec 24, 2024
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	268	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	10763	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok

Physical Parameters

Moisture % - 0.1 16.9
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

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 : Pattarapol Sawangjalarn

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

Approved by

Sawitree N.
Sawitree Nongsangiam
Manager

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

Lot ID: 24142384
Date Received : Dec 23, 2024
Date Reported : Jan 02, 2025
Report Number : 3206294-1

Page 1 of 1

Sample Number 24142384-4
Sampled Date Dec 23, 2024 10:20 AM
Sample Description Soil
Location S1 ความลึก 30 เซนติเมตร ตำแหน่งที่ 2
Date Analysis Commenced Dec 25, 2024
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	756	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 : Patrapol Sawangjaliam รหัสประจำตัว 7-204-a-0002

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

Technical Management

Sawitree N.
Sawitree Naisangiam
Manager
รหัสประจำตัว 7-204-a-0007

Approved by

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

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

Lot ID: 24142384
Date Received : Dec 23, 2024
Date Reported : Jan 02, 2025
Report Number : 3206294-2

Page 1 of 1

Sample Number 24142384-4
Sampled Date Dec 23, 2024 10:20 AM
Sample Description Soil
Location S1 ความลึก 30 เซนติเมตร ตำแหน่งที่ 2
Date Analysis Commenced Dec 24, 2024
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	333	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	11850	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok

Physical Parameters

Moisture
%
-
0.1
8.3
No Standard
In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2003, part 2540 G

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 : Patrapol Sawangjaliam

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

Approved by

Sawitree N.
Sawitree Naisangiam
Manager

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ระดับความร้อนในสถานที่ทำงาน



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 : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24102411
Date Received : Sep 17, 2024
Date Reported : Sep 23, 2024
Report Number: 3101241-1

Page 1 of 6

Sample Number	24102411-1					
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)					
Measurement Date	Sep 16, 2024					
Measurement by	Tinnakorn Kumpasee					
Location	บริเวณงาน 1 หลัง (ผา-บางเสา ฝั่งซ้าย) : - แดด :-)					
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)	
บริเวณพื้นที่งานก่อสร้าง (H1) (Solar #R-Tech)	120	33.2	29.7	41.5	41.5	
Average (WBGT)		33.2				
Guideline WBGT (°C)		34.0				

Reference Method : Wet Bulb Globe Temperature

Guideline:

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



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 : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24102411
Date Received : Sep 17, 2024
Date Reported : Sep 23, 2024
Report Number: 3101241-1



Page 2 of 6

Sample Number	24102411-2					
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)					
Measurement Date	Sep 16, 2024					
Measurement by	Tinnakorn Kumpasee					
Location	บริเวณงาน 1 หลัง (ผา-บางเสา ฝั่งซ้าย) : - แดด :-)					
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)	
บริเวณพื้นที่งานก่อสร้าง (H2) (เครื่องสูบลม #RTD)	120	26.7	24.0	32.9	32.4	
Average (WBGT)		26.7				
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  **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 : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24102411

Date Received : Sep 17, 2024
Date Reported : Sep 23, 2024

Report Number: 3101241-1

Page 3 of 6

Sample Number	24102411-3
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Sep 16, 2024
Measurement by	Tinnakorn Kumpasee
Location	บริเวณงาน 1 หลัง (ใต้-ร่มเงา อุปกรณ์งาน : - แสง : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่ร่มเงาอาคาร (H3) (M32 ฐานรถ#RTO)	120	27.8	25.7	32.7	32.6
Average (WBGT)		27.8			
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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Section Head

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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 : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24102411

Date Received : Sep 17, 2024
Date Reported : Sep 23, 2024

Report Number: 3101241-1

Page 4 of 6

Sample Number	24102411-4
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Sep 16, 2024
Measurement by	Tinnakorn Kumpasee
Location	บริเวณงาน 1 หลัง (ใต้-ร่มเงา อุปกรณ์งาน : - แสง : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่ร่มเงาอาคาร (H4) (Wet Drawing#RCD1)	120	24.1	21.6	29.9	29.8
Average (WBGT)		24.1			
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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Section Head

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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21120

P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24102411

Date Received : Sep 17, 2024

Date Reported : Sep 23, 2024

Report Number: 3101241-1

Page 5 of 6

Sample Number	24102411-5
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Sep 16, 2024
Measurement by	Tinnakorn Kumpasee
Location	บริเวณด้าน 1 ซีกฟ้า (ฝั่ง-บ้านเลขที่ 129 มอ 3) : - แยก : -

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณด้าน 1 ซีกฟ้า (ฝั่ง-บ้านเลขที่ 129 มอ 3) (Wet Drawing#RC02)	120	26.1	24.7	29.4	29.3
Average (WBGT)		26.1			
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

Supt S.

Technical Management

Supot Salameh
Section Head

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager



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 : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24102411

Date Received : Sep 17, 2024

Date Reported : Sep 23, 2024

Report Number: 3101241-1

Page 6 of 6

Sample Number	24102411-6
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Sep 16, 2024
Measurement by	Tinnakorn Kumpasee
Location	บริเวณด้าน 1 ซีกฟ้า (ฝั่ง-บ้านเลขที่ 129 มอ 3) : - แยก : -

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณด้าน 1 ซีกฟ้า (ฝั่ง-บ้านเลขที่ 129 มอ 3) (Wet Drawing#RC03)	120	23.8	21.8	28.6	28.6
Average (WBGT)		23.8			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

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21120

P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24139562

Date Received : Dec 20, 2024

Date Reported : Dec 25, 2024

Report Number: 3189242-1

Page 1 of 6

Sample Number	24139562-1
Parameter	Heat Stress (Sampling Time : 01.00 PM - 03.00 PM)
Measurement Date	Dec 19, 2024
Measurement by	Tinnakorn Kumpasee
Location	บริเวณงาน 1 ชั้น (ใต้-บนอาคาร 5 ชั้น) : - นอก : -

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่งานก่อสร้าง (H1) (Boiler-R-Tech)	120	25.9	22.8	33.2	33.1
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

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21120

P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24139562

Date Received : Dec 20, 2024

Date Reported : Dec 25, 2024

Report Number: 3189242-1

Page 2 of 6

Sample Number	24139562-2
Parameter	Heat Stress (Sampling Time : 01.00 PM - 03.00 PM)
Measurement Date	Dec 19, 2024
Measurement by	Tinnakorn Kumpasee
Location	บริเวณงาน 1 ชั้น (ใต้-บนอาคาร 5 ชั้น) : - นอก : -

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่งานก่อสร้าง (H2) (Boiler-R-Tech)	120	25.9	22.9	33.0	32.8
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

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Supot Salameh
Section Head

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Client : Michelin Siam Co., Ltd.
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21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24139562

Date Received : Dec 20, 2024
Date Reported : Dec 25, 2024
Report Number: 3189242-1

Page 3 of 6

Sample Number	24139562-3				
Parameter	Heat Stress (Sampling Time : 01.00 PM - 03.00 PM)				
Measurement Date	Dec 19, 2024				
Measurement by	Tinnakorn Kumpasee				
Location	บริเวณงาน 1 ชั้น (ใต้-บนสุด บริเวณงาน : - นอก : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่บนอาคาร (H3) (M32 (ทุบ ธนู)/RTO)	120	26.4	23.0	34.2	34.1
Average (WBGT)		26.4			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

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Assistant Manager



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 : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24139562

Date Received : Dec 20, 2024
Date Reported : Dec 25, 2024
Report Number: 3189242-1

Page 4 of 6

Sample Number	24139562-4				
Parameter	Heat Stress (Sampling Time : 01.00 PM - 03.00 PM)				
Measurement Date	Dec 19, 2024				
Measurement by	Tinnakorn Kumpasee				
Location	บริเวณงาน 1 ชั้น (ใต้-บนสุด บริเวณงาน : - นอก : -)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่งานอาคารแบบเปิด (H4) (Wet Drawing#RCD1)	120	23.2	20.8	28.9	28.7
Average (WBGT)		23.2			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

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P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24139562

Date Received : Dec 20, 2024

Date Reported : Dec 25, 2024

Report Number: 3189242-1

Page 5 of 6

Sample Number	24139562-5
Parameter	Heat Stress (Sampling Time : 01.00 PM - 03.00 PM)
Measurement Date	Dec 19, 2024
Measurement by	Tinnakorn Kumpasee
Location	บริเวณงาน 1 หลัง (ด้านหน้าอาคารสำนักงาน : - นอก :-)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่งานด้านหน้าอาคารสำนักงาน (H5) (Wet Drawing#RCD2)	120	24.1	21.8	29.5	29.2
Average (WBGT)		24.1			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

- Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
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21120

P/O : 4510513811

Project Name : Environment : EIA

Project Location :

Lot ID: 24139562

Date Received : Dec 20, 2024

Date Reported : Dec 25, 2024

Report Number: 3189242-1

Page 6 of 6

Sample Number	24139562-6
Parameter	Heat Stress (Sampling Time : 01.00 PM - 03.00 PM)
Measurement Date	Dec 19, 2024
Measurement by	Tinnakorn Kumpasee
Location	บริเวณงาน 1 หลัง (ด้านหน้าอาคารสำนักงาน : - นอก :-)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่งานด้านหน้าอาคารสำนักงาน (H6) (Wet Drawing#RCD3)	120	22.5	19.6	29.2	29.1
Average (WBGT)		22.5			
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 : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24102413
Date Received : Sep 17, 2024
Date Reported : Sep 25, 2024
Report Number : 3101272-1

Page 1 of 4

Sample Number	24102413-1
Sampled Date	Sep 16, 2024
Sample Description	Air Quality
Location	พื้นที่ก่อสร้าง D1
Date Analysis Commenced	Sep 19, 2024
Condition of Sample	Drawn into two filter papers placed in each cassette
Barometric Pressure	755 mmHg
Atmospheric Temperature	30.0 °C
Analyte	
Air Testing	
Respirable Dust	09:00 AM - 05:00 PM mg/m3 - 0.15 <0.15 5 Based on NIOSH (1998), OSHA 0600
Total Dust	09:00 AM - 05:00 PM mg/m3 - 0.15 1.33 15 Based on NIOSH (1994), OSHA 0500
Guideline :	
OSHA : Occupational Safety and Health Administration	
Sampled By :	Timakorn Kumpasee
Remark :	
- LOD : Limit of Detection	
- "c" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)	

Orawan R.

Approved by
Orawan Rakyoung
Scientist (3)

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21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24102413
Date Received : Sep 17, 2024
Date Reported : Sep 25, 2024
Report Number : 3101272-1

Page 2 of 4

Sample Number	24102413-2
Sampled Date	Sep 16, 2024
Sample Description	Air Quality
Location	พื้นที่ก่อสร้างถนน D2
Date Analysis Commenced	Sep 19, 2024
Condition of Sample	Drawn into two filter papers placed in each cassette
Barometric Pressure	755 mmHg
Atmospheric Temperature	30.0 °C
Analyte	
Air Testing	
Respirable Dust	09:00 AM - 05:00 PM mg/m3 - 0.15 <0.15 5 Based on NIOSH (1998), OSHA 0600
Total Dust	09:00 AM - 05:00 PM mg/m3 - 0.15 0.36 15 Based on NIOSH (1994), OSHA 0500
Guideline :	
OSHA : Occupational Safety and Health Administration	
Sampled By :	Timakorn Kumpasee
Remark :	
- LOD : Limit of Detection	
- "c" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)	

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Approved by
Orawan Rakyoung
Scientist (3)

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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 : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24102413
Date Received : Sep 17, 2024
Date Reported : Sep 25, 2024
Report Number : 3101272-1

Page 3 of 4

Sample Number	24102413-3	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Sampled Date	Sep 16, 2024	Air Quality							
Sample Description	Air Quality								
Location	ฟาร์มสุรนา (F1)								
Date Analysis Commenced	Sep 19, 2024								
Condition of Sample	Drawn into one sorbent tube, refrigerated								
Barometric Pressure	755 mmHg								
Atmospheric Temperature	30.0 °C								
Analyte									
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 : Tinnakorn Kumpasee
Remark :
- LOD : Limit of Detection
- "L" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Orawan R.
Orawan Rakyong
Scientist (3)



Analysis / Test Report

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129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24102413
Date Received : Sep 17, 2024
Date Reported : Sep 25, 2024
Report Number : 3101272-1

Page 4 of 4

Sample Number	24102413-4	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Sampled Date	Sep 16, 2024	Air Quality							
Sample Description	Air Quality								
Location	ฟาร์มสุรนา (F2)								
Date Analysis Commenced	Sep 19, 2024								
Condition of Sample	Drawn into one sorbent tube, refrigerated								
Barometric Pressure	755 mmHg								
Atmospheric Temperature	30.0 °C								
Analyte									
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 : Tinnakorn Kumpasee
Remark :
- LOD : Limit of Detection
- "L" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Orawan R.
Orawan Rakyong
Scientist (3)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand
21120
Date Received : Dec 20, 2024
Date Reported : Dec 28, 2024
Report Number : 3189245-1

P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Page 1 of 4

Sample Number	24139564-1
Sampled Date	Dec 18, 2024
Sample Description	Air Quality
Location	พื้นที่หน้างาน D1
Date Analysis Commenced	Dec 24, 2024
Condition of Sample	Drawn into two filter papers placed in plastic cassette
Barometric Pressure	756 mmHg
Atmospheric Temperature	27.1 °C
Analyte	
Air Testing	
Respirable Dust	08:20 AM - 04:20 PM mg/m3 - 0.15 <0.15 5
Total Dust	08:20 AM - 04:20 PM mg/m3 - 0.15 0.54 15

Analyte		Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing									
Respirable Dust	08:20 AM - 04:20 PM	mg/m3	-	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	08:20 AM - 04:20 PM	mg/m3	-	0.15	0.54	15		In-house method : STM 02-023 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 : Ronnachai Moungma

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

Savanya C.
Savanya Chalerthamrong
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Approved by

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Analysis / Test Report

Lot ID: 24139564
Date Received : Dec 20, 2024
Date Reported : Dec 28, 2024
Report Number : 3189245-1

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand
21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Page 2 of 4

Sample Number	24139564-2								
Sampled Date	Dec 18, 2024								
Sample Description	Air Quality								
Location	พื้นที่หน้างานตามแผน D2								
Date Analysis Commenced	Dec 24, 2024								
Condition of Sample	Drawn into two filter papers placed in plastic cassette								
Barometric Pressure	756 mmHg								
Atmospheric Temperature	27.1 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location

Analyte		Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing									
Respirable Dust	08:20 AM - 04:20 PM	mg/m3	-	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	08:20 AM - 04:20 PM	mg/m3	-	0.15	<0.15	15		In-house method : STM 02-023 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 : Ronnachai Moungma

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

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21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24139564
Date Received : Dec 20, 2024
Date Reported : Dec 28, 2024
Report Number : 3189245-1

Page 3 of 4

Sample Number	24139564-3	Sampled Date/Time	Dec 18, 2024	Unit	mg/m3	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Sample Description	Air Quality	Location	ฟาร์มสุรา (F1)								
Date Analysis Commenced	Dec 23, 2024	Condition of Sample	Drawn into one sorbent tube, refrigerated								
Barometric Pressure	756 mmHg	Atmospheric Temperature	27.1 °C								
Analyte											
Air Testing											
Phosphoric acid	08:15 AM - 04:15 PM	mg/m3	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL			Bangkok
Sulfuric acid	08:15 AM - 04:15 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 : Ronnachai Mouringma
Remark :
• LOD : Limit of Detection
• "e" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24139564
Date Received : Dec 20, 2024
Date Reported : Dec 28, 2024
Report Number : 3189245-1

Page 4 of 4

Sample Number	24139564-4	Sampled Date/Time	Dec 18, 2024	Unit	mg/m3	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Sample Description	Air Quality	Location	ฟาร์มสุรา (F2)								
Date Analysis Commenced	Dec 23, 2024	Condition of Sample	Drawn into one sorbent tube, refrigerated								
Barometric Pressure	756 mmHg	Atmospheric Temperature	27.1 °C								
Analyte											
Air Testing											
Phosphoric acid	08:15 AM - 04:15 PM	mg/m3	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL			Bangkok
Sulfuric acid	08:15 AM - 04:15 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 : Ronnachai Mouringma
Remark :
• LOD : Limit of Detection
• "e" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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ระดับเสียงในสถานที่ทำงาน



Analysis / Test Report

Client: Michelin Siam Co., Ltd.
129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24102405
Date Received : Sep 17, 2024
Date Reported : Sep 20, 2024
Report Number: 3116884-1

Page 1 of 1

Sample Number	24102405-1
Parameter	Noise (Leq 8 hrs.)
Location	บริเวณเครื่องจักรตามแนวลำน้ำ (N1) (Heat treatment & Brass Coating #/RTO)
Measurement Date	Sep 16, 2024
Measurement by	Tinnakorn Kumpasee
Time	Leq (dB(A)) Lmax (dB(A)) L90 (dB(A))
09:04 AM - 10:04 AM	87.4 88.4 87.2
10:04 AM - 11:04 AM	86.5 89.1 86.0
11:04 AM - 12:04 PM	87.9 88.9 87.7
12:04 PM - 01:04 PM	88.2 89.1 87.8
01:04 PM - 02:04 PM	88.4 89.3 88.2
02:04 PM - 03:04 PM	88.0 89.3 86.8
03:04 PM - 04:04 PM	88.6 91.2 88.1
04:04 PM - 05:04 PM	88.5 89.8 87.3
Leq Average 8 hrs. (dB(A))	88.0
Lmax (dB(A))	91.2
Standard (dB(A))	90
Reference Method	: ISO1996-1 and 1996-2
Standard	: ประกาศกระทรวงอุตสาหกรรม เรื่อง การควบคุมความดังของเสียง ในการปฏิบัติงานโรงงาน/อาคาร/สถานประกอบการและอื่น ๆ พ.ศ.๒๕๔๖

Technical Management

Chonticha Subongkach

Scientist (3)

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Supot Salameh
Section Head

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2272-62/ BMAIL

S:\Report\Air Noise rpt (11:55AM)



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 : 4510513811
Project Name : Environment : EIA
Project Location :

Lot ID: 24102405
Date Received : Sep 17, 2024
Date Reported : Sep 20, 2024
Report Number: 3116885-1

Page 1 of 1

Sample Number	24102405-2
Parameter	Noise (Leq 8 hrs.)
Location	บริเวณเครื่องจักรตามแนวลำน้ำ (N2) (Wet Drawing (Cadm)/RCD?)
Measurement Date	Sep 16, 2024
Measurement by	Tinnakorn Kumpasee
Time	Leq (dB(A)) Lmax (dB(A)) L90 (dB(A))
09:00 AM - 10:00 AM	82.1 91.7 81.7
10:00 AM - 11:00 AM	82.3 93.9 81.2
11:00 AM - 12:00 PM	82.3 91.9 81.9
12:00 PM - 01:00 PM	81.0 83.4 80.5
01:00 PM - 02:00 PM	80.6 84.6 80.0
02:00 PM - 03:00 PM	81.4 85.5 80.3
03:00 PM - 04:00 PM	81.4 90.3 80.9
04:00 PM - 05:00 PM	81.1 88.0 80.6
Leq Average 8 hrs. (dB(A))	81.6
Lmax (dB(A))	93.9
Standard (dB(A))	90
Reference Method	: ISO1996-1 and 1996-2
Standard	: ประกาศกระทรวงอุตสาหกรรม เรื่อง การควบคุมความดังของเสียง ในการปฏิบัติงานโรงงาน/อาคาร/สถานประกอบการและอื่น ๆ พ.ศ.๒๕๔๖

Technical Management

Chonticha Subongkach

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S:\Report\Air Noise rpt (11:55AM)



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P/O : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24139560
Date Received : Dec 20, 2024
Date Reported : Dec 24, 2024
Report Number: 3201437-1

Page 1 of 1

Sample Number	24139560-1
Parameter	Noise (Leq 8 hrs.)
Location	บริเวณหลังอาคารแบบแห้ง (N1) (Heat treatment & Brass Coating #RTQ)
Measurement Date	Dec 18, 2024
Measurement by	Romachai Moungma
Time	
08:53 AM - 09:53 AM	74.4
09:53 AM - 10:53 AM	75.5
10:53 AM - 11:53 AM	75.3
11:53 AM - 12:53 PM	77.1
12:53 PM - 01:53 PM	79.5
01:53 PM - 02:53 PM	81.1
02:53 PM - 03:53 PM	81.5
03:53 PM - 04:53 PM	81.4
Leq Average 8 hrs. (dB(A))	79.1
Lmax (dB(A))	83.0
Standard (dB(A))	90
Reference Method	: ISO1996-1 and 1996-2
Standard	: ประเมินค่าการรบกวนจากเสียงตามมาตรฐานของกรมอนามัย Turn to the left for the noise measurement results in the table.

Technical Management

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Chonticha Subongkoch
Scientist (3)

Approved by

Supt S.

Supot Salameeh
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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
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P/O : 4510513811
Project Name : Environment : EIA
Project Location :
Lot ID: 24139560
Date Received : Dec 20, 2024
Date Reported : Dec 24, 2024
Report Number: 3201438-1

Page 1 of 1

Sample Number	24139560-2
Parameter	Noise (Leq 8 hrs.)
Location	บริเวณหลังอาคารแบบแห้ง (N2) (Wet Drawing (Cedro)/RCD3)
Measurement Date	Dec 18, 2024
Measurement by	Romachai Moungma
Time	
08:43 AM - 09:43 AM	82.7
09:43 AM - 10:43 AM	82.5
10:43 AM - 11:43 AM	81.6
11:43 AM - 12:43 PM	81.4
12:43 PM - 01:43 PM	83.3
01:43 PM - 02:43 PM	82.4
02:43 PM - 03:43 PM	83.0
03:43 PM - 04:43 PM	82.6
Leq Average 8 hrs. (dB(A))	82.5
Lmax (dB(A))	93.8
Standard (dB(A))	90
Reference Method	: ISO1996-1 and 1996-2
Standard	: ประเมินค่าการรบกวนจากเสียงตามมาตรฐานของกรมอนามัย Turn to the left for the noise measurement results in the table.

Technical Management

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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_FS0518	10-Jul-24	10-Jan-25	6
Stack	Oxides of Nitrogen	Pitot Tube	BKK_FS0522	10-Jul-24	10-Jan-25	6
Stack	Oxides of Nitrogen	Flue gas Analyzer	RYG_FS0564	24-Apr-24	23-Apr-25	12
Stack	Oxides of Nitrogen	Vacuum Gauge	BKK_FS0483	20-Aug-24	20-Feb-26	18
Stack	Oxides of Nitrogen	SPECTROPHOTOMETER	RYG_EN0037	18-Sep-23	18-Mar-25	18
Stack	Phosphoric acid	Console Control Unit	BKK_FS0556	10-Jul-24	10-Jan-25	6
Stack	Phosphoric acid	Pitot Tube	BKK_FS0560	10-Jul-24	10-Jan-25	6
Stack	Phosphoric acid	Flue gas Analyzer	RYG_FS0565	7-Nov-24	7-Nov-25	12
Stack	Phosphoric acid	Dry Gas	BKK_FS0563	10-Jul-24	10-Jan-25	6
Stack	Phosphoric acid	Ion Chromatography	BKK_EN0069	12-Jan-24	12-Jan-25	12
Stack	Sulfuric Acid	Console Control Unit	BKK_FS0556	10-Jul-24	10-Jan-25	6
Stack	Sulfuric Acid	Pitot Tube	BKK_FS0560	10-Jul-24	10-Jan-25	6
Stack	Sulfuric Acid	Flue gas Analyzer	RYG_FS0565	7-Nov-24	7-Nov-25	12
Stack	Total Suspended Particulate	Console Control Unit	BKK_FS0518	10-Jul-24	10-Jan-25	6
Stack	Total Suspended Particulate	Pitot Tube	BKK_FS0523	10-Jul-24	10-Jan-25	6
Stack	Total Suspended Particulate	Flue gas Analyzer	RYG_FS0564	24-Apr-24	23-Apr-25	12
Stack	Total Suspended Particulate	Digital Balance	RYG_EN0003	22-Feb-24	22-Feb-25	12
Ambient	Total Suspended Particulate	High Volume	RYG_FS0662	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0663	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0291	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0179	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0179	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0396	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0664	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0395	-	-	On site Calibration
Ambient	Total Suspended Particulate	Digital Balance	RYG_EN0001	22-Feb-24	22-Feb-25	12
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	BKK_FS1090	3-Jul-24	3-Jan-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0459	3-Jul-24	3-Jan-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0453	3-Jul-24	3-Jan-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0261	2-Jul-24	2-Jan-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0252	2-Jul-24	2-Jan-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0261	2-Jul-24	2-Jan-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0255	2-Jul-24	2-Jan-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0732	3-Jul-24	3-Jan-25	6
Ambient	Sulfuric Acid	Field Rotameter	BKK_FS1039	2-Oct-24	2-Jan-25	3
Ambient	Sulfuric Acid	Field Rotameter	RYG_FS0627	2-Oct-24	2-Jan-25	3
Ambient	Sulfuric Acid	Ion Chromatography	BKK_EN0069	12-Jan-24	12-Jan-25	12
Ambient	Phosphoric acid	Field Rotameter	BKK_FS1039	2-Oct-24	2-Jan-25	3
Ambient	Phosphoric acid	Field Rotameter	RYG_FS0627	2-Oct-24	2-Jan-25	3
Ambient	Phosphoric acid	Ion Chromatography	BKK_EN0069	12-Jan-24	12-Jan-25	12
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0530	21-Aug-24	21-Feb-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0089	7-Oct-24	7-Apr-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0087	7-Oct-24	7-Apr-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0081	4-Oct-24	4-Apr-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0412	29-Oct-24	29-Apr-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0413	29-Oct-24	29-Apr-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0414	29-Oct-24	29-Apr-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_FS0141	20-Aug-24	20-Feb-26	18
Noise	Leq 24 hrs	Sound Calibrator	RYG_FS0215	23-Aug-24	23-Aug-25	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0437	19-Oct-23	19-Oct-24	12
Workplace	Total Dust	Field Rotameter	BKK_FS1040	1-Jul-24	1-Oct-24	3
Workplace	Total Dust	Field Rotameter	RYG_FS0196	2-Oct-24	2-Jan-25	3
Workplace	Total Dust	Digital Balance	RYG_EN0004	22-Feb-24	22-Feb-25	12
Workplace	Respirable Dust	Field Rotameter	BKK_FS1040	1-Jul-24	1-Oct-24	3
Workplace	Respirable Dust	Field Rotameter	RYG_FS0196	2-Oct-24	2-Jan-25	3
Workplace	Respirable Dust	Digital Balance	RYG_EN0004	22-Feb-24	22-Feb-25	12
Workplace	Phosphoric Acid	Field Rotameter	BKK_FS1004	2-Jul-24	2-Oct-24	3
Workplace	Phosphoric Acid	Field Rotameter	RYG_FS0627	2-Oct-24	2-Jan-25	3
Workplace	Phosphoric Acid	Ion Chromatography	BKK_EN0069	12-Jan-24	12-Jan-25	12



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Workplace	Sulfuric Acid	Field Rotameter	BKK_FS1004	2-Jul-24	2-Oct-24	3
Workplace	Sulfuric Acid	Field Rotameter	RYG_FS0627	2-Oct-24	2-Jan-25	3
Workplace	Sulfuric Acid	Ion Chromatography	BKK_EN0069	12-Jan-24	12-Jan-25	12
Noise	Leq 8 hrs	Sound Calibrator	RYG_FS0496	26-Jan-24	25-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0025	25-Jan-24	24-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0027	22-Jan-24	21-Jan-25	12
Noise	Leq 8 hrs	Sound Calibrator	RYG_FS0215	23-Aug-24	23-Aug-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0302	19-Sep-24	19-Sep-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0303	23-Aug-24	23-Aug-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0359	15-Jan-24	14-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0360	15-Jan-24	14-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0520	25-Jan-24	24-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0521	25-Jan-24	24-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0522	25-Jan-24	24-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0523	26-Jan-24	25-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0218	15-Feb-24	14-Feb-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0219	15-Feb-24	14-Feb-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0224	16-Feb-24	15-Feb-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0226	16-Feb-24	15-Feb-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0232	16-Feb-24	15-Feb-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0236	17-May-24	17-May-25	12
Soil	Copper	ICP-OES	BKK_EL0037	29-Feb-24	28-Feb-25	12
Soil	Copper	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Soil	Copper	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Soil	Iron	ICP-OES	BKK_EL0037	29-Feb-24	28-Feb-25	12
Soil	Iron	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Soil	Iron	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Soil	Zinc	ICP-OES	BKK_EL0037	29-Feb-24	28-Feb-25	12
Soil	Zinc	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Soil	Zinc	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Rayong Lab	Temperature	pH meter	RYG_FS0477	30-May-24	30-May-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	24-Jul-23	24-Jan-25	18
Rayong Lab	BOD	Incubator	RYG_EN0154	1-Nov-24	1-May-26	18
Rayong Lab	BOD	Burette	RYG_EN0216	24-Sep-24	24-Sep-25	12
Rayong Lab	COD	Spectrophotometer	RYG_EN0037	18-Sep-23	18-Mar-25	18
Rayong Lab	Total Suspended Solids	Electronic Balance	RYG_EN0002	22-Feb-24	22-Feb-25	12
Rayong Lab	Total Suspended Solids	Hot Air Oven	RYG_EN0010	21-Mar-24	21-Sep-25	18
Rayong Lab	Total Dissolved Solids 180°C	Electronic Balance	RYG_EN0002	22-Feb-24	22-Feb-25	12
Rayong Lab	Total Dissolved Solids 180°C	Hot Air Oven	RYG_EN0010	21-Mar-24	21-Sep-25	18
Rayong Lab	Oil & Grease	Electronic Balance	RYG_EN0002	22-Feb-24	22-Feb-25	12
Rayong Lab	Oil & Grease	Hot Air Oven	RYG_EN0213	21-Mar-24	21-Mar-25	12
Rayong Lab	Oil & Grease	Water Bath	RYG_EN0061	21-Mar-24	21-Sep-25	18
Water Lab	Iron	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Iron	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Iron	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Copper	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Copper	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Copper	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Zinc	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Zinc	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Zinc	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Rayong Lab	Conductivity	Conductivity meter	RYG_EN0029	4-Sep-23	4-Mar-25	18



CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Calibration of Date : 10-Jul-24
 Next Cal. Date : 10-Jan-25
 Barometric Pressure (mmHg) : 752.4
 Relative Humidity (%) : 64.0
 Temperature (C°) : 29.2
 Reference Dry Gas Meter Data
 Calibration No. : C-100724-BKK-FS0518
 Dry Gas Meter ID : BKK-FS0518
 Serial No. : 1504025
 Model No. : XC-572-V
 Reference Dry Gas Meter Data
 Calibration No. : BKK-FS1122
 Dry Gas Meter ID : A2003240
 Serial No. : 1504025
 Model No. : XC-572-V
 Correction Factor (Y) : 0.9824
 Next Calibration Date : 7-Nov-24

ΔH (mm H ₂ O)	Θ Microdis	Reference Dry Gas Meter Calibration						Console Control Drygas Meter						Dry Gas Meter Correction Factor (Y)	Critical Calibration Factor (Avg)
		V ₀ (liters)			T ₀ (°C)	V ₁ (liters)			T ₁ (°C)	Total (°C)	Avg.T ₁ (°C)				
		Final	Initial	Total		Final	Initial	Total							
15	12.00	150.00	0.00	150.00	28.0	701379.0	701200.0	149.00	29.0	28.0	26.0	0.9908	44.0579		
25	9.10	150.00	0.00	150.00	29.0	701528.0	701380.0	148.00	30.0	30.0	30.0	0.9965	42.0680		
50	6.34	150.00	0.00	150.00	29.0	701679.0	701500.0	149.00	30.0	30.0	30.0	0.9974	41.1305		
80	5.00	150.00	0.00	150.00	30.0	701800.0	701680.0	150.00	31.0	31.0	31.0	0.9780	41.0653		
120	4.08	150.00	0.00	150.00	30.0	701855.0	701815.0	150.00	31.0	31.0	31.0	0.9742	41.0164		
											Avg.	0.9954	41.9278		

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

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

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

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

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

FORM NO. : F 05-027 REVISION NO. : 2 ISSUE DATE : 30-Jul-22



Stopwatch Calibration Test Report

Calibration Date : 10 Jul 24
 Barometric Pressure (mmHg) : 752.4
 Relative Humidity (%) : 64.0
 Next Cal. Date : 10 Jan 25
 Temperature (°C) : 29.2
 Reference Stopwatch Data
 Stopwatch ID No. : RYG_FS0540
 Model : F808
 Serial No. : E18061
 Calibration Date : 4 Jul 24
 Certificate No. : E-2407022
 Console Control Meter Data
 Dry Gas Meter No : BKK_FS518
 Model : XC-572-V
 Serial No. : 1504025

Run No.	Time Actual (m:ss.ms)	Time Reading (m:ss)	Diff. (ms)	Diff. (min)
1	5:00:03	5:00	3	0.00005
2	5:00:07	5:00	7	0.00012
3	5:00:07	5:00	7	0.00012
4	5:00:08	5:00	8	0.00013
5	5:00:05	5:00	5	0.00008
6	5:00:06	5:00	6	0.00010
7	5:00:06	5:00	6	0.00010
8	5:00:06	5:00	6	0.00010
9	5:00:07	5:00	7	0.00012
10	5:00:07	5:00	7	0.00012
Average				0.00010
SD				0.00002

Calibrate by: Saksit Phaisanphisit
 Mr. Saksit Phaisanphisit
 RYG Field Service Scientist (4)
 Approved by: Nattapon Jengwarewong
 Mr. Nattapon Jengwarewong
 RYG Field Service Specialist (1)



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date : 10 Jul 24		Ambient Temperature (°C) : 29.2			
Calibration sheet No : C-10724-BKK_FS0519		Relative Humidity (%) : 64			
Digital Temperature ID : BKK_FS0519		Reference Temperature ID RYG_FS0681			
Serial No. : 1504025		Serial No. : 201090014818			
Model : XC-572-V		Model : Digicon-CC-VT-MS			
		Next Calibrate : 13 Nov 24			
Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass
	100	100	0	±3	Pass
	150	150	0	±3	Pass
	200	201	1	±3	Pass
Probe	250	251	1	±3	Pass
	300	301	1	±3	Pass
	500	501	1	±3	Pass
	100	100	0	±3	Pass
	120	121	1	±3	Pass
	140	141	1	±3	Pass
Oven	100	100	0	±3	Pass
	120	121	1	±3	Pass
	140	141	1	±3	Pass
Filter	100	100	0	±3	Pass
	120	121	1	±3	Pass
	140	141	1	±3	Pass
Ext	0	0	0	±3	Pass
	10	9	-1	±3	Pass
	20	19	-1	±3	Pass
Meter	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	51	1	±3	Pass
AUX	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	51	1	±3	Pass

MPE : (Maximum permissible error of measurement) ค่าความคลาดเคลื่อนสูงสุดที่อนุญาต

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



PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

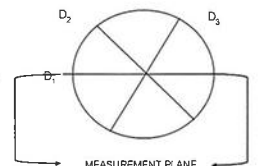
Calibration Date : 10 Jul 24			Nozzle Set ID. : BKK_FS0524		
Calibration Sheet No. : C-100724-BKK_FS0524			Vernier Caliper ID. : BKK_FS1123		
Nozzle ID #	Nozzle Diameter (cm.)			Hi - Lo	(D ₁ + D ₂ + D ₃) / 3
	D ₁	D ₂	D ₃	ΔD	D _{avg}
1	0.318	0.318	0.318	0.000	0.318
2	0.472	0.474	0.475	0.003	0.474
3	0.632	0.635	0.634	0.003	0.634
4	0.792	0.792	0.792	0.000	0.792
5	0.952	0.952	0.952	0.000	0.952
6	1.091	1.110	1.092	0.019	1.098
7	1.256	1.262	1.262	0.006	1.260
8	1.601	1.598	1.600	0.003	1.600

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

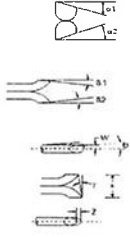


Calibrated by: Saksit Phaisanphisit
 (Mr. Saksit Phaisanphisit)
 RYG Field Service Scientist (4)
 Approved by: Nattapon Jengwarewong
 (Mr. Nattapon Jengwarewong)
 RYG Field Service Specialist (1)



Type S Pitot Tube Calibration

Date Calibration 10-Jul-24 Due Date 10-Jan-25
Pitot ID BKK_F50522 Inclinator ID BKK_F51131
Pitot SN Vernier ID RYG_F50539



Parameter	Value	Allowable Range	Check
$\alpha 1$	-1.8	$-10^\circ < \alpha 1 < +10^\circ$	OK
$\alpha 2$	-1.4	$-10^\circ < \alpha 2 < +10^\circ$	OK
$\beta 1$	-1.7	$-5^\circ < \beta 1 < +5^\circ$	OK
$\beta 2$	-2	$-5^\circ < \beta 2 < +5^\circ$	OK
γ	-1.3	-	-
θ	-0.4	-	-
$Z = A \tan \gamma$	-0.021	$Z \leq 0.125^\circ$	OK
$W = A \tan \theta$	-0.006	$W \leq 0.031^\circ$	OK
Dt	0.330	$0.188''$ to $0.375''$	OK
A/2Dt	1.394	$1.05 \leq A/2Dt \leq 1.5$	OK
A	0.92	$2.1Dt \leq A \leq 3Dt$	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
(Mr. Saksit Phaisanphut)
RYG Field Services Scientist (4)

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

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



Calibration Certificate



Certificate No: G 670280
Date of issue: 25-Apr-24

REVIEW BY: Ningkan P
APPROVED BY: Ningkan P
NEXT CAL DATE: 23/4/25

Instrument description : Rue Gas Analyzer
Instrument model : Testo 350 New
Control unit serial no. : 03580162/1121
Instrument serial no. : 62985049/1121
ID no. or control no. : RYG_F50564
Manufacturer : Testo SE & Co. KGaA
Probe description : -
Probe model : -
Probe serial no. : -
Customer name : ALS LABORATORY GROUP (THAILAND) CO., LTD.
Customer address : 104 Phatthanakan 40, Phatthanakan Road, Khwaeng Phatthanakan, Khet Suan Luang, Bangkok, 10250 Thailand
Total pages of certificate : 3 Pages
Receiving no. : I-241468
Receiving date : 11-Apr-24
Parameter of calibration : Gas Calibration (Oxygen 2.50, 10.04, 21.02 %vol, Carbon Monoxide 80.14, 302, 1003 ppm, Nitrogen Dioxide 30.34, 80.96, 201.9 ppm, Nitric Oxide 30.01, 151.5, 322.5 ppm, Sulphur Dioxide 50.36, 100.8, 600.8 ppm)
Condition of UUC : Used
Ambient condition : All of the Measurement were carried out the stabilized laboratory
Temperature : 23 \pm 5 $^\circ$ C
Humidity : 55 \pm 15 %RH
Calibration place : 17/121 Soi Ngaiwongwan 47 Yaek 48, Toongsonghong, Luks, Bangkok 10210 THAILAND
Calibration procedure no. : This instrument was calibrated by comparison with Standard gas mixture according to calibration Work Instruction no. WI-CL-2B-C

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

Mr. Kwanchai Khamduang
Calibration Technician

Mrs. Nongluck Wongsettee
Technical Manager

FM-CL-09-C Rev B

Page 1 of 3

Issue Date 26/02/16

Entech Industrial Solution Co., Ltd.

17/121 Soi Ngaiwongwan 47 Yaek 48, Toongsonghong, Luks, Bangkok 10210 THAILAND Tel: 0-2779-8888 Calibration Certificate No. G 670280
Fax: 0-21065603-5555 www.entech.co.th



Calibration Certificate



Certificate No.: G 670280

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.50 % Vol	2412/23	Linde	27-Aug-27
Oxygen (O ₂) 10.04 % Vol	CG-0153-21	Niml	15-Nov-26
Oxygen (O ₂) 21.02 % Vol	CG-0041-22	Niml	10-Feb-27
Carbon monoxide (CO) 80.14 ppm	CG-0040-23	Niml	14-Feb-27
Carbon monoxide (CO) 302 ppm	2915/23	Linde	16-Jun-25
Carbon monoxide (CO) 1003 ppm	2584/23	Linde	10-Sep-25
Nitrogen Dioxide (NO ₂) 30.34 ppm	2703/22	Linde	22-Aug-24
Nitrogen Dioxide (NO ₂) 80.96 ppm	3546/23	Linde	14-Jan-26
Nitrogen Dioxide (NO ₂) 201.9 ppm	1975/23	Linde	17-Jul-25
Nitric Oxide (NO) 30.01 ppm	CG-0014-23	Niml	19-Feb-25
Nitric Oxide (NO) 151.5 ppm	0161/23	Linde	22-Jan-26
Nitric Oxide (NO) 322.5 ppm	1974/23	Linde	17-Jul-25
Sulphur Dioxide (SO ₂) 50.36 ppm	2004/23	Linde	17-Jul-25
Sulphur Dioxide (SO ₂) 100.8 ppm	3507/22	Linde	09-Nov-24
Sulphur Dioxide (SO ₂) 600.8 ppm	2003/23	Linde	17-Jul-25

Measured room conditions

Temperature : 22.6 $^\circ$ C Humidity : 64.3 %RH Pressure : 1006.4 mbar

Calibration conditions

Gas Temperature : 24 $^\circ$ C Flow rate : 1,200 ml/min Gas pressure : 1019.2 mbar

Calibration Results (Before adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.50	2.44	-0.06	0.15
O ₂ (%Vol)	10.04	9.92	-0.12	0.20
O ₂ (%Vol)	21.02	21.12	0.10	0.30
CO (ppm)	80.14	80	-0.14	3.0
CO (ppm)	302	301	-1	6.0
CO (ppm)	1003	1002	-2	12
NO ₂ (ppm)	30.34	22.8	-7.54	8.0
NO ₂ (ppm)	80.96	73.4	-7.92	8.0
NO ₂ (ppm)	201.9	191.5	-10.4	12
NO (ppm)	30.01	28	-2.01	8.0
NO (ppm)	151.5	147	-4.5	8.0
NO (ppm)	322.5	308	-14.5	12
SO ₂ (ppm)	50.36	52	1.64	6.0
SO ₂ (ppm)	100.8	101	0.2	6.0
SO ₂ (ppm)	600.8	599	-1.8	13

Calibration Results (After adjustment) (Table 3)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.50	2.44	-0.06	0.15
O ₂ (%Vol)	10.04	9.92	-0.12	0.20
O ₂ (%Vol)	21.02	21.12	0.10	0.30
CO (ppm)	80.14	80	-0.14	3.0
CO (ppm)	302	301	-1	6.0
CO (ppm)	1003	1001	-2	12
NO ₂ (ppm)	30.34	27.6	-2.74	8.0
NO ₂ (ppm)	80.96	80.2	-0.76	8.0
NO ₂ (ppm)	201.9	201.1	-0.8	12
NO (ppm)	30.01	31	0.99	8.0
NO (ppm)	151.5	153	1.5	8.0
NO (ppm)	322.5	324	1.5	12
SO ₂ (ppm)	50.36	52	1.64	6.0
SO ₂ (ppm)	100.8	101	0.2	6.0
SO ₂ (ppm)	600.8	599	-1.8	13

Remark : 1 cmol/mol = 1 %vol, 1 ppmol/mol = 1 ppm

End of Report

FM-CL-09-C Rev C

Page 2 of 3

Issue Date 26/02/16

Entech Industrial Solution Co., Ltd.

17/121 Soi Ngaiwongwan 47 Yaek 48, Toongsonghong, Luks, Bangkok 10210 THAILAND Tel: 0-2779-8888 Calibration Certificate No. G 670280
Fax: 0-21065603-5555 www.entech.co.th



Calibration Certificate



Certificate No.: G 670280

Entech Industrial Solution Co., Ltd.

17/121 Soi Ngaiwongwan 47 Yaek 48, Toongsonghong, Luks, Bangkok 10210 THAILAND Tel: 0-2779-8888 Calibration Certificate No. G 670280
Fax: 0-21065603-5555 www.entech.co.th



CALIBRATION LABORATORY CO., LTD.

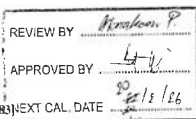
210/11, 14, 55 Soi Prasert Manukul 23 Yaeek 4, Prasert Manukul Rd., Ladprao, Bangkok 10230
Tel: 02-578-0353-4 Fax: 02-578-2672 www.cllab.co.th Email: info@cllab.co.th



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : VACUUM GAUGE
MANUFACTURER : DWYER
MODEL / TYPE : DPGA-00
SERIAL NO. : DVG08[BKK_FS0483]
CLID. NO. : 212300280
JOB CONTROL NO. : 240819087097
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE



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

DATE OF RECEIVED : 19 August 2024

DATE OF ISSUED : 22 August 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

[Signature]

Approved By : Mongkol Yosoonorn
Authorized Signatory
22 August 2024



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

Certificate No. Q24087097

F3-011-05/12-23

page 1 of 3



CALIBRATION LABORATORY CO., LTD.

210/11, 14, 55 Soi Prasert Manukul 23 Yaeek 4, Prasert Manukul Rd., Ladprao, Bangkok 10230
Tel: 02-578-0353-4 Fax: 02-578-2672 www.cllab.co.th Email: info@cllab.co.th



REPORT OF CALIBRATION

FOR

NOMENCLATURE : VACUUM GAUGE
MANUFACTURER : DWYER
MODEL / TYPE : DPGA-00
SERIAL NO. : DVG08[BKK_FS0483]
DATE OF CALIBRATION : 20 August 2024

ENVIRONMENT CONDITIONS :

Temperature : (23 ± 2) °C

Relative Humidity : (55 ± 10) %RH

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPMP-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 700PD5 S/N. 39404505

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. MP-0040-24, Due Date 05 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. Q24087097

F3-011-05/12-23

page 2 of 3



CALIBRATION LABORATORY CO., LTD.

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Tel: 02-578-0353-4 Fax: 02-578-2672 www.cllab.co.th Email: info@cllab.co.th



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 was recorded and the means 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
0.00	0.000	0.000	0.000	0.000	0.000	0.000
-10.00	-33.829	-33.813	-9.990	-9.991	-0.010	-0.009
-20.00	-67.679	-67.683	-19.986	-19.987	-0.014	-0.013
-26.00	-87.989	-87.992	-25.983	-25.984	-0.017	-0.016
-27.00	-91.381	-91.385	-26.985	-26.986	-0.018	-0.014
-28.00	-94.773	-94.774	-27.987	-27.987	-0.013	-0.013

Uncertainty of measurement ± 0.055 inHg

Transmitting fluid : Air

Technical Note: Conversion factor 1 kPa : 0.2953003 inHg

Note: The Scope of Accredited ANAB Certificate No. ACDM-2814 V01 on 01/2 Page 43 of 67

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

*** End of Certificate ***

Certificate No. Q24087097

F3-011-05/12-23

page 3 of 3



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-00005382
Page: 1 of 3

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

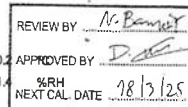
Environment Condition: Temperature 23.9 °C ± 0.2
Humidity 65.3 %RH ± 1.4

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

Calibration By: Mr. Natapat Rungueang
Calibration Date: 18 September 2023
The Method used: In house method, CAL-WI-24, base on ASTM E 275-08 and ASTM E 387-04

Traceability: This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Sarna 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. Natapat Rungueang)
Person in charge

(Mr. Nitnun Srihawan)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

DKSH Technology Limited
2533 Sukhumvit Road, Bangkok, Phraechinang, Bangkok 10260
Phone: +66 2626 7000 Email: info@calibration@dksh.com Website: www.dksh.com/calibration-thailand

Delivering Growth - In Asia and Beyond.

CAL-FM-C06-15 12 Sep 2022

Calibration Results:
Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 2 nm and UUC at 2 nm				
Standard Wavelength	Unit Under Calibration	Correction	Uncertainty	
418.61	418.3	0.31	0.13	
536.66	536.6	0.06	0.13	
637.98	636.3	-0.32	0.13	
748.48	748.7	-0.22	0.13	
807.03	807.4	-0.37	0.13	
Photometric Accuracy (Absorbance)				
Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.2930	0.289	0.0040	0.0045
	0.5168	0.519	-0.0022	0.0045
	1.0288	1.028	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
	0.2518	0.250	0.0016	0.0045
	0.4585	0.462	-0.0025	0.0045
	0.9334	0.933	0.0004	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.2481	0.245	0.0011	0.0045
	0.4652	0.466	-0.0008	0.0045
	0.9488	0.948	0.0008	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.2584	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
	0.2578	0.257	0.0009	0.0045
	0.4971	0.497	0.0001	0.0045
	0.9720	0.971	0.0010	0.0045

บริษัท ดีเคเอส อีซี จำกัด
DKSH Technology Limited
2533 สุขุมวิท รัชดาภิเษก ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
Phone: +66 2039 7000 Email: info@dksh.com Website: www.dksh.com

Delivering Growth - In Asia and Beyond.

CAL-FM-C06-15: 12 Sep 2022

Calibration Results:
Without Adjustment

Photometric Accuracy (Absorbance)				
Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0080
	0.7355	0.737	-0.0015	0.0080
257 nm	0.0000	0.000	0.0000	0.0080
	0.8574	0.857	0.0004	0.0080
313 nm	0.0000	0.000	0.0000	0.0080
	0.2864	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	1.3	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)	268.66	266.69	1.38	2.00
UUC: Wavelength (nm)	268.2	266.1		
Std Absorbance (A)	0.4566	0.2780		
Absorbance (A)	0.413	0.300		

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

The End of Certificate

บริษัท ดีเคเอส อีซี จำกัด
DKSH Technology Limited
2533 สุขุมวิท รัชดาภิเษก ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
Phone: +66 2039 7000 Email: info@dksh.com Website: www.dksh.com

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CAL-FM-C06-15: 12 Sep 2022

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: WO-00005382

ชนิดเครื่องมือ: SPECTROPHOTOMETER รุ่น: DR6000 หมายเลขเครื่อง: 1627845

ตรวจสอบ (วัน)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
16 Sep 2023			18 Sep 2023		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
General					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด - เปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Spectrophotometer					
<input type="checkbox"/>	<input type="checkbox"/>	6. แบตเตอรี่ไฟฟ้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวหมุนเลือกความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	*
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9.2 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	741.5 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. 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. ระดับสารละลายใน Electrode (Level KCl)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาดักฝุ่นปลาย 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. ค่าความขุ่นที่ใสสุด (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการกรองแสงของแสง (>= 2.5 ไม่นาน 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
Automatic titrator					
<input type="checkbox"/>	<input type="checkbox"/>	18. ฝาปิด 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. ระบบทำความสะอาดอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	
เพิ่มเพิ่ม/ลบเพิ่ม : 656.1nm&656.1nm					

เพิ่มเส้นขอบเขต: *656.1nm=656.1nm

*486.0nm=485.5nm

Mr.Nattapat Rungroeng
Service Engineer

บริษัท ดีเคเอส อีซี จำกัด
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CAL-FM-R31-03: 20 Jul 2022



CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Barometric Pressure (mmHg): 749.1

Relative Humidity (%): 46.2

Temperature (°C): 33.8

Reference Dry Gas Meter Data

Reference Dry Gas Meter ID: BKK-FS1122

Serial No.: A2003240

Correction Factor (V): 0.9824

Next Calibration Date: 7-Nov-24

Calibration of Date: 10-Jul-24

Next Cal. Date: 10-Jan-25

Console Control Meter Data

Calibration No.: C-100724-BKK-FS0556

Dry Gas Meter ID: BKK-FS0556

Serial No.: 1506041

Model No.: XC-572-V

ΔH (mm H ₂ O)	⊖ Minutes	Reference Dry Gas Meter Calibration						Console Control Dry Gas Meter						Dry Gas Meter Correction Factor	Office Calibration Factor	ΔAvg
		Vr (Liters)		Tr (°C)		Vr (Liters)		Tr (°C)		Avg Tr						
		Final	Initial	Total		Final	Initial	Total		To	From					
15	11.75	150.00	0.00	150.00	29.0	303546.0	303400.0	146.00	30.0	30.0	30.0	0.9975	(V)	42.5888		
25	9.24	150.00	0.00	150.00	29.0	303697.0	303550.0	147.00	30.0	30.0	30.0	1.0033		43.8741		
50	6.53	150.00	0.00	150.00	29.0	303848.0	303700.0	146.00	31.0	31.0	31.0	0.9974		43.6907		
80	5.10	150.00	0.00	150.00	30.0	303997.0	303850.0	147.00	31.0	31.0	31.0	0.9979		44.4416		
120	4.20	150.00	0.00	150.00	30.0	304146.0	304000.0	146.00	31.0	31.0	31.0	1.0009		43.6561		
											Avg			43.6442		

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

ΔAvg - Office pressure differential that equates to 21-24 in at 25°C and 760 mm of mercury, with 100% tolerance for individual values ± 5.08 from average.

Precision: 40 CFR 60 APP AMETH SEC 5.3 & 7

Calibrated by: S. Nattapat Rungroeng

(Mr. Nattapat Rungroeng)

RYG Field Service Specialist

FORM NO. 7 (Rev. 2) 05/24 DATE: 06-Jul-22



Stopwatch Calibration Test Report

Calibration Date : 10 Jul 24 Next Cal. Date : 10 Jan 25
Barometric Pressure (mmHg) : 749.1 Temperature (°C) : 33.8
Relative Humidity (%) : 46.2

Reference Stopwatch Data Console Control Meter Data
Stopwatch ID No. : RYG_FS0540 Dry Gas Meter No. BKK_FS0556
Model : F808 Model : XC-572-V
Serial No. : E18061 Serial No. : 1606041
Calibration Date : 4 Jul 24
Certificate No. : E-2407022

Run No.	Time Actual (m:ss.ms)	Time Reading (m:ss)	Diff. (ms)	Diff. (min)
1	5:00.03	5:00	3	0.00005
2	5:00.07	5:00	7	0.00012
3	5:00.07	5:00	7	0.00012
4	5:00.08	5:00	8	0.00013
5	5:00.05	5:00	5	0.00008
6	5:00.07	5:00	7	0.00012
7	5:00.06	5:00	6	0.00010
8	5:00.08	5:00	8	0.00013
9	5:00.08	5:00	8	0.00013
10	5:00.07	5:00	7	0.00012
Average				0.00011
SD				0.00003

Calibrate by: Saksit Phaisanphisit Approved by: Nattapol Jengwarewong
Mr. Saksit Phaisanphisit Mr. Nattapol Jengwarewong
RYG Field Service Scientist (4) RYG Field Service Specialist (1)



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date :		10 Jul 24	Ambient Temperature (°C)		33.8
Calibration sheet No. : C-100724-BKK_FS0557			Relative Humidity (%) :		46.2
Digital Temperature ID : BKK_FS0557			Reference Temperature ID RYG_FS0681		
Serial No. : 1606041			Serial No. : 201090014618		
Model : XC-572-V			Model : Digicon-CC-VT-MS		
			Next Calibrate :		13 Nov 24
Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	±3	Pass
	25	24	-1	±3	Pass
	50	49	-1	±3	Pass
	100	99	-1	±3	Pass
	150	149	-1	±3	Pass
	200	199	-1	±3	Pass
Probe	250	249	-1	±3	Pass
	300	299	-1	±3	Pass
	500	499	-1	±3	Pass
	100	99	-1	±3	Pass
	120	119	-1	±3	Pass
	140	139	-1	±3	Pass
Oven	100	99	-1	±3	Pass
	120	119	-1	±3	Pass
	140	139	-1	±3	Pass
Filter	100	100	0	±3	Pass
	120	120	0	±3	Pass
	140	141	1	±3	Pass
Exit	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) ค่าความคลาดเคลื่อนสูงสุดที่อนุญาต

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

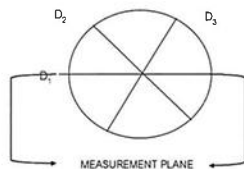
FORM NO. : F 06-027 REVISION NO. : 2 ISSUE DATE: 9 Feb 23



PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

Calibration Date : 10 Jul 24		Nozzle Set ID. : BKK_FS0562			
Calibration Sheet No. : C-100724-BKK_FS0562		Vernier Caliper ID. : BKK_FS1123			
Nozzle ID #	Nozzle Diameter (cm.)			Hi - Lo	(D ₁ + D ₂ + D ₃) / 3
	D ₁	D ₂	D ₃	ΔD	D _{avg}
1	0.305	0.302	0.302	0.003	0.303
2	0.485	0.475	0.485	0.010	0.482
3	0.620	0.635	0.635	0.015	0.630
4	0.765	0.765	0.765	0.000	0.765
5	0.970	0.980	0.975	0.010	0.975
6	1.085	1.085	1.081	0.004	1.084
7	1.275	1.275	1.275	0.000	1.275
8	1.610	1.610	1.615	0.005	1.612

Where :
D₁, D₂, D₃ = 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



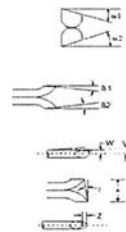
Calibrated by: Saksit Phaisanphisit Approved by: Nattapol Jengwarewong
(Mr. Saksit Phaisanphisit) (Mr. Nattapol Jengwarewong)
RYG Field Service Scientist (4) RYG Field Service Specialist (1)

FORM NO. : F 06-024 REVISION NO. : 1 ISSUE DATE: 9 Feb 23



Type S Pitot Tube Calibration

Date Calibration 10-Jul-24 Due Date 10-Jan-25
Pitot ID BKK_FS0560 Inclinator ID BKK_FS1131
Pitot SN - 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 θ	-0.017	Z ≤ 0.125"	OK
W = A tan β	0.020	W ≤ 0.031"	OK
Dt	0.311	0.188" to 0.375"	OK
A/2Dt	1.415	1.05 ≤ A/2Dt ≤ 1.5	OK
A	0.88	2.1Dt ≤ A ≤ 3Dt	OK

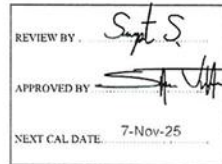
Certify that pitot tube/probe meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube certification fact of 0.84. See 40 CFR Pt. 60, App. A, EPA Method 2.

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

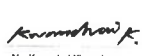

FORM NO. : F 06-124 REVISION NO. : 0 ISSUE DATE: 25/12/23

Certificate No: G 670781
Date of Issue : 07-Nov-24

Instrument description : Flue Gas Analyzer
Instrument model : Testo 340
Instrument serial no. : 63119028
Control unit serial no. : -
JD no. or control no. : RYG_FS0565
Manufacturer : Testo SE & Co. KGaA
Probe description : -
Probe model : -
Probe serial no. : -
Customer name : ALS LABORATORY GROUP (THAILAND) CO.,LTD.
Customer address : 104 Phatthanakan 40, Phatthanakan Road, Khwaeng Phatthanakan, Khet Suan Luang, Bangkok, 10250 Thailand
Total pages of certificate : 3 Pages
Receiving no. : L-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 Measurement were carried out the stabilized laboratory
Temperature : 23 ± 5 °C
Humidity : 55 ± 15 %RH
Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Lakso, 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 applied only to items under test Environmental condition.
This Calibration Certificate may not be reproduced other than in full except with the permission of the issuing laboratory.
Calibration certificates without signature and seal not valid and The results relate only to the items tested/calibrated.
This calibration certificate documents are traceability to national standards, which realize measurement according to the International System of Units (SI).
Date of calibration : 07-Nov-24


Mr. Kwanchai Khamboung
Calibration Technician

Mr. Nongluck Wongsetee
Technical Manager

FM-CL-09-C Rev.8

Page 1 of 3

Issued Date 26/02/16

ENTECH INDUSTRIAL SOLUTION CO.,LTD.

17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Lakso, Bangkok 10210 THAILAND Tel: 0-2779-6008 Fax: 0-2779-6009 info@entech.co.th
Tax ID : 0105636035501 www.entech.co.th

Certificate No.: G 670781

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.50 % Vol	2412/23	Linde	27-Aug-27
Oxygen (O ₂) 9.984 % Vol	CG-0113-24	Nimt	01-Aug-29
Oxygen (O ₂) 21.02 % Vol	CG-0041-22	Nimt	10-Feb-27
Carbon monoxide (CO) 80.18 ppm	CG-0002-24	Nimt	11-Jan-29
Carbon monoxide (CO) 302 ppm	1915/23	Linde	16-Jun-25
Carbon monoxide (CO) 1007 ppm	1870/24	Linde	17-Jun-26
Nitric Oxide (NO) 30.0 ppm	CG-0065-24	Nimt	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	3507/22	Linde	09-Nov-24
Sulphur Dioxide (SO ₂) 600.8 ppm	2003/23	Linde	17-Jul-25

Measured room conditions

Temperature : 21.8 °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	21.11	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	603	2.2	13

FM-CL-09-C Rev.8

Page 2 of 3

Issued Date 26/02/16

ENTECH INDUSTRIAL SOLUTION CO.,LTD.

17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Lakso, Bangkok 10210 THAILAND Tel: 0-2779-6008 Fax: 0-2779-6009 info@entech.co.th
Tax ID : 0105636035501 www.entech.co.th

Certificate No.: G 670781

Calibration Results (After adjustment) (Table 3)

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	21.11	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	321	-1.5	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	603	2.2	13

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

End of Report

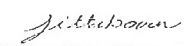
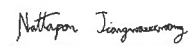


DRY GAS METER CALIBRATION TEST REPORT

Calibration of Date : 10-Jul-24 Barometric Pressure (mm.Hg) : 749.1
Next Calibration Date : 10-Jan-25 Relative Humidity (%) : 46.2
Temperature (°C) : 33.8
Dry Gas Meter Data
Reference Dry Gas Meter ID : BKK_FS1122
Calibration sheet No. : C-090724-BKK_FS0563
Dry Gas Meter ID : BKK_FS0563 Serial No. : A2003240
Serial No. : 1605011 Correction Factor (Y) : 0.9824
Model No. : XC-62-CV Next Calibration Date : 7 Nov 24

Reference Dry Gas Meter Calibration				Dry Gas Meter					Dry Gas Meter Correction Factor
Vr (Liters)			Tr (°C)	Vm (Liters)			Ti (°C)	To (°C)	Avg. Tm (°C)
Final	Initial	Total	(°C)	Final	Initial	Total	(°C)	(°C)	(°C)
30.00	0.00	30.00	27.0	30.22	0.00	30.22	27.0	27.0	27.0
30.00	0.00	30.00	27.0	30.21	0.00	30.21	27.0	27.0	27.0
60.00	0.00	60.00	27.0	61.11	0.00	61.11	28.0	28.0	27.0
60.00	0.00	60.00	27.0	60.98	0.00	60.98	28.0	28.0	27.0
90.00	0.00	90.00	27.0	90.33	0.00	90.33	28.0	28.0	27.0
90.00	0.00	90.00	27.0	90.22	0.00	90.22	28.0	28.0	27.0
Avg.									0.9737

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

Calibrate by : 
Mr. (Jitakorn Sreasa)
RYG Field Service Scientist (2)
Approved by : 
(Mr.Natthapol Jengwarewong)
RYG Field Service Specialist (1)

FM-CL-09-C Rev.8

Page 3 of 3

Issued Date 26/02/16

ENTECH INDUSTRIAL SOLUTION CO.,LTD.

17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Lakso, Bangkok 10210 THAILAND Tel: 0-2779-6008 Fax: 0-2779-6009 info@entech.co.th
Tax ID : 0105636035501 www.entech.co.th

FORM NO: F 06-023 REVISION NO: 1 ISSUE DATE 30/6/22



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date :	10 Jul 24	Ambient Temperature (°C)	33.8
Calibration sheet No. :	C-100724-BKK_FS0563	Relative Humidity (%) :	46.2
Digital Temperature ID :	BKK_FS0563	Reference Temperature ID	RYG_FS0681
Serial No. :	1606011	Serial No. :	201090014918
Model :	XC-62-CV	Model :	Digilcon-CC-VT-MS
		Next Calibrate :	13 Nov 24

Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass
	100	100	0	±3	Pass
	150	150	0	±3	Pass
	200	199	-1	±3	Pass
	250	250	0	±3	Pass
	300	299	-1	±3	Pass
Probe	500	499	-1	±3	Pass
	100	100	0	±3	Pass
	120	118	-1	±3	Pass
Oven	140	139	-1	±3	Pass
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
AUX	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass

MPE : (Maximum permissible error of measurement) ค่าความผิดพลาดสูงสุดของการวัด

Calibrated by : Sittichawan Approved by : Nattapon Jengwareewong
Mr. Jitakorn Srwasa Mr. Nattapon Jengwareewong
RYG Field Service Scientist (2) RYG Field Service Specialist (1)
FORM NO. F 06-027 REVISION NO.: 2 ISSUE DATE: 9 Feb 23

REVIEW BY Aitchaiwan S
APPROVED BY Taninart m
NEXT CAL DATE 12 Jan 2025

ARCHERICA

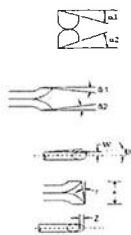
Certificate of Calibration
ICS-2100: Anion (ID#659)
This certificate is to verify that instrument below are calibrated
by Archemica Lab Co., Ltd.
ICS-2100 S/N: 15010977
AS-HV S/N: 5450A36659
For
ALS Laboratory Group (Thailand) Co., Ltd.

Operator Signature: Nutdanai Date: Jan 12, 2024
(Mr. Nutdanai Laekhwan)
Application Chemist



Type S Pitot Tube Calibration

Date Calibration 10-Jul-24 Due Date 10-Jan-25
Pitot ID BKK_FS0523 Inclinator ID BKK_FS1131
Pitot SN - Vernier ID RYG_FS0539



Parameter	Value	Allowable Range	Check
$\alpha 1$	-0.2	$-10^\circ < \alpha 1 < +10^\circ$	OK
$\alpha 2$	2.4	$-10^\circ < \alpha 2 < +10^\circ$	OK
$\beta 1$	-1.2	$-5^\circ < \beta 1 < +5^\circ$	OK
$\beta 2$	-1.6	$-5^\circ < \beta 2 < +5^\circ$	OK
γ	-1.1	-	-
θ	0.2	-	-
$Z = A \tan \gamma$	-0.018	$Z \leq 0.125''$	OK
$W = A \tan \theta$	0.003	$W \leq 0.031''$	OK
Dt	0.308	$0.188'' \text{ to } 0.375''$	OK
A/2Dt	1.494	$1.05 \leq A/2Dt \leq 1.5$	OK
A	0.92	$2.1Dt \leq A \leq 3Dt$	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 factor of 0.84. See 40 CFR Pt. 60, App. A, EPA Method 2.

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2841 8381-6, e-mail: service.thailand@sartorius.com

NSC-TLS-TLS 17025
CALIBRATION 0426

SARTORIUS

Certificate of Calibration

REVIEW BY Thawit
APPROVED BY D
NEXT CAL DATE 29/02/2025

Model Number : MSU224S-100-DU Certificate No. : 24BC10073
Description : Analytical Balance Issued Date : Friday, February 23, 2024
Serial Number : 0031708552 Reference No. : 229196
ID No. : RYG_EN0003
Manufacturer : Sartorius Page No. : 1 of 2

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

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

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

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

Measurement Method UKAS Publication Ref :Lab 14
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor ($k=2$) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came from list of Sartorius Metrological Specifications.

Traceability:

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

This certificate relate and apply this equipment only.
This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division
Sartorius (Thailand) Co., Ltd.

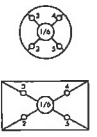
SOP FM 33 03 February 2022
Mr.chonchai Inthana(Technical Manager)



Certificate of Calibration

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

Calibration Results : Without Adjustment

Repeatability			Eccentricity (Off-center loading error)																
<p>The reproducibility is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.</p>			<p>The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/2 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76).</p>																
Nominal Value : (Low Load)	20.0000	200.0001	Nominal value :	100	g														
20 g	20.0000	200.0000	Tolerance	0.0004	g														
Tolerance	20.0001	200.0001	 <table border="1"><thead><tr><th colspan="2">Difference</th></tr></thead><tbody><tr><td>1</td><td>-</td></tr><tr><td>2</td><td>0.0000</td></tr><tr><td>3</td><td>-0.0001</td></tr><tr><td>4</td><td>0.0000</td></tr><tr><td>5</td><td>0.0001</td></tr><tr><td>6</td><td>-</td></tr></tbody></table>			Difference		1	-	2	0.0000	3	-0.0001	4	0.0000	5	0.0001	6	-
Difference																			
1	-																		
2	0.0000																		
3	-0.0001																		
4	0.0000																		
5	0.0001																		
6	-																		
0.0001 g	20.0000	200.0001																	
Nominal Value : (High Load)	20.0000	200.0001																	
200 g	19.9999	200.0001																	
Tolerance	20.0000	200.0000																	
0.0001 g	20.0000	200.0000																	
Standard Deviation	0.00005	0.00005																	

Linearity				
<p>The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.</p>				
Tolerance	0.0002 g			
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
0.01	0.0100	0.0100	0.0000	0.00013
0.1	0.1000	0.1000	0.0000	0.00013
0.5	0.5000	0.5000	0.0000	0.00013
1	1.0000	1.0000	0.0000	0.00013
5	5.0000	5.0000	0.0000	0.00013
10	10.0000	10.0000	0.0000	0.00013
20	20.0000	20.0000	0.0000	0.00013
50	50.0000	50.0000	0.0000	0.00024
100	100.0000	99.9999	-0.0001	0.00018
200	200.0000	199.9999	-0.0001	0.00029

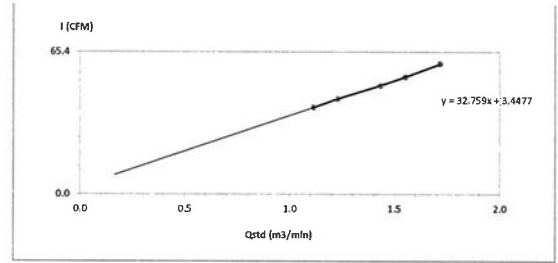
End of Report

SOP FM 33 03 February 2022

High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 755.2
Calibrate Location : สำนักงานเขตปทุมธานี (A1) Temperature (°C) : 32.5
Calibrate Date : 11-Oct-24 High Volume ID : RYG_FS0662
CalibrationSheet No. : C-111024-RYG_FS0662 High Volume Model : TE-5009X
Calibrator ID : RYG_FS0206 High Volume S/N : 6259
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	1.1148	40	Slope : 32.7588
2	3.3	1.2298	44	Intercept : 3.4477
3	4.5	1.4319	50	Correlation Coefficient : 0.9992
4	5.3	1.5518	54	
5	6.5	1.7158	60	



Calibrated by : [Signature]
(Mr. Norranon Tathongkham)
Field Scientist(2)

Approved by : [Signature]
(Mr. Noppong Juntaruphan)
Enviro Field Coordinator Scientist (3)

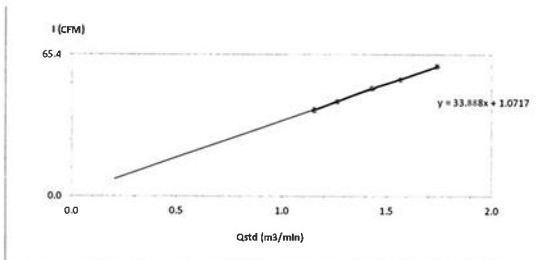
FORM NO: F 06-073 REVISION NO:2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 755.2
Calibrate Location : สำนักงานเขตปทุมธานี (A2) Temperature (°C) : 32.5
Calibrate Date : 11-Oct-24 High Volume ID : RYG_FS0663
CalibrationSheet No. : C-111024-RYG_FS0663 High Volume Model : TE-5009X
Calibrator ID : RYG_FS0206 High Volume S/N : 6260
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	2.9	1.1545	40	Slope : 33.8885
2	3.5	1.2658	44	Intercept : 1.0717
3	4.5	1.4319	50	Correlation Coefficient : 0.9995
4	5.4	1.5662	54	
5	6.7	1.7417	60	



Calibrated by : [Signature]
(Mr. Norranon Tathongkham)
Field Scientist(2)

Approved by : [Signature]
(Mr. Noppong Juntaruphan)
Enviro Field Coordinator Scientist (3)

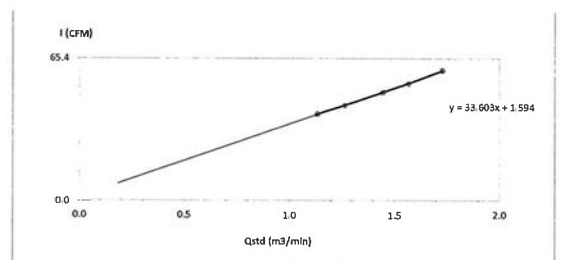
FORM NO: F 06-073 REVISION NO:2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 755.2
Calibrate Location : สำนักงานเขตปทุมธานี (A3) Temperature (°C) : 32.5
Calibrate Date : 11-Oct-24 High Volume ID : RYG_FS0291
CalibrationSheet No. : C-111024-RYG_FS0291 High Volume Model : TE-5170D
Calibrator ID : RYG_FS0206 High Volume S/N : 5333
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	2.8	1.1348	40	Slope : 33.6033
2	3.5	1.2658	44	Intercept : 1.5940
3	4.6	1.4475	50	Correlation Coefficient : 0.9994
4	5.4	1.5662	54	
5	6.6	1.7288	60	



Calibrated by : [Signature]
(Mr. Norranon Tathongkham)
Field Scientist(2)

Approved by : [Signature]
(Mr. Noppong Juntaruphan)
Enviro Field Coordinator Scientist (3)

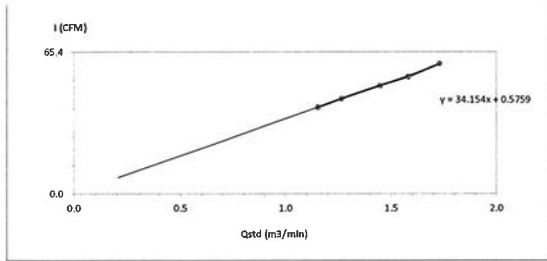
FORM NO: F 06-073 REVISION NO:2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site: Michelin Siam Co., Ltd. Barometric Pressure (mm Hg): 755.2
Calibrate Location: บ้านคลองน้ำเย็น (A4) Temperature (°C): 32.5
Calibrate Date: 11-Oct-24 High Volume ID: RYG_FS0179
Calibration Sheet No.: C-111024-RYG_FS0179 High Volume Model: TE-5170D
Calibrator ID: RYG_FS0206 High Volume S/N: 4805
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	2.9	1.1545	40	Slope: 34.1541 Intercept: 0.5759 Correlation Coefficient: 0.9990
2	3.5	1.2658	44	
3	4.6	1.4475	50	
4	5.5	1.5804	54	
5	6.6	1.7288	60	



Calibrated by: [Signature]
(Mr. Norranon Tathongkham)
Field Scientist (2)

Approved by: [Signature]
(Mr. Noppong Juntaruban)
Enviro Field Coordinator Scientist (3)

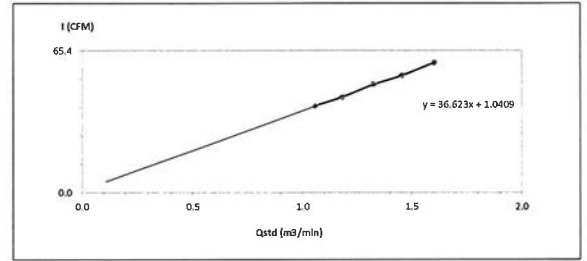
FORM NO.: F 06-073 REVISION NO.:2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site: Michelin Siam Co., Ltd. Barometric Pressure (mm Hg): 758.4
Calibrate Location: สำนักงานเขตหนองจอก (A1) Temperature (°C): 29.7
Calibrate Date: 20-Dec-24 High Volume ID: RYG_FS0179
Calibration Sheet No.: C-201224-RYG_FS0179 High Volume Model: TE-5170D
Calibrator ID: RYG_FS0206 High Volume S/N: 4805
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	2.4	1.0594	40	Slope: 36.6229 Intercept: 1.0409 Correlation Coefficient: 0.9991
2	3.0	1.1815	44	
3	3.8	1.3266	50	
4	4.6	1.4570	54	
5	5.6	1.6050	60	



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

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

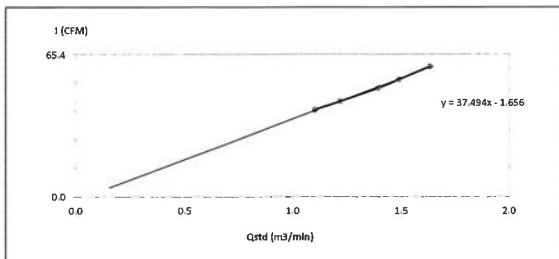
FORM NO.: F 06-073 REVISION NO.:2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site: Michelin Siam Co., Ltd. Barometric Pressure (mm Hg): 758.4
Calibrate Location: บ้านคลองน้ำเย็น (A2) Temperature (°C): 29.7
Calibrate Date: 20-Dec-24 High Volume ID: RYG_FS0396
Calibration Sheet No.: C-201224-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	2.6	1.1017	40	Slope: 37.4936 Intercept: -1.6560 Correlation Coefficient: 0.9987
2	3.2	1.2194	44	
3	4.2	1.3934	50	
4	4.8	1.4878	54	
5	5.8	1.6330	60	



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

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

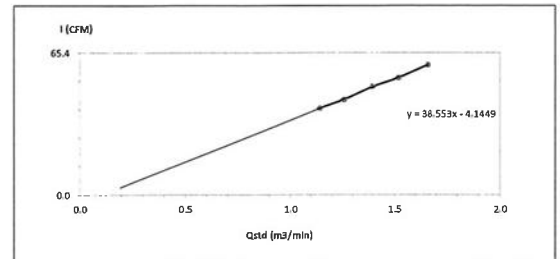
FORM NO.: F 06-073 REVISION NO.:2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site: Michelin Siam Co., Ltd. Barometric Pressure (mm Hg): 758.4
Calibrate Location: บ้านคลองน้ำเย็น (A3) Temperature (°C): 29.7
Calibrate Date: 20-Dec-24 High Volume ID: RYG_FS0664
Calibration Sheet No.: C-201224-RYG_FS0664 High Volume Model: TE-5009X
Calibrator ID: RYG_FS0206 High Volume S/N: 6261
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	2.8	1.1423	40	Slope: 38.5526 Intercept: -4.1449 Correlation Coefficient: 0.9991
2	3.4	1.2562	44	
3	4.2	1.3934	50	
4	5.0	1.5180	54	
5	6.0	1.6605	60	



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

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

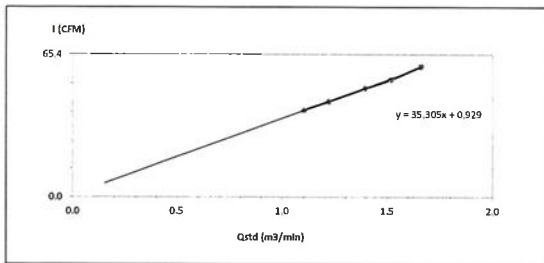
FORM NO.: F 06-073 REVISION NO.:2 ISSUE DATE: 20/11/23



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 758.4
Calibrate Location : บ้านคลองน้ำเย็น (A4) Temperature (°C) : 29.7
Calibrate Date : 20-Dec-24 High Volume ID : RYG_FS0395
Calibration Sheet No. : C-201224-RYG_FS0395 High Volume Model : TE-5170D
Calibrator ID : RYG_FS0206 High Volume S/N : 5692
Calibrator Model : TE-5028A Calibrator Slope : 1.48469
Calibrator S/N : 1543 Calibrator Intercept : -0.02523

Test No.	Delta H ₂ O (Inch)	Q _{air} (m ³ /min)	I: Chart (CFM)	Linear Regression
1	2.6	1.1017	40	Slope: 35.3050
2	3.2	1.2194	44	Intercept: 0.9290
3	4.2	1.3934	50	Correlation Coefficient: 0.9990
4	5.0	1.5180	54	
5	6.0	1.6605	60	



Calibrated by : (Mr. Khunakon Manchuan)
RYG-Field Services Scientist (1)

Approved by : (Mr. Supot Sarameteh)
RYG-Field Services Section Head

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

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



MSC-TS-TIS 17025
CALIBRATION 0426

SARTORIUS

Certificate of Calibration

Model Number : LA130S-F Certificate No. : 24BCI0088
Description : Analytical Balance Issued Date : Friday, February 23, 2024
Serial Number : 25409864 Reference No. : 228198
ID No. : RYG_EN0001
Manufacturer : Sartorius Page No. : 1 of 2
Customer Name : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5 T. Maenam Khu, A. 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 Procedure No. : This calibration was conducted by
Calibration Date : Thursday, February 22, 2024 Using in-house calibration procedure number (WI-003)
Based on UKAS LAB 14 : 2019

Metrological data : Capacity : 150 g Readability : 0.0001 g
Ambients Conditions : Temperature : 23.6 °C ± 5.0 °C
Humidity : 54.0 % RH ± 10.0 % RH
Pressure : ±
Reasons for calibration : ☒ New Installation ☐ Service / Registered ☒ Re-calibration/ Maintenance
Equipment Condition : ☒ Good Operate ☐ Fair

Measurement Method UKAS Publication Ref : Lab 14
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came from list of Sartorius Metrological Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 5000g E2.YCS011-522-00	TCS	M2308197S	23-Aug-2025
MHB-362SD	Humidity/Barometer/Temp. Lutron MHB-362SD	DKSH	C18231845	23-Aug-2024

This certificate relate and apply this equipment only.
This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division Sartorius (Thailand) Co., Ltd.

Mr. Chonchai Inthana (Technical Manager)

SOP FM 33 03 February 2022



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

SARTORIUS

Certificate of Calibration

Model Number : LA130S-F Certificate No. : 24BCI0088
Description : Analytical Balance Issued Date : Friday, February 23, 2024
Serial Number : 25409864 Reference No. : 228198
ID No. : RYG_EN0001
Manufacturer : Sartorius Page No. : 2 of 2

Calibration Results : Without Adjustment

Repeatability			Eccentricity (Off-center loading error)		
The repeatability is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same test within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.			The off-center loading error is yielded by the difference between the 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 R118).		
Nominal Value : (Low Load)	10.0000	99.9999	Nominal value : 50 g		
10 g	10.0000	100.0000	Tolerance 0.0004 g		
Tolerance 0.0001 g	10.0000	100.0001			
	10.0000	100.0001			
	9.9999	100.0000			
Nominal Value : (High Load)	10.0000	100.0001			
100 g	10.0000	100.0000			
Tolerance 0.0001 g	10.0000	100.0001			
	9.9999	100.0002			
	9.9999	100.0001			
Standard Deviation	0.00005	0.00008			

Linearity				
The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.				
Tolerance 0.0002 g				
Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
0.01	0.0100	0.0100	0.0000	0.00020
0.05	0.0500	0.0500	0.0000	0.00021
0.1	0.1000	0.1000	0.0000	0.00021
0.5	0.5000	0.5000	0.0000	0.00021
1	1.0000	1.0000	0.0000	0.00021
2	2.0000	2.0000	0.0000	0.00021
5	5.0000	5.0000	0.0000	0.00021
10	10.0000	10.0001	0.0001	0.00024
20	20.0000	20.0001	0.0001	0.00021
100	100.0000	99.9999	-0.0001	0.00024

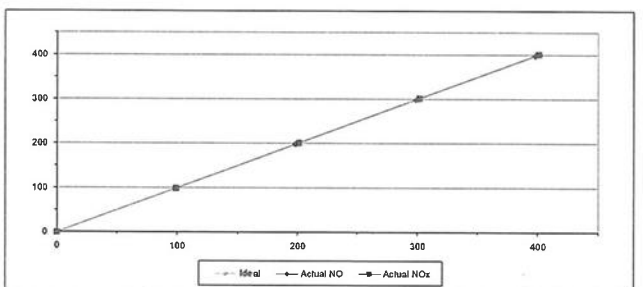
End of Report.



MULTIPOINT CALIBRATION REPORT

Calibration Date : 3-Jul-24 Equipment Name : NOx Analyzer
Manufacturer : HORIBA Model : APNA-370
Serial No. : SUDLS8MU Equipment ID : BKK_FS1090
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	98.70	-1.30	-1.30	99.10	-0.90	-0.90
2	200.00	198.30	-1.70	-0.85	201.50	1.50	0.75
3	300.00	299.30	-0.70	-0.23	302.00	2.00	0.67
4	400.00	398.30	-1.70	-0.42	401.20	1.20	0.30
AVERAGE (%)				-0.54			0.18



Calibrated By

Approved By

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

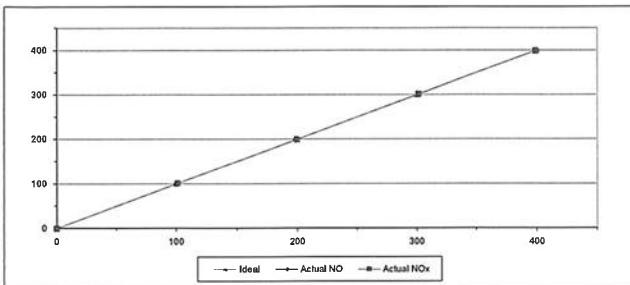
(Mr. Sanyuth Jitranont)
Assistant General Manager



MULTIPOINT CALIBRATION REPORT

Calibration Date 3-Jul-24 Equipment Name NOx Analyzer
 Manufacturer HORIBA Model APNA-370
 Serial No. NV0ER3YH Equipment ID RYG_FS0459
 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	0.05	0.05	0.05	0.10	0.10	0.10
1	100.00	99.50	-0.50	-0.50	101.20	1.20	1.20
2	200.00	198.70	-1.30	-0.65	199.70	-0.30	-0.15
3	300.00	301.10	1.10	0.37	301.40	1.40	0.47
4	400.00	400.30	0.30	0.08	398.80	-1.20	-0.30
AVERAGE (%)				-0.13			0.26



Calibrated By

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

Approved By

(Mr.Sansyuth Jittrantont)
Assistant General Manager

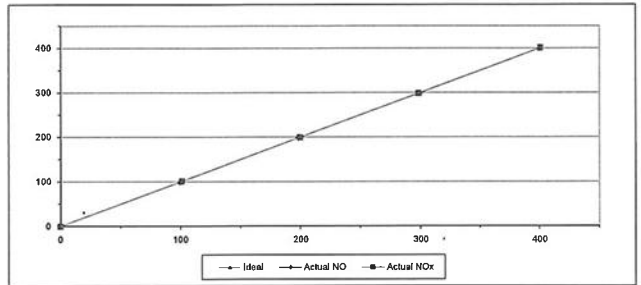
ALS Laboratory Group
FORM NO.: F 06-056 REVISION NO.: - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date 3-Jul-24 Equipment Name NOx Analyzer
 Manufacturer HORIBA Model APNA-370
 Serial No. AWXG87CR Equipment ID RYG_FS0453
 Calibrator Manufacturer Teledyne API Model 700
 Serial No. 947
 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	101.10	1.10	1.10
2	200.00	198.60	-1.40	-0.70	199.80	-0.20	-0.10
3	300.00	299.00	-1.00	-0.33	298.60	-1.40	-0.47
4	400.00	401.10	1.10	0.28	401.10	1.10	0.28
AVERAGE (%)				-0.21			0.18



Calibrated By

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

Approved By

(Mr.Sansyuth Jittrantont)
Assistant General Manager

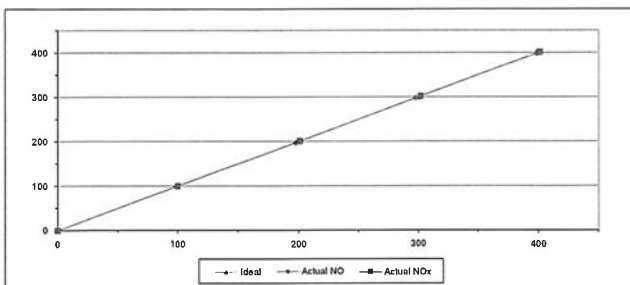
ALS Laboratory Group
FORM NO.: F 06-056 REVISION NO.: - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date 2-Jul-24 Equipment Name NOx Analyzer
 Manufacturer HORIBA Model APNA-370
 Serial No. SEEAW53E Equipment ID RYG_FS0281
 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	98.70	-1.30	-1.30	100.20	0.20	0.20
2	200.00	197.70	-2.30	-1.15	201.20	1.20	0.60
3	300.00	298.10	-1.90	-0.63	302.00	2.00	0.67
4	400.00	398.50	-1.50	-0.38	401.40	1.40	0.35
AVERAGE (%)				-0.87			0.38



Calibrated By

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

Approved By

(Mr.Sansyuth Jittrantont)
Assistant General Manager

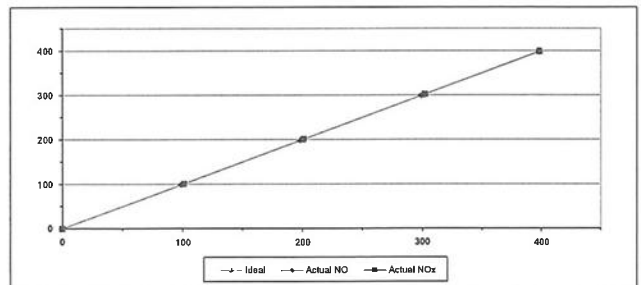
ALS Laboratory Group
FORM NO.: F 06-056 REVISION NO.: - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date 2-Jul-24 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 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	98.70	-1.30	-1.30	101.00	1.00	1.00
2	200.00	198.00	-2.00	-1.00	201.30	1.30	0.65
3	300.00	298.50	-1.50	-0.50	302.30	2.30	0.77
4	400.00	398.20	-1.80	-0.45	398.60	-1.40	-0.35
AVERAGE (%)				-0.63			0.43



Calibrated By

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

Approved By

(Mr.Sansyuth Jittrantont)
Assistant General Manager

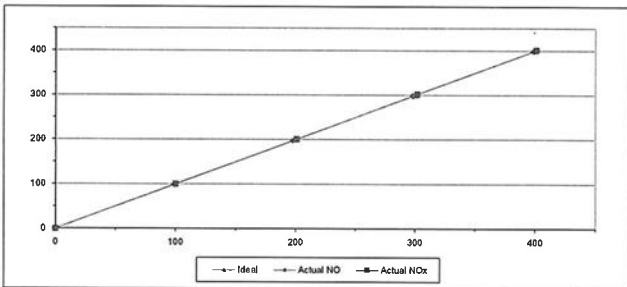
ALS Laboratory Group
FORM NO.: F 06-056 REVISION NO.: - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	2-Jul-24	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	SEEAW53E	Equipment ID	RYG_FS0261
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	98.70	-1.30	-1.30	100.20	0.20	0.20
2	200.00	197.70	-2.30	-1.15	201.20	1.20	0.60
3	300.00	298.10	-1.90	-0.63	302.00	2.00	0.67
4	400.00	398.50	-1.50	-0.38	401.40	1.40	0.35
AVERAGE (%)				-0.67			0.38



Calibrated By

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

Approved By

(Mr. Sanayuth Jitranont)
Assistant General Manager

ALS Laboratory Group

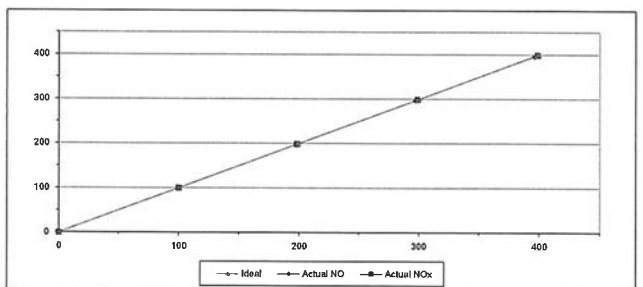
FORM NO.: F 06-056 REVISION NO.: - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	2-Jul-24	Equipment Name	NOx Analyzer
Manufacturer	Teledyne API	Model	T200
Serial No.	2197	Equipment ID	RYG_FS0265
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	198.00	-2.00	-1.00	198.70	-1.30	-0.65
3	300.00	297.30	-2.70	-0.90	298.70	-1.30	-0.43
4	400.00	396.40	-3.60	-0.90	396.80	-1.20	-0.30
AVERAGE (%)				-0.82			-0.24



Calibrated By

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

Approved By

(Mr. Sanayuth Jitranont)
Assistant General Manager

ALS Laboratory Group

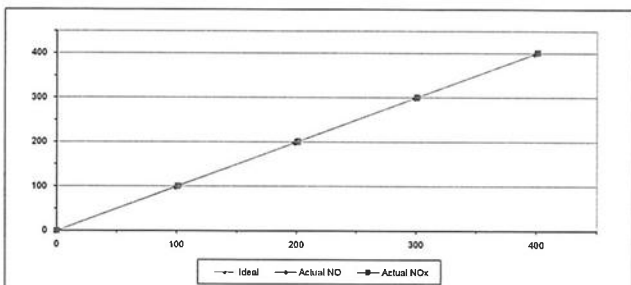
FORM NO.: F 06-056 REVISION NO.: - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	3-Jul-24	Equipment Name	NOx Analyzer
Manufacturer	Teledyne API	Model	N200
Serial No.	122	Equipment ID	RYG_FS0732
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	55.88	Cylinder No.	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	99.20	-0.80	-0.80	101.30	1.30	1.30
2	200.00	198.50	-1.50	-0.75	201.30	1.30	0.65
3	300.00	298.80	-1.20	-0.40	301.00	1.00	0.33
4	400.00	398.50	-1.50	-0.38	401.30	1.30	0.33
AVERAGE (%)				-0.44			0.54



Calibrated By

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

Approved By

(Mr. Sanayuth Jitranont)
Assistant General Manager

ALS Laboratory Group

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



ROTA METER CALIBRATION RESULT OCTOBER 2024

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0573	02 Oct 24	Y = 1.0146x + 4.4306	1.0000
BKK_FS0577	02 Oct 24	Y = 1.1097x + 3.8082	0.9994
BKK_FS0584	02 Oct 24	Y = 1.0163x + 3.55	0.9997
BKK_FS0585	02 Oct 24	Y = 1.0324x + 2.63	0.9997
BKK_FS0587	02 Oct 24	Y = 1.029x + 1.25	0.9999
BKK_FS0591	02 Oct 24	Y = 1.0002x + 15.177	1.0000
BKK_FS0592	02 Oct 24	Y = 1.0003x + 15.506	1.0000
BKK_FS0594	02 Oct 24	Y = 1.0024x + 7.9314	1.0000
BKK_FS1006	02 Oct 24	Y = 1.0705x + 3.1952	1.0000
BKK_FS1007	02 Oct 24	Y = 1.0983x + 4.1833	0.9998
BKK_FS1008	02 Oct 24	Y = 1.1231x + 0.8782	0.9988
BKK_FS1017	02 Oct 24	Y = 1.0361x + 2.7864	0.9998
BKK_FS1018	02 Oct 24	Y = 1.0137x + 0.9333	1.0000
BKK_FS1019	02 Oct 24	Y = 1.0016x + 6.9648	1.0000
BKK_FS1026	02 Oct 24	Y = 1.1424x - 0.8571	0.9975
BKK_FS1027	02 Oct 24	Y = 1.0293x + 3.5233	1.0000
BKK_FS1028	02 Oct 24	Y = 1.0026x + 9.8067	1.0000
BKK_FS1039	02 Oct 24	Y = 1.0041x + 9.1033	0.9993
BKK_FS1040	02 Oct 24	Y = 1.0025x + 1.1619	1.0000
BKK_FS1041	02 Oct 24	Y = 1.0352x + 1.6626	1.0000
BKK_FS1042	02 Oct 24	Y = 1.0015x + 11.25	0.9995
BKK_FS1044	02 Oct 24	Y = 1.1163x + 0.7323	0.9973
PHK_FS0027	02 Oct 24	Y = 1.0849x + 3.3133	0.9991
PHK_FS0028	02 Oct 24	Y = 1.0257x + 1.5667	0.9999
PHK_FS0029	02 Oct 24	Y = 0.9889x + 14.706	1.0000
RYG_FS0195	02 Oct 24	Y = 1.0031x + 10.024	1.0000
RYG_FS0196	02 Oct 24	Y = 1.0047x + 6.6114	1.0000
RYG_FS0197	02 Oct 24	Y = 1.0049x + 10.074	1.0000
RYG_FS0198	02 Oct 24	Y = 1.0051x + 3.3863	1.0000
RYG_FS0199	02 Oct 24	Y = 1.0349x + 2.3983	0.9993
RYG_FS0627	02 Oct 24	Y = 1.0162x + 6.0933	0.9999
RYG_FS0628	02 Oct 24	Y = 1.0035x + 7.8667	0.9999
RYG_FS0654	02 Oct 24	Y = 1.0541x + 2.2446	0.9999
RYG_FS0655	02 Oct 24	Y = 0.9734x + 17.51	0.9997
RYG_FS0656	02 Oct 24	Y = 1.0034x + 8.661	0.9999
RYG_FS0657	02 Oct 24	Y = 1.0322x + 4.2303	0.9999
RYG_FS0658	02 Oct 24	Y = 0.9945x + 10.98	0.9996
RYG_FS0659	02 Oct 24	Y = 1.0022x + 9.2876	1.0000
SGK_FS0135	02 Oct 24	Y = 1.0203x + 3.7733	0.9999



ROTA METER CALIBRATION RESULT OCTOBER 2024

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
SGK_FS0136	02 Oct 24	$Y = 1.0313x - 1.0933$	0.9999
SGK_FS0138	02 Oct 24	$Y = 1.0479x + 5.8214$	1.0000
SGK_FS0139	02 Oct 24	$Y = 1.0166x + 4.0367$	0.9998
SGK_FS0140	02 Oct 24	$Y = 1.0008x + 14.979$	1.0000
SGK_FS0141	02 Oct 24	$Y = 1.0846x + 3.8398$	1.0000
SGK_FS0142	02 Oct 24	$Y = 1.0211x + 2.0233$	1.0000
SGK_FS0143	02 Oct 24	$Y = 1.0042x + 6.461$	1.0000

Review By: Wichan Choonharat
(Mr. Wichan Choonharat)
Enviro Field Services Manager

Approved By: [Signature]
(Mr. Sarayuth Jitranont)
Assistant General Manager

Page 2 of 2

ALS Laboratory Group



HIRANATEE ASSOCIATES CO., LTD.

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E-mail: nac-calibration@hiranatee.com
Web site: www.jnac.com

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

Air speed measurement laboratory
Calibration services department



NSC-TIS-TIS 17025
CALIBRATION 0367

Certificate Number

CWS-031-67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE

SERIAL NUMBER

ID NUMBER
CONDITION AS-RECEIVED
CUSTOMER

: Cup anemometer

: Novaflow

: Sensor: WS-02F

: Data logger: 110-WS-25DL-D

: Sensor: WSD-AS660

: Data logger: AS660

: RYG_F40550

: Used item

: ALS laboratory group (Thailand) Co., Ltd.

: 104 Phatthanakan Rd, Phatthanakan Rd, Khwaeng Suan Luang,

: Khwaeng Suan Luang, Bangkok 10250 Thailand.

Calibration procedure:

The Cup anemometer was calibrated against Standard air velocity transducer model: 8415-27 and pilot tube with precision differential pressure meter model: 10842-001 in air flow test section of Effel-type wind tunnel with 500 cm² cross test section area. The WDC 760 based on IEC 61400-12-2, Wind energy generation systems - Part 12-2: Power performance measurements of electrically 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 NIMT (National Metrology Institute of Thailand) via Certificate number: NM-0007-24 and NM-0030-23.

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).

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

: 08 Aug 2024

: 21 Aug 2024

: 21 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
Atmospheric Pressure : 1010.10 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITIONS

Wind tunnel cross section area¹ : 900 cm²
Wind direction frontal area² : 100 cm²
Diameter of mounting pipe : - mm
Blockage ratio of test object³ : 0.111 [-]

Preconditioning

: 24 hours at ambient conditions.

Measurement Condition

: The average values during measurement are (23.0) °C, (41.8) %RH and (1002.6) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

: Mr. Sarayuth Jitranont

: Mr. Jitranont Jitranont



Approved signature: [Signature]
Mr. Parinya Booncharoen
Calibration Department Manager

REVIEW BY

: [Signature]

APPROVED BY

: [Signature]

NEXT CAL DATE

: 21/12/26

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

MEASUREMENT RESULTS¹

The Cup anemometer, Unit Under Calibration (UUC) was exercise at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer 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 pilot 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 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_{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V_{ref} (m/s)	Error (m/s)	U (k=2) (m/s)
0.935	23.70	23.55	0.8	-0.7	0.31
2.010	23.46	23.55	1.8	-0.2	0.31
2.857	23.64	23.55	2.9	-0.1	0.31
4.037	23.66	23.55	3.8	-0.2	0.31
4.58	23.44	23.55	4.9	-0.1	0.31
5.96	23.10	23.55	6.0	0.0	0.31
7.04	23.50	23.55	7.0	0.0	0.31
7.97	23.94	23.55	8.0	0.0	0.31
8.99	23.24	23.55	9.1	0.1	0.31
9.97	22.92	23.55	10.2	0.2	0.31
10.95	23.40	23.55	11.1	0.1	0.31
12.03	23.08	23.55	12.3	0.3	0.31
12.95	23.40	23.55	13.3	0.3	0.31
14.09	23.20	23.55	14.3	0.2	0.31
15.02	23.40	23.55	15.3	0.3	0.31
15.97	23.30	23.55	16.4	0.4	0.31

Remark:

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

PHOTO OF CALIBRATION SET-UP



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



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

Wind direction measurement laboratory
Calibration services department



NSC-TIS-TIS 17025
CALIBRATION 0367

Certificate Number

CWS-031-67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE

SERIAL NUMBER

ID NUMBER
CONDITION AS-RECEIVED
CUSTOMER

: Wind Direction Sensor

: Novaflow

: Sensor: WS-03F

: Data logger: 110-WS-25DL-D

: Sensor: WSD-AS660

: Data logger: AS660

: RYG_F40550

: Used item

: ALS laboratory group (Thailand) Co., Ltd.

: 104 Phatthanakan Rd, Phatthanakan Rd, Khwaeng Suan Luang,

: Khwaeng Suan Luang, Bangkok 10250 Thailand.

Calibration procedure:

The wind direction sensor was calibrated against Standard Rotary Encoder model: AN-00915-0004-P15-010 in an closed configuration of Effel-type wind tunnel with 900 cm² cross test section area. The WDC 760 based on IEC 61400-12-2, Wind energy generation systems - Part 12-2: Power performance measurements of electrically 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 NIMT (National Metrology Institute of Thailand) via Certificate number: NM-0007-24 and NM-0030-23.

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).

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

: 08 Aug 2024

: 21 Aug 2024

: 21 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
Atmospheric Pressure : 1010.10 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITION

Wind tunnel cross section area¹ : 900 cm²
Wind direction frontal area² : 129 cm²
Diameter of mounting pipe : - mm
Blockage ratio of test object³ : 0.143 [-]

Preconditioning

: 24 hours at ambient conditions.

Measurement Condition

: The average values during measurement are (23.7) °C, (46.3) %RH and (1007.5) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

: Mr. Sarayuth Jitranont

: Mr. Jitranont Jitranont



Approved signature: [Signature]
Mr. Parinya Booncharoen
Calibration Department Manager

Remark:

¹ Wind tunnel 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 1.

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Certificate Number
CWD-031-67

Page 2 of 3 Pages

MEASUREMENT RESULTS¹

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

Air speed m/s	D _{me} Degree (°)	D _{me} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
	0.000	0	0	0.80
	45.000	42	-3	0.80
	90.000	88	-2	0.80
	135.000	133	-2	0.80
	180.000	181	1	0.80
	225.000	229	4	0.80
	270.000	273	3	0.80
	315.000	318	3	0.80

Remark:

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

² Direction of standard.

³ Direction of Unit Under Calibration.

End of Certificate of Calibration



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Accredited calibration laboratory
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NSC-TIS-TIS 17025
CALIBRATION 0367

Temperature measurement laboratory
Calibration services department



NSC-TIS-TIS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No. : CDT-156-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Data Logger with Temperature sensor
MANUFACTURER : Novalynx
MODEL/TYPE : 110-WS-25DL-D
SERIAL NUMBER : AS660
ID NUMBER : RYG_F50530
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khuang Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

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

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory 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 at W-CL-001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale was based on ITS-90.

Traceability:
The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT) Certificate number TT-0047-24. Certificate number: FR U103 73.

Reference Used During Calibration:
1. Standard Temperature Probe Model STS-100 AS00, Serial No. 667682 09, Use date: 26 Mar 2025
2. Digital Temperature Indicator Model DTI-1000-A MK II, Serial No. 671407-00591 Due date: 14 Sep 2024.

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

Calibrated by:
☒ Mr. Sorawit Thachalad
☒ Mr. Nattaporn Lertsuamphol
☒ Ms. Ruangrumpai Phoommit



Approved signatory:
Mr. Panyia Booncharoen
Calibration Department Manager

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Continuation of Certificate of Calibration Number CDT-156-67

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 5/N, S4620631, Dimension: Diameter 12 mm, Length 80 mm.

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

UUC: Unit Under Calibration

End of Certificate of Calibration



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NSC-TIS-TIS 17025
CALIBRATION 0367

Relative humidity and Air Temperature measurement laboratory
Calibration services department

CERTIFICATE OF CALIBRATION

Certificate No. : CRT-032-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Relative humidity with data logger
MANUFACTURER : Novalynx
MODEL/TYPE : Data Logger: 110-WS-25DL-U
Sensor: HMP60
SERIAL NUMBER : Data Logger: AS660
Sensor: S4620631
ID NUMBER : RYG_F50530
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khuang Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand.

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

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory 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 at W-CL-003 and W-CL-039 according to comparison method with Standard Class 3 Mirror 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 Thailand (NIMT) Certificate number: TH 0079-23 and through Jirantee Associates Co., Ltd. Certificate number: CDT 001 67.

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. Sorawit Thachalad
☒ Mr. Nattaporn Lertsuamphol
☒ Ms. Ruangrumpai Phoommit



Approved signatory:
Mr. Panyia Booncharoen
Calibration Department Manager

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

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 (NRH)	UUC Reading (NRH)	Error (NRH)	Uncertainty (NRH)
25.82	59.64	57.8	-1.8	0.83
29.89	59.72	48.0	-2.7	± 1
28.87	81.34	78.5	-3.0	2.3

UUC*: Unit Under Calibration

End of Certificate of Calibration



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

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

Air speed measurement laboratory
Calibration services department

NSC-TIS-TIS 17025
CALIBRATION 0367

Certificate Number

CWS-053-67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Cup anemometer
MANUFACTURER: Novakita
MODEL/TYPE: Sensor: WS-02F
Data logger: 200-WS-250L
SERIAL NUMBER: Sensor: WSD-A4987
Data logger: AA987
ID NUMBER: RVC, P50069
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: 30 Sep 2024
MEASUREMENT DATE: 07 Oct 2024
ISSUE DATE: 07 Oct 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: 1010.9 hPa

PLACE OF CALIBRATION

Effel type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITIONS

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

Preconditioning: 24 hours at ambient conditions.
Measurement Condition: The average values during measurement are (23.0) °C, (42.6) %RH and (1009.5) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:
☒ Mr. Sorawit Thairakul
☐ Miss Jitraporn Lertsoonthorn

Approved signature

Mr. Panyisa Booncharoen
Calibration Department Manager

Remark:
¹ Nozzle 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: %

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

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The Cup anemometer, Unit Under Calibration (UUC) was exercise at 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 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 lower plate at center of test section. The calibration was carried out under both rising and falling air velocity in the range at 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

V_{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V_{ref} (m/s)	Error (m/s)	$\pm U(U=2)$ (m/s)
1.002	23.94	23.00	0.9	-0.1	0.33
2.223	23.12	23.00	2.0	-0.2	0.33
3.093	22.81	23.00	3.0	-0.1	0.33
4.236	22.84	23.00	4.0	-0.2	0.33
4.95	22.96	23.00	5.0	0.0	0.33
5.96	22.86	23.00	6.0	0.1	0.33
7.03	22.84	23.00	7.0	0.0	0.33
7.96	22.92	23.00	8.0	0.0	0.33
8.97	22.60	23.00	9.2	0.2	0.33
9.96	22.70	23.00	10.1	0.2	0.33
11.09	22.72	23.00	11.3	0.2	0.33
12.02	22.70	23.00	12.2	0.2	0.33
12.94	22.84	23.00	13.2	0.3	0.33
13.92	22.89	23.00	14.3	0.4	0.33
14.99	22.90	23.00	15.3	0.3	0.33
15.96	22.90	23.00	16.2	0.2	0.35

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

² Velocity of standard

³ Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



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

End of Certificate of Calibration

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

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

Wind direction measurement laboratory
Calibration services department

NSC-TIS-TIS 17025
CALIBRATION 0367

Certificate Number

CWD-053-67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Wind Direction Sensor
MANUFACTURER: Novakita
MODEL/TYPE: Sensor: WS-02F
Data logger: 200-WS-250L
SERIAL NUMBER: Sensor: WSD-A4987
Data logger: AA987
ID NUMBER: RVC, P50069
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: 30 Sep 2024
MEASUREMENT DATE: 07 Oct 2024
ISSUE DATE: 07 Oct 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: 1010.9 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITION

Wind tunnel cross-section area¹: 900 cm²
Wind direction frontal area²: 129 cm²
Diameter of mounting pipe³: mm
Blockage ratio of test object⁴: 0.143 [-]

Preconditioning: 24 hours at ambient conditions.
Measurement Condition: The average values during measurement are (23.3) °C, (46.1) %RH and (1007.5) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:
☒ Mr. Sorawit Thairakul
☐ Miss Jitraporn Lertsoonthorn

Approved signature

Mr. Panyisa Booncharoen
Calibration Department Manager

Remark:
¹ Nozzle 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: %

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

Air speed m/s	D ₁₀₀ Degree (°)	D ₁₀₀ Degree (°)	Error Degree (°)	U (k=2) Degree (°)
	0.000	0	0	0.80
	45.000	42	-3	0.80
	90.000	88	-2	0.80
	135.000	134	-1	0.80
	180.000	180	0	0.80
	225.000	228	3	0.80
	270.000	274	4	0.80
	315.000	317	2	0.80

Remarks:

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

² Direct on standard.

³ Direction of Unit Under Calibration.

End of Certificate of Calibration

Certificate Number

CWD-053-67



Jiranatee Associate Co., Ltd.
63/14-15, RTV35-36,
Pattana 2521, 12, W222/222A, Bangkok,
Thailand 10110 (Thailand)
Tel: +662-018-1111
Mobile: +662-018-1111
E-mail: naca@jiranatee.com
Web site: www.jiranatee.com

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

Air speed measurement laboratory
Calibration services department



NSC - TIS - TIS 17025
CALIBRATION 0367

Certificate Number

CWS-053-67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE

Cup anemometer

Novasys

Data logger: WS-02F

Data logger: 200-WS-25DL

Sensor: WSD-A4986

Data logger: A4986

RWS_F30007

Used item

ID NUMBER

AUS laboratory group (Thailand) Co., Ltd.

CONDITION AS-RECEIVED

104 Phatthanakan 40, Phatthanakan Rd, Khwaeng, Suai Luang,

CUSTOMER

Khet Suai Luang, Bangkok 10250 Thailand.

RECEIVED DATE

10 Sep 2024

MEASUREMENT DATE

07 Oct 2024

ISSUE DATE

07 Oct 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

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

CALIBRATION CONDITIONS

Wind tunnel cross-section area¹900 cm²Wind direction frontal area²100 cm²Diameter of mounting pipe³

mm

Blockage ratio of test object⁴

0.131 [-]

Preconditioning

24 hours at ambient conditions.

Measurement Condition

The average values during measurement are (23.3) °C, (40.9) %RH and (1007.3) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

Mr. Sorawat Thaisakul

Mr. Nitiraporn Lertkarnsri

Approved signature:

REVIEW BY: *[Signature]*
APPROVED BY: *[Signature]*
NEXT CAL DATE: 4/4/26

Mr. Pinyakorn Boonchanon
Calibration Department Manager

Remarks:

¹ Horizontal cross-section area of the wind tunnel.² Projected cross-section area of the test object include mounting pipe.³ Diameter of mounting pipe.⁴ Ratio [-].

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 exercise at 30 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer 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 table of the lower plate at center of test section. The calibration was carried out under both ring and falling air velocity in the range of 1 m/s to 16 m/s at calibration accuracy of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

Vel ¹ (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	Vel ² (m/s)	Error (m/s)	U (k=2) (m/s)
1.013	23.26	23.30	0.8	-0.2	0.31
2.237	23.24	23.30	2.0	-0.2	0.31
3.651	23.18	23.30	3.0	-0.1	0.31
4.204	23.16	23.30	4.0	-0.2	0.31
4.96	22.97	23.30	5.0	0.0	0.31
5.88	22.70	23.30	6.0	0.0	0.31
7.05	22.64	23.30	7.0	0.0	0.31
7.56	22.58	23.30	8.0	0.0	0.31
8.07	22.00	23.30	9.0	0.0	0.31
9.97	22.96	23.30	10.1	0.1	0.31
11.03	22.10	23.30	11.2	0.2	0.31
12.02	22.94	23.30	12.1	0.1	0.31
13.55	22.70	23.30	13.2	0.2	0.31
15.93	23.04	23.30	14.2	0.3	0.34
14.98	23.20	23.30	15.2	0.2	0.33
15.91	23.14	23.30	16.2	0.3	0.31

Remarks:

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

² Velocity of standard.

³ Velocity of Unit Under Calibration.

PHOTO OF CALIBRATION SET-UP:



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

End of Certificate of Calibration

Certificate Number

CWS-052-67



Jiranatee Associate Co., Ltd.
63/14-15, RTV35-36,
Pattana 2521, 12, W222/222A, Bangkok,
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Tel: +662-018-1111
Mobile: +662-018-1111
E-mail: naca@jiranatee.com
Web site: www.jiranatee.com

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

Wind direction measurement laboratory
Calibration services department



NSC - TIS - TIS 17025
CALIBRATION 0367

Certificate Number

CWD-052-67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE

Wind Direction Sensor

Novasys

Sensor: WS-02F

Data logger: 200-WS-25DL

Sensor: WSD-A4986

Data logger: A4986

RWS_F30007

ID NUMBER

AUS laboratory group (Thailand) Co., Ltd.

CONDITION AS-RECEIVED

104 Phatthanakan 40, Phatthanakan Rd, Khwaeng, Suai Luang,

CUSTOMER

Khet Suai Luang, Bangkok 10250 Thailand.

RECEIVED DATE

20 Sep 2024

MEASUREMENT DATE

07 Oct 2024

ISSUE DATE

07 Oct 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

Eiffel type wind tunnel of Jiranatee Associate Co., Ltd.

CALIBRATION CONDITION

Wind tunnel cross-section area¹900 cm²Wind direction frontal area²129 cm²Diameter 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 (23.3) °C, (47.2) %RH and (1007.3) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

Mr. Sorawat Thaisakul

Mr. Nitiraporn Lertkarnsri

Approved signature:

Mr. Pinyakorn Boonchanon
Calibration Department Manager

Remarks:

¹ Horizontal cross-section area of the wind tunnel.² Projected cross-section area of the test object include mounting pipe.³ Diameter of mounting pipe.⁴ Ratio [-].

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

Certificate Number
CWD-052-67

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 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 _{me} Degree (°)	D ² _{me} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
	0.000	0	0	0.80
	45.000	42	-3	0.80
	90.000	87	-3	0.80
	135.000	133	-2	0.80
	180.000	178	-2	0.80
	225.000	224	-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 Unit Under Calibration.

End of Certificate of Calibration



Jiranatee Associates Co., Ltd.
43/14-15, 67/35-36
Petchburi 27/1, Rd. Wattana, Bangkok,
Bangkok 10330 (Thailand)
Tel: +66(0)2-012
Fax: +66(0)2-012
E-mail: info@jiranatee.com
Web site: www.jiranatee.com

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

All speed measurement laboratory
Calibration services department



NSC - TIS - TIS 17025
CALIBRATION 0367

Certificate Number
CW5-051-67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

Cup anemometer

MANUFACTURER

Navalyn

MODEL/TYPE

Sensor: WS-02E

SERIAL NUMBER

Data logger: 110-WS-16N

ID NUMBER

Sensor: WSD-1159

CONDITION AS-RECEIVED

Data logger: 1159

CUSTOMER

Used item
ALS Laboratory group (Thailand) Co., Ltd.
104 Phatthanakan Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

30 Sep 2024

MEASUREMENT DATE

04 Oct 2024

ISSUE DATE

07 Oct 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature	23.0 ± 3.0	°C
Relative Humidity	55.0 ± 15.0	%RH
Atmospheric Pressure	1010.1 ± 10	hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITIONS

Wind tunnel cross-section area ¹	900	cm ²
Wind direction funnel area ²	100	cm ²
Diameter of mounting pipe ³		mm
Blockage ratio of test object ⁴	0.111	[-]

Preconditioning

24 hours at ambient conditions.

Measurement Condition

The average values during measurement are (23.5) °C, (43.5) %RH and (1007.6) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

- Mr. Sorawit Thachais
- Miss Jitaporn Lertmanont

Remark:

- ¹ Round cross-section area of the wind tunnel
- ² Irregular cross-section area of the tested object include mounting pipe
- ³ Diameter of mounting pipe
- ⁴ Ratio (%)

Calibration procedure:

The Cup anemometer was calibrated against Standard air velocity transducer model: DPM252 and pitot tube with precision differential pressure meter model: DPM2500 in an effel-type section of Effel-type wind tunnel with 900 cm² cross test section area. The WGL-1000 Series in IEC 60400-12-1, Wind energy generation systems - Part 12-1: Power performance measurements of electricity producing wind turbines, March 2017 was used as a calibration guideline.

Traceability:

The certificate provides a traceability of the measurement to recognized the national standards and to realization of the international system of units (SI) through the NMV (National Metrology Institute of Thailand) via Certificate Number: NMV-0007-24 and NMV-0005-24.

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).

REVIEW BY

Mr. Sorawit Thachais

APPROVED BY

Mr. Sorawit Thachais

NEXT CAL DATE

07/10/25

Approved signature

Mr. Sorawit Thachais

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-051-67

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The Cup anemometer, Unit Under Calibration (UUC) was exercised at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer which was installed 50 mm away from wind tunnel inside 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 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 power 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 26 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

v _{me} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	v _{ref} (m/s)	Error (m/s)	U (k=2) (m/s)
1.011	23.30	23.50	0.9	-0.1	0.33
2.138	23.64	23.50	2.0	0.1	0.33
3.084	23.30	23.50	3.0	-0.1	0.33
4.173	23.30	23.50	4.0	-0.2	0.33
5.02	23.07	23.50	5.0	0.0	0.33
5.90	23.42	23.50	5.0	-0.1	0.33
7.04	22.98	23.50	7.0	0.0	0.33
7.90	23.40	23.50	7.9	0.0	0.33
9.04	23.08	23.50	9.1	0.1	0.33
9.97	23.22	23.50	10.1	0.2	0.33
10.98	23.18	23.50	11.1	0.2	0.33
12.09	23.18	23.50	12.2	0.2	0.33
13.27	23.26	23.50	13.2	0.2	0.33
13.96	23.22	23.50	14.2	0.2	0.33
14.99	23.30	23.50	15.2	0.3	0.33
15.93	23.26	23.50	16.2	0.3	0.33

Remark:

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

² Velocity of standard.

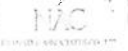
³ Velocity of Unit Under Calibration.

PHOTO OF CALIBRATION SET-UP



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

End of Certificate of Calibration



Jiranatee Associates Co., Ltd.
63/14-15, 67/35-36
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Bangkok 10330 (Thailand)
Tel: +66(0)2-012
Fax: +66(0)2-012
E-mail: info@jiranatee.com
Web site: www.jiranatee.com

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

Wind direction measurement laboratory
Calibration services department



NSC - TIS - TIS 17025
CALIBRATION 0367

Certificate Number
CWD-051-67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

Wind Direction Sensor

MANUFACTURER

Navalyn

MODEL/TYPE

Sensor: WS-02E

SERIAL NUMBER

Data logger: 110-WS-16N

ID NUMBER

Sensor: WSD-1159

CONDITION AS-RECEIVED

Data logger: 1159

CUSTOMER

Used item
ALS Laboratory group (Thailand) Co., Ltd.
104 Phatthanakan Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

30 Sep 2024

MEASUREMENT DATE

04 Oct 2024

ISSUE DATE

07 Oct 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature	23.0 ± 3.0	°C
Relative Humidity	55.0 ± 15.0	%RH
Atmospheric Pressure	1010.1 ± 10	hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITION

Wind tunnel cross-section area ¹	900	cm ²
Wind direction funnel area ²	120	cm ²
Diameter of mounting pipe ³		mm
Blockage ratio of test object ⁴	0.143	[-]

Preconditioning

24 hours at ambient conditions.

Measurement Condition

The average values during measurement are (23.5) °C, (42.5) %RH and (1007.6) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

- Mr. Sorawit Thachais
- Miss Jitaporn Lertmanont

Remark:

- ¹ Round cross-section area of the wind tunnel
- ² Irregular 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 rotary encoder model: J400075-DNA4-P3-540 in an effel-type section of Effel-type wind tunnel with 900 cm² cross test section area. The WGL-1000 Series in IEC 60400-12-1, Wind energy generation systems - Part 12-1: Power performance measurements of electricity producing wind turbines, March 2017 was used as a calibration guideline.

Traceability:

The certificate provides a traceability of the measurement to recognized the national standards and to realization of the international system of units (SI) through the NMV (National Metrology Institute of Thailand) via Certificate Number: NMV-0007-24.

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).

REVIEW BY

Mr. Sorawit Thachais

APPROVED BY

Mr. Sorawit Thachais

NEXT CAL DATE

07/10/25

Approved signature

Mr. Sorawit Thachais

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 056 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 in wind tunnel (usually 5 m/s) is kept constant while the sensor is rotated around its vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below.

Air speed m/s	D ₁₀₀ Degree (°)	D ₁₀₀ Degree (°)	Error Degree (°)	U (k=2) Degree (°)
	0.000	0	0	0.80
	45.000	42	-3	0.80
	90.000	85	-2	0.80
	135.000	134	-1	0.80
	180.000	177	-3	0.80
	225.000	229	4	0.80
	270.000	273	3	0.80
	315.000	317	2	0.80

Remarks:

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

² Direction of standard.

³ Direction of Unit Under Calibration.

End of Certificate of Calibration



Jirarattee Associates Co., Ltd.
63/14-15, 63/15, 63/16,
Rachaburi 3, 7/1, 62, 63, 64, 65, 66, 67, 68,
Pattana (Sukhvit) Road,
T1 - 10500 (M12)
Bangkok 10500 (M12)
E-mail: jirarattee@jirarattee.com
Web site: www.jirarattee.com

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

Air speed measurement laboratory
Calibration services department.



Certificate Number
CWS 056 67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS RECEIVED
CUSTOMER

Cup anemometer
: Novalyne
: Sensor: WS-02F
: Data logger: 200-WS-251B
: Sensor: WSD-AS374
: Data logger: AS374
: RFG_F50412
: Used item
: ALS laboratory group (Thailand) Co., Ltd.
: 104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,
: Khwaeng Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

: 18 Oct 2024
: 29 Oct 2024
: 29 Oct 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 : 1010.1 ± 10 hPa

PLACE OF CALIBRATION

: Fillet type wind tunnel of Jirarattee Associates Co., Ltd.

CALIBRATION CONDITIONS

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

Preconditioning
Measurement Condition

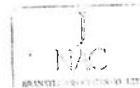
: 24 hours at ambient conditions.
: The average values during measurement are (23.2) °C, (48.9) %RH and (1002.8) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

☒ Mr. Sorawit Thachalud
☐ Miss Jiraporn Lertsompiet



Approved signature

Mr. Panyaa Boonlertan
Calibration Department Manager

Remarks:

¹ Nozzle 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 056 67

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The Cup anemometer, Unit Under Calibration (UUC) was reverse 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 43 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 ports on 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 at 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 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 _{std} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V _{std} (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
1.602	23.96	23.20	3.0	0.0	0.31
4.228	27.26	23.20	4.0	-0.2	0.31
4.94	23.04	23.20	5.0	0.0	0.31
5.96	22.90	23.20	6.0	0.1	0.31
7.02	22.74	23.20	7.2	0.1	0.31
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	0.36
13.93	22.68	23.20	13.1	0.1	0.40
15.94	22.90	23.20	14.0	0.0	0.44
15.00	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 circumstances and environmental conditions during which calibration took place.

² Velocity of standard.

³ Velocity of Unit Under Calibration.

PHOTO OF CALIBRATION SET-UP



Calibration set-up of the Cup anemometer calibration in the wind tunnel of Jirarattee Associates Co., Ltd. The Cup anemometer shown may differ from the calibration set-up. Remarks: The proportion of the set-up is not true to scale, it is for illustrating only.

End of Certificate of Calibration



Jirarattee Associates Co., Ltd.
63/14-15, 63/15, 63/16,
Rachaburi 3, 7/1, 62, 63, 64, 65, 66, 67, 68,
Pattana (Sukhvit) Road,
T1 - 10500 (M12)
Bangkok 10500 (M12)
E-mail: jirarattee@jirarattee.com
Web site: www.jirarattee.com

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

Air speed measurement laboratory
Calibration services department.



Certificate Number
CWS 057 67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS RECEIVED
CUSTOMER

Cup anemometer
: Novalyne
: Sensor: WS-02F
: Data logger: 200-WS-251B
: Sensor: WSD-AS374
: Data logger: AS374
: RFG_F50412
: Used item
: ALS laboratory group (Thailand) Co., Ltd.
: 104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,
: Khwaeng Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

: 18 Oct 2024
: 29 Oct 2024
: 29 Oct 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 : 1010.1 ± 10 hPa

PLACE OF CALIBRATION

: Fillet type wind tunnel of Jirarattee Associates Co., Ltd.

CALIBRATION CONDITIONS

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

Preconditioning
Measurement Condition

: 24 hours at ambient conditions.
: The average values during measurement are (22.9) °C, (42.4) %RH and (1004.2) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

☒ Mr. Sorawit Thachalud
☐ Miss Jiraporn Lertsompiet



Approved signature

Mr. Panyaa Boonlertan
Calibration Department Manager

Remarks:

¹ Nozzle 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 029-67

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The Cup anemometer, Unit Under Calibration (UUC) was exercised at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer 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 probe on 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 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_{std} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V_{uuc} (m/s)	Error (m/s)	$U/(V \pm 2)$ (m/s)
1.015	23.50	23.90	0.8	-0.2	0.33
2.042	24.28	23.90	1.8	-0.2	0.33
3.007	23.30	23.90	2.9	-0.1	0.33
4.108	23.34	23.90	3.8	-0.3	0.33
4.58	23.36	23.90	5.0	0.0	0.33
5.55	23.50	23.90	6.0	0.1	0.33
7.02	23.14	23.50	7.1	0.3	0.33
7.96	23.30	23.90	8.0	0.1	0.33
8.98	23.26	23.90	9.1	0.3	0.33
9.96	23.16	23.50	10.1	0.1	0.33
10.95	23.50	23.90	11.1	0.1	0.33
12.02	23.30	23.50	12.2	0.1	0.33
12.94	23.50	23.80	13.2	0.2	0.33
14.08	23.38	23.90	14.2	0.1	0.33
15.02	23.60	23.90	15.2	0.2	0.33
15.55	23.50	23.90	16.5	0.3	0.33

Remark:

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

² Velocity of standard.

Velocity of Unit Under Calibration.

PHOTO OF CALIBRATION SET-UP



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



Certificate Number
CWD-029-67

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 (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.

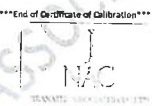
Air speed m/s	D'_{cw} Degree (°)	D'_{ccw} Degree (°)	Error Degree (°)	$U/(V \pm 2)$ Degree (°)
5.01	45.000	41	-4	0.80
	90.000	87	-3	0.80
	135.000	134	-1	0.80
	180.000	182	2	0.80
	225.000	230	5	0.80
	270.000	275	5	0.80
	315.000	320	5	0.80
	360.000	359	-1	0.80

Remark:

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

² Direction of standard.

³ Direction of Unit Under Calibration.



Jiranatee Associates Co., Ltd.
41-44/51, Srinthorn Road,
Bangkok 10700, Thailand
Tel: +66 2433 8331
Fax: +66 2433 8331
E-mail: info@jiranatee.com
Website: www.jiranatee.com

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

Wind direction measurement laboratory
Calibration services department



Certificate Number
CWD 029-67

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

Wind Direction Sensor

Manufacturer

Sensor: WS-02

Data logger: WS-23DL

Sensor: WS-04485

Data logger: A4483

SKK_F50341

Used Item

ALS laboratory group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Road, Khwaeng Suan Luang,

Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

18 Aug 2024

20 Aug 2024

20 Aug 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature

Relative Humidity

Atmospheric Pressure

23.0 ± 1.0 °C

55.0 ± 15.0 %RH

1010 ± 10 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITION

Wind tunnel cross-section area

Wind direction frontal area²

Diameter of mounting pipe³

Blockage ratio of test object⁴

900

129

-

0.143

cm²

cm²

mm

[-]

Preconditioning

Measurement Condition

24 hours at ambient conditions

17 average values during measurement are (23.7) °C, (45.7) %RH and (1007.7) hPa

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

(1) Mr. Sorawit Thirachud

(2) Miss Jiraporn Petchurui



Approved signatory:

Mr. Narin Boonchareon
Calibration Department Manager

Remark:

¹ Validity: measurement area of the wind tunnel.

² Projected cross-section area of the test object including mounting pipe

³ Diameter of mounting pipe

⁴ Page 2 of 2

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

SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

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

SITHIPORN
ASSOCIATES



Cert. No.: ACC24037

Pages: 1 of 3

Calibration Certificate

Equipment:

Manufacturer:

Model:

Serial No.:

ID No.:

SOUND CALIBRATOR

RION

NC-74

34178123

RYG_F50215

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:

Pressure:

Relative Humidity:

(23.0 ± 3)

(101.3 ± 3)

(50.0 ± 20)

°C

kPa

%

Received Date:

Calibration Date:

Date of Issue:

09 AUGUST 2024

23 AUGUST 2024

26 AUGUST 2024

Calibrated by:

Nathakorn Pisutpaian

Approved by:

T. Petchurui
(Thanakul Petchurui)

REVIEW BY	Nathakorn P
APPROVED BY	T. Petchurui
NEXT CAL DATE	09/08/25

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

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

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

SITHIPORN
associates



Cert. No. : ACC24037
Job No. : VC67AC0140
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	3351 JB	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL_BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL_BP 20/0267	15-FEB-25
Digital Multimeter	33461A	MY60024273	EEL_BP 23/0267	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
Audio Analyzer	AVR-3360A	V744B6069	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 at :

3.1 National Institute of Metrology (Thailand).

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

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

451-451/1 Sinitorn Road, Bangbunru, Bangkok, 10700 Thailand
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associates



Cert. No. : ACC24037
Job No. : VC67AC0140
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	94.06	0.06	0.45	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Acceptance limit (%)
1000	1001.4	0.1	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Acceptance limit (%)
2.02	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. Petchur

T. Petchur

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

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



Cert. No. : ACL23320
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00597167 / 179118 / 87525
ID No. : RYG_FS0437

Condition As Found : GOOD

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

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

Received Date : 11 OCTOBER 2023
Calibration Date : 19-20 OCTOBER 2023
Date of Issue : 24 OCTOBER 2023

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur
(Thanakul Petchurai)

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

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL23320
Job No. : VC67AC0011
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

3.1 National Institute of Metrology (Thailand).

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

T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL23320
Job No. : VC67AC0011
Pages : 3 of 8

Summary of Measurement Result :

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

Note : Pass/Fail evaluation for each parameter,
will be considered together from the acceptance limit and the Maximum-permitted uncertainty of measurement.

Continuation of Calibration Certificate

Cert. No. : ACL23320
Job No. : VC67AC0011
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.6

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

Frequency Weighting	Measured value (dB)
A - weight	11.2
C - weight	17.5
Flat	23.1

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	1.3	1.4	1.4	±5.0

QF-TS12-04-04-020664

T. Pethu

QF-TS12-04-04-020664

T. Pethu

Continuation of Calibration Certificate

Cert. No. : ACL23320
Job No. : VC67AC0011
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

Continuation of Calibration Certificate

Cert. No. : ACL23320
Job No. : VC67AC0011
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	63.9	-0.1	± 1.1
59.0	59.0	0.0	± 1.1
54.0	53.9	-0.1	± 1.1
49.0	48.9	-0.1	± 1.1
44.0	43.9	-0.1	± 1.1
39.0	38.9	-0.1	± 1.1
34.0	34.0	0.0	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

QF-TS12-04-04-020664

T. Pethu

QF-TS12-04-04-020664

T. Pethu

Continuation of Calibration Certificate

Cert. No. : ACL23320
Job No. : VC67AC0011
Pages : 7 of 8

8. Level linearity including the level range control

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

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.1	0.1	±3.0
One	136.4	136.1	-0.3	±3.0

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

QF-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23320
Job No. : VC67AC0011
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.6	0.1	±1.5

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-04-020664

T. Petch



ROTA METER CALIBRATION RESULT JULY 2024

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0577	01 Jul 24	$Y = 1.0001x + 0.0433$	1.0000
BKK_FS0584	01 Jul 24	$Y = 1.0056x - 2.7974$	1.0000
BKK_FS0585	02 Jul 24	$Y = 1.0315x + 3.0033$	0.9998
BKK_FS0587	02 Jul 24	$Y = 1.0294x + 0.71$	1.0000
BKK_FS0588	01 Jul 24	$Y = 0.9751x + 9.8452$	0.9999
BKK_FS0591	01 Jul 24	$Y = 1.0035x - 8.2303$	1.0000
BKK_FS0592	02 Jul 24	$Y = 1.002x + 14.273$	1.0000
BKK_FS0594	02 Jul 24	$Y = 1.0003x + 7.0095$	1.0000
BKK_FS0595	01 Jul 24	$Y = 1.0871x - 114.97$	0.9985
BKK_FS1004	02 Jul 24	$Y = 0.9826x + 13.51$	0.9999
BKK_FS1005	02 Jul 24	$Y = 1.0217x - 0.5833$	0.9997
BKK_FS1006	02 Jul 24	$Y = 1.149x - 1.0422$	0.9981
BKK_FS1007	02 Jul 24	$Y = 1.1116x + 3.3558$	0.9994
BKK_FS1008	02 Jul 24	$Y = 1.1273x + 0.4837$	0.9999
BKK_FS1009	01 Jul 24	$Y = 1.1044x - 0.8245$	1.0000
BKK_FS1017	02 Jul 24	$Y = 1.0488x + 2.2027$	0.9998
BKK_FS1018	02 Jul 24	$Y = 1.0173x - 0.1967$	0.9999
BKK_FS1019	02 Jul 24	$Y = 1.0022x + 5.619$	1.0000
BKK_FS1026	01 Jul 24	$Y = 1.072x - 2.4954$	1.0000
BKK_FS1027	01 Jul 24	$Y = 1.0104x - 4.4788$	0.9999
BKK_FS1028	01 Jul 24	$Y = 1.0009x - 3.7755$	1.0000
BKK_FS1029	01 Jul 24	$Y = 1.1118x - 4.4431$	0.9965
BKK_FS1030	01 Jul 24	$Y = 1.0159x - 6.395$	1.0000
BKK_FS1031	01 Jul 24	$Y = 0.9973x - 5.3371$	0.9999
BKK_FS1039	02 Jul 24	$Y = 0.9992x + 9.6833$	0.9992
BKK_FS1040	01 Jul 24	$Y = 1.0034x - 2.5343$	1.0000
BKK_FS1041	02 Jul 24	$Y = 1.0511x + 1.1272$	0.9996
BKK_FS1042	02 Jul 24	$Y = 1.0016x + 10.387$	0.9995
BKK_FS1043	01 Jul 24	$Y = 0.9965x + 9.3743$	1.0000
BKK_FS1044	02 Jul 24	$Y = 1.1237x - 0.4231$	0.9981
BKK_FS1200	01 Jul 24	$Y = 1.0337x - 0.1016$	0.9994
BKK_FS1201	01 Jul 24	$Y = 0.9671x + 5.0931$	0.9986
BKK_FS1202	01 Jul 24	$Y = 0.7978x + 301.39$	0.9334
PHK_FS0027	02 Jul 24	$Y = 1.0722x + 3.4395$	0.9988
PHK_FS0028	02 Jul 24	$Y = 1.0254x + 1.04$	1.0000
PHK_FS0029	02 Jul 24	$Y = 0.999x + 12.73$	1.0000
RYG_FS0197	01 Jul 24	$Y = 1.0045x + 10.291$	1.0000
RYG_FS0198	01 Jul 24	$Y = 1.0056x + 1.8883$	1.0000
RYG_FS0199	02 Jul 24	$Y = 1.0029x + 3.2381$	0.9990



ROTA METER CALIBRATION RESULT JULY 2024

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
RYG_FS0654	02 Jul 24	$Y = 1.0421x + 1.4935$	1.0000
RYG_FS0655	02 Jul 24	$Y = 0.975x + 15.2$	0.9994
RYG_FS0656	01 Jul 24	$Y = 1.0042x + 7.1067$	0.9999
RYG_FS0657	02 Jul 24	$Y = 1.0337x + 1.8918$	0.9998
RYG_FS0658	02 Jul 24	$Y = 0.9921x + 10.87$	0.9996
RYG_FS0659	01 Jul 24	$Y = 1.0022x + 8.4152$	1.0000
SGK_FS0135	02 Jul 24	$Y = 1.0193x + 3.6833$	0.9999
SGK_FS0136	02 Jul 24	$Y = 1.0217x + 1.63$	1.0000
SGK_FS0138	02 Jul 24	$Y = 1.055x + 4.5833$	0.9999
SGK_FS0139	02 Jul 24	$Y = 1.0154x + 3.74$	0.9998
SGK_FS0140	02 Jul 24	$Y = 1.0008x + 13.353$	1.0000
SGK_FS0141	02 Jul 24	$Y = 1.1185x + 1.4867$	0.9998
SGK_FS0142	02 Jul 24	$Y = 1.0211x + 1.39$	1.0000
SGK_FS0143	02 Jul 24	$Y = 1.0045x + 5.6981$	1.0000

Review By : Wichan Choonharat
(Mr. Wichan Choonharat)
Enviro Field Services Manager

Approved By : (Signature)
(Mr. Sarayuth Jitranont)
Assistant General Manager



SARTORIUS

Certificate of Calibration

REVIEW BY: *Thamill*
APPROVED BY: *[Signature]*
NEXT CAL. DATE: 08/10/2025

Model Number: MSE125P-100-DU
Description: Semi-micro Balance
Serial Number: 0033108993
ID No.: RYG_EN0004
Manufacturer: Sartorius
Certificate No.: 24BCI0071
Issued Date: Friday, February 23, 2024
Reference No.: 228196
Page No.: 1 of 3

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

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

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

Metrological data:
Capacity: 60.120 g Readability: 0.00001/0.0001 g
Ambients Conditions:
Temperature: 24.0 °C ± 5.0 °C
Humidity: 60.0 % RH ± 10.0 % RH
Pressure: ±

Reasons for calibration:
☐ New Installation ☐ Service / Repair ☒ Re-calibration/ Maintenance
Equipment Condition: ☒ Good Operate ☐ Fair

Measurement Method UKAS Publication Ref :Lab 14
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came from list of Sartorius Metrological Specifications.

Traceability:

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

This certificate relate and apply this equipment only.
This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division
Sartorius (Thailand) Co., Ltd.

Mr.Chonchai Inthana(Technical Manager)



SOP FM 33 03 February 2022

SARTORIUS

Certificate of Calibration

Model Number: MSE125P-100-DU
Description: Semi-micro Balance
Serial Number: 0033108993
ID No.: RYG_EN0004
Manufacturer: Sartorius
Certificate No.: 24BCI0071
Issued Date: Friday, February 23, 2024
Reference No.: 228196
Page No.: 2 of 3

Calibration Results : Without Adjustment

Repeatability	Eccentricity (Off-center loading error)												
<p>The reproducibility is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.</p> <p>Nominal Value : (Low Load) 5 g Tolerance 0.000015 g</p> <p>Nominal Value : (High Load) 50 g Tolerance 0.000015 g</p> <p>Standard Deviation 0.000008 0.000005</p>	<p>The off-center loading error is yielded by the difference between the reading of the load, 1 g, 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76).</p> <p>Nominal value : 50 g Tolerance 0.00015 g</p> <p>Difference</p> <table><tr><td>1</td><td>-</td></tr><tr><td>2</td><td>-0.00001</td></tr><tr><td>3</td><td>0.00000</td></tr><tr><td>4</td><td>0.00001</td></tr><tr><td>5</td><td>0.00001</td></tr><tr><td>6</td><td>-</td></tr></table>	1	-	2	-0.00001	3	0.00000	4	0.00001	5	0.00001	6	-
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.

Tolerance 0.00004 g

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	0.000089
40	40.00005	40.00003	-0.00002	0.000089
50	50.00002	50.00001	-0.00001	0.000089

SOP FM 33 03 February 2022

SARTORIUS

Certificate of Calibration

REVIEW BY: *Thamill*
APPROVED BY: *[Signature]*
NEXT CAL. DATE: 08/10/2025

Model Number: MSE125P-100-DU
Description: Semi-micro Balance
Serial Number: 0033108993
ID No.: RYG_EN0004
Manufacturer: Sartorius
Certificate No.: 24BCI0071
Issued Date: Friday, February 23, 2024
Reference No.: 228196
Page No.: 3 of 3

Calibration Results : Without Adjustment

Repeatability	Eccentricity (Off-center loading error)												
<p>The reproducibility is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.</p> <p>Nominal Value : (Low Load) g Tolerance 0.000015 g</p> <p>Nominal Value : (High Load) 100 g Tolerance 0.000015 g</p> <p>Standard Deviation 0.00003</p>	<p>The off-center loading error is yielded by the difference between the reading of the load, 1 g, 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76).</p> <p>Nominal value : 50 g Tolerance 0.00015 g</p> <p>Difference</p> <table><tr><td>1</td><td>-</td></tr><tr><td>2</td><td>-</td></tr><tr><td>3</td><td>-</td></tr><tr><td>4</td><td>-</td></tr><tr><td>5</td><td>-</td></tr><tr><td>6</td><td>-</td></tr></table>	1	-	2	-	3	-	4	-	5	-	6	-
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.

Tolerance 0.0001 g

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	0.00016
85	85.0001	85.0001	0.0000	0.00018
90	90.0001	90.0001	0.0000	0.00017
95	95.0001	95.0001	0.0000	0.00019
100	100.0000	100.0000	0.0000	0.00024
110	110.0000	110.0000	0.0000	0.00026
120	120.0000	120.0000	0.0000	0.00026

End of Report.

SOP FM 33 03 February 2022

SITHIPORN ASSOCIATES



Cert. No.: ACC24008
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-75
Serial No.: 35002736
ID No.: RYG_RS0496

Condition As Found : GOOD

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

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

Received Date : 19 JANUARY 2024
Calibration Date : 26 JANUARY 2024
Date of Issue : 29 JANUARY 2024

Calibrated by : Nithakorn Pisutpaisan

Approved by : *[Signature]*
(Thanakorn Petchurui)

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

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

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

SITHIPORN
associates



Cert. No. : ACC24008
Job No. : VC67AC0058
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-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL_BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL_BP 30/0267	13-FEB-24
Digital Multimeter	33461A	MY60024273	EEL_BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24
Audio Analyzer	AVR-3360A	V744B6069	EF-0012-23	10-FEB-24

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

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

3.1 National Institute of Metrology (Thailand).

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

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

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

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Cert. No. : ACC24008
Job No. : VC67AC0058
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	93.98	-0.02	0.14	0.40

2. Frequency

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

3. Total distortion

Measured value (%)	Uncertainty (%)	Acceptance limit (%)
0.83	0.10	3.0

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

End of Calibration Certificate

T. Petchurai

T. Petchurai

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

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

SITHIPORN
associates



Cert. No. : ACL24091
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00233184 / 144837 / 23232
ID No.: RYG_FS0025

Condition As Found : GOOD

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

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

Received Date : 19 JANUARY 2024
Calibration Date : 25-26 JANUARY 2024
Date of Issue : 29 JANUARY 2024

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchurai
(Thanakul Petchurai)

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

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

451-451/1 Srinthorn Road, Bangbunru, Bangkok, 10700 Thailand
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SITHIPORN
associates



Cert. No. : ACL24091
Job No. : VC67AC0058
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

3.1 National Institute of Metrology (Thailand).

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

T. Petchurai

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

7. Pethu

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.6

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

Frequency Weighting	Measured value (dB)
A - weight	10.8
C - weight	17.3
Flat	23.0

3. Acoustical signal tests of frequency weightings

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

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

7. Pethu

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

7. Pethu

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	132.9	-0.1	± 1.1
132.0	131.9	-0.1	± 1.1
131.0	130.9	-0.1	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
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

7. Pethu

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Job No. : VC67AC0058
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.1	0.1	±1.1

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	135.6	-0.8	±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

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Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.6	0.0	±1.5

12. High level stability

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

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

End of Calibration Certificate

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Cert. No. : ACL24076
Pages : 1 of 8

Calibration Certificate

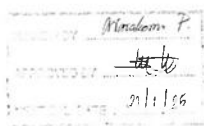
Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier N11-24
Serial No.: 00734221 / 157777 / 22653
ID No.: RYG_FS0027

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 : 11 JANUARY 2024
Calibration Date : 22-24 JANUARY 2024
Date of Issue : 24 JANUARY 2024



Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur
(Thanakul Petchurui)

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Cert. No. : ACL24076
Job No. : VC67AC0054
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

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

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Cert. No. : ACL24076
Job No. : VC67AC0054
Pages : 3 of 8

Summary of Measurement Result :

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

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Cert. No. : ACL24076
Job No. : VC67AC0054
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.4

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

Frequency Weighting	Measured value (dB)
A - weight	12.6
C - weight	18.9
Flat	24.7

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	-0.5	-0.4	-0.4	± 5.0

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Job No. : VC67AC0054
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

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Cert. No. : ACL24076
Job No. : VC67AC0054
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	137.1	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	109.0	0.0	± 1.1
104.0	104.1	0.1	± 1.1
99.0	99.1	0.1	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

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Cert. No. : ACL24076
Job No. : VC67AC0054
Pages : 7 of 8

8. Level linearity including the level range control

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

9. Tone burst response

Time Weighing	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	116.9	-0.1	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.8	-0.2	1.5 ; -5.0
	2	8	108.0	107.9	-0.1	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

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

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

T. Petchur

Cert. No. : ACL24076
Job No. : VC67AC0054
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle	0.0	±1.5
89.6	89.6		

12. High level stability

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

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

End of Calibration Certificate

T. Petchur

Cert. No. : ACL24283
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No. : 00472127 / 169440 / 72461
ID No. : RYG_PS0302

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 : 04 SEPTEMBER 2024
Calibration Date : 19 SEPTEMBER 2024
Date of Issue : 20 SEPTEMBER 2024

Calibrated by : Nattakorn Pisutpavan

Approved by :

T. Petchur
(Thanakul Petchurai)

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Cert. No. : ACL24283
Job No. : VC67AC0148
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	ET-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	ET-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	33461A	MY60024273	EEL-BP 22/0267	15-FEB-25
Programmable Attenuator	MA7-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAJ	34560495	AA-3001-24	05-FEB-25

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

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

3.1 National Institute of Metrology (Thailand).

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

T. Petchur

Summary of Measurement Result :

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

T. Petch

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
17.5

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

Frequency Weighting	Weighting (dB)
A - weight	12.0
C - weight	18.2
Flat	24.1

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.1	0.2	0.2	± 1.5
1000	-0.2	-0.2	-0.2	± 1.0
8000	-1.2	-1.1	-1.1	± 5.0

T. Petch

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.1	0.1	± 0.3

T. Petch

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.1	0.1	± 1.1
134.0	134.1	0.1	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.1	0.1	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.1	0.1	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	33.9	-0.1	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

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Job No. : VC67AC0148
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	30.0	30.0	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	116.9	-0.1	1.0 : -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	107.9	-0.1	1.5 : -5.0
	200	800	127.6	127.5	-0.1	±1.0
	0.25	1	99.0	98.8	-0.2	1.5 : -5.0
SEL	2	8	108.0	107.9	-0.1	1.0 : -2.5
	200	800	126.0	128.0	0.0	±1.0

T. Petchur

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

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

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Cert. No. : ACL24283
Job No. : VC67AC0148
Pages : 8 of 8

10. Peak C sound level

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

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle	0.0	±1.5
89.7	89.7		

12. High level stability

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

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

End of Calibration Certificate

T. Petchur

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451/451/1 Srinthorn Road, Bangbunru, Bangplut, Bangkok, 10700 Thailand
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Cert. No. : ACL24260
Pages : 1 of 8

Calibration Certificate

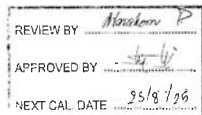
Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No. : 00472130 / 169816 / 72464
ID No. : RYG_PS0303

Condition As Found : GOOD

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

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

Received Date : 09 AUGUST 2024
Calibration Date : 23 AUGUST 2024
Date of Issue : 26 AUGUST 2024



Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur
(Thanakul Petchurai)

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

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

451/451/1 Srinthorn Road, Bangbunru, Bangplut, Bangkok, 10700 Thailand
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Cert. No. : ACL24260
Job No. : VC67AC0140
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL-BP 20/0267	15-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 as :

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

T. Petchur

Cert. No. : ACL24260
Job No. : VC67AC0140
Pages : 3 of 8

Summary of Measurement Result :

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

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Cert. No. : ACL24260
Job No. : VC67AC0140
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)
14.50000003

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

Frequency Weighting	Weighting (dB)
A - weight	7.8
C - weight	14.8
Flat	20.5

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	1.3	1.4	1.4	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	-4.1	-4.0	-4.0	± 5.0

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Job No. : VC67AC0140
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

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Cert. No. : ACL24260
Job No. : VC67AC0140
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	135.9	-0.1	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	132.9	-0.1	± 1.1
132.0	131.9	-0.1	± 1.1
131.0	130.9	-0.1	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.1	0.1	± 1.1
27.0	27.1	0.1	± 1.1
26.0	26.1	0.1	± 1.1
25.0	25.0	0.0	± 1.1

T. Petch.

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Job No. : VC67AC0140
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.1	0.1	±1.1

9. Tone burst response

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

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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	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	±0.3

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

End of Calibration Certificate

T. Petch...

T. Petch...



J NAC
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Accredited calibration laboratory
ISO/IEC 17025:2017
NSC-TSI-TIS 17025
CALIBRATION 0367
Temperature measurement laboratory
Calibration services department



NSC-TSI-TIS 17025
CALIBRATION 0367



JIRANATEE ASSOCIATES CO., LTD.

Continuation of Certificate of Calibration Number COT-021-67

Page 2 of 2 Pages

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 - 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 18021465.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.038	20.0	0.0	0.099
80	25.047	25.0	0.0	0.099
80	30.042	30.0	0.0	0.099
80	35.037	35.0	0.0	0.099
80	40.031	40.0	-0.1	0.14

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276 2 S/N: 20008280.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.038	20.0	0.0	0.099
110	25.047	25.0	0.0	0.14
110	30.042	30.1	0.1	0.099
110	35.037	35.1	0.1	0.099
110	40.031	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207 2 S/N: 18021262.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.038	20.1	0.0	0.14
75	25.047	24.9	-0.1	0.099
75	30.042	29.8	-0.2	0.099
75	35.037	34.8	-0.2	0.099
75	40.031	39.7	-0.3	0.099

UUC*: Unit Under Calibration

Remark: The reported uncertainty of measurement is 0.14, based on standard uncertainty multiplied by a coverage factor $k=2$ providing a level of confidence of approximately 95%.

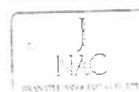
End of Certificate of Calibration

Calibrated by:
☒ Mr. Sorawit Thachalad
☒ Miss Jittaporn Lertsomphol
☒ Miss Ruangrumpai Phoommit



Approved signatory

Mr. Parinya Booncharoen
Calibration Department Manager



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-022-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 18018316
ID NUMBER : RYG_FS0360
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 11 Jan 2024
MEASUREMENT DATE : 15 Jan 2024
ISSUE DATE : 17 Jan 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

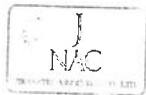
Calibration procedure:
The temperature calibration was done by In-House calibration method at WH-CL-001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale use was based on ITS-90.

Traceability:
The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT). Certificate number: TT-0038-23, Certificate number: ER-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 AS500, Serial No: 667682-09, Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTH-1000-A MK II, Serial No: 671407-00591 Due date: 14 Sep 2024

Uncertainty of Measurement:
The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM Evaluation of measurement data. Guide to the expression of uncertainty in measurement.

Calibrated by:
☐ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol
☐ Miss Ruangrumpal Pitoommit



Approved signatory:
Mr. Panyia Booncharoen
Calibration Department Manager

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Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 – 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 18021471.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.060	20.0	-0.1	0.099
80	25.051	25.0	-0.1	0.099
80	30.041	30.0	0.0	0.099
80	35.035	35.0	0.0	0.099
80	40.024	40.0	0.0	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP9276.2 S/N: 18020502.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.060	20.1	0.0	0.099
110	25.051	25.1	0.0	0.099
110	30.041	30.1	0.1	0.099
110	35.036	35.1	0.1	0.099
110	40.025	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 18021266.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.060	20.1	0.0	0.099
75	25.051	25.0	-0.1	0.099
75	30.041	29.8	-0.2	0.099
75	35.036	34.7	-0.3	0.099
75	40.025	39.6	-0.4	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-028-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 20032240
ID NUMBER : RYG_FS0520
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 : 24 Jan 2024
MEASUREMENT DATE : 25 Jan 2024
ISSUE DATE : 30 Jan 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

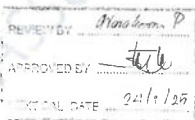
The table on next page give the measured values.

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

Traceability:
The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT). Certificate number: TT-0038-23, Certificate number: ER-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 AS500, Serial No: 667682-09, Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTH-1000-A MK II, Serial No: 671407-00591 Due date: 14 Sep 2024

Uncertainty of Measurement:
The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM Evaluation of measurement data. Guide to the expression of uncertainty in measurement.



Calibrated by:
☐ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol
☐ Miss Ruangrumpal Pitoommit



Approved signatory:
Mr. Panyia Booncharoen
Calibration Department Manager

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Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 – 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 21001213.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.054	20.1	0.0	0.099
80	25.054	25.2	0.1	0.099
80	30.046	30.2	0.2	0.099
80	35.043	35.2	0.2	0.099
80	40.033	40.2	0.2	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP9276.2 S/N: 21001245.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.054	20.1	0.0	0.099
110	25.055	25.1	0.0	0.099
110	30.046	30.1	0.1	0.099
110	35.043	35.1	0.1	0.099
110	40.033	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 21001285.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.053	20.1	0.0	0.16
75	25.055	25.0	-0.1	0.099
75	30.046	30.0	0.0	0.099
75	35.043	35.0	0.0	0.099
75	40.033	39.9	-0.1	0.099

UUC*: Unit Under Calibration

Remark: The reported uncertainty of measurement is 0.16, based on standard uncertainty multiplied by a coverage factor $k=2$ 21 providing a level of confidence of approximately 95%.

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-029-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 20032241
ID NUMBER : RYG_F50521
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS Laboratory group (Thailand) Co., Ltd.
104 Phatthananon 40, Phatthananon Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 24 Jan 2024
MEASUREMENT DATE : 25 Jan 2024
ISSUE DATE : 30 Jan 2024

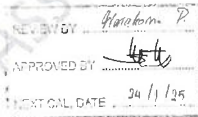
ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.



Approved signatory:

Mr. Pannipon Booncharoen
Calibration Department Manager

Calibrated by:
☐ Mr. Somchai Thachalad
☐ Miss Jitraporn Lertsonphol
☒ Miss Ruangrumpal Phoommit

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

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

Traceability:
The measurement results are traceable to the
international system of units (SI) through
National Institute of Metrology Thailand (NIMT)
Certificate number: TT-0038-23, Certificate
number: LR-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 AS00, Serial No.: 67682-09,
Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTI-1000 A MK II, Serial No.: 671407-
00591 Due date: 14 Sep 2024

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 21001217.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.052	20.1	0.0	0.099
80	25.054	25.1	0.0	0.099
80	30.047	30.1	0.1	0.099
80	35.041	35.1	0.1	0.099
80	40.035	40.1	0.1	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 21001242.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.052	20.0	-0.1	0.099
110	25.055	25.0	-0.1	0.099
110	30.047	30.0	0.0	0.099
110	35.041	35.0	0.0	0.099
110	40.035	40.0	0.0	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 21001783.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.052	20.3	0.0	0.099
75	25.054	25.3	0.0	0.099
75	30.047	30.0	0.0	0.099
75	35.041	34.9	-0.1	0.099
75	40.035	39.8	0.2	0.099

UUC*: Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-030-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 20032242
ID NUMBER : RYG_F50522
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS Laboratory group (Thailand) Co., Ltd.
104 Phatthananon 40, Phatthananon Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 24 Jan 2024
MEASUREMENT DATE : 25 Jan 2024
ISSUE DATE : 30 Jan 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.



Approved signatory:

Mr. Pannipon Booncharoen
Calibration Department Manager

Calibrated by:
☐ Mr. Somchai Thachalad
☐ Miss Jitraporn Lertsonphol
☒ Miss Ruangrumpal Phoommit

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

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

Traceability:
The measurement results are traceable to the
international system of units (SI) through
National Institute of Metrology Thailand (NIMT)
Certificate number: TT-0038-23, Certificate
number: LR-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 AS00, Serial No.: 667682-09,
Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTI-1000 A MK II, Serial No.: 671407-
00591 Due date: 14 Sep 2024

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 21001206.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.055	20.0	-0.1	0.099
80	25.051	25.0	-0.1	0.099
80	30.040	30.1	0.1	0.099
80	35.032	35.1	0.1	0.099
80	40.023	40.1	0.1	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 21001250.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.055	20.0	-0.1	0.099
110	25.051	25.1	0.0	0.099
110	30.040	30.1	0.1	0.099
110	35.032	35.1	0.1	0.099
110	40.023	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 21001796.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.055	20.3	0.0	0.099
75	25.051	25.0	-0.1	0.099
75	30.040	30.0	0.0	0.099
75	35.032	34.9	-0.1	0.099
75	40.023	39.8	-0.2	0.099

UUC*: Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-031-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta DHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 20032243
ID NUMBER : RYG_F50523
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phatthanasukan 40, Phatthanasukan Rd.,
Khuang Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand

RECEIVED DATE : 24 Jan 2024
MEASUREMENT DATE : 26 Jan 2024
ISSUE DATE : 30 Jan 2024

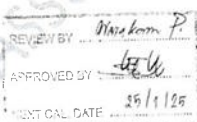
ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.



Approved signatory: Mr. Parinya Booncharoen
Calibration Department Manager

Calibration procedure:
The temperature calibration was done by
in-house calibration method as VIM-CL-001
according to comparison method with standard
digital temperature indicator and standard
temperature probe. The temperature scale use
was based on ITS-90

Traceability:
The measurement results are traceable to the
international system of units (SI) through
National Institute of Metrology Thailand (NIMT)
Certificate number: TT-0038-23, Certificate
number: EA-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 ASD0, Serial No.: 667682-09,
Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTI-1000-A MK II, Serial No.: 671407,
00591 Due date: 14 Sep 2024

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 - 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 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	-0.1	0.16
80	25.047	25.0	0.0	0.099
80	30.041	30.0	0.0	0.099
80	35.032	35.0	0.0	0.099
80	40.023	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	25.047	25.1	0.1	0.099
110	30.040	30.1	0.1	0.099
110	35.033	35.0	0.0	0.099
110	40.023	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	25.047	25.0	0.0	0.099
75	30.040	30.0	0.0	0.099
75	35.033	34.9	-0.1	0.099
75	40.023	39.9	-0.1	0.099

UUC*: Unit Under Calibration

Remark: The reported uncertainty of measurement is 0.16, based on standard uncertainty multiplied by a coverage factor k=2.21
providing a level of confidence of approximately 95%

End of Certificate of Calibration



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

CERTIFICATE OF CALIBRATION

Certificate No. : CDT-054-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta DHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 15006713
ID NUMBER : RYG_F50218
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phatthanasukan 40, Phatthanasukan Rd.,
Khuang Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand

RECEIVED DATE : 12 Feb 2024
MEASUREMENT DATE : 15 Feb 2024
ISSUE DATE : 20 Feb 2024

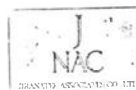
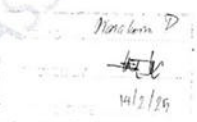
ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.



Approved signatory: Mr. Parinya Booncharoen
Calibration Department Manager

Calibration procedure:
The temperature calibration was done by
in-house calibration method as VIM-CL-001
according to comparison method with standard
digital temperature indicator and standard
temperature probe. The temperature scale use
was based on ITS-90

Traceability:
The measurement results are traceable to the
international system of units (SI) through
National Institute of Metrology Thailand (NIMT)
Certificate number: TT-0038-23, Certificate
number: EA-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 ASD0, Serial No.: 667682-09,
Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTI-1000-A MK II, Serial No.: 671407,
00591 Due date: 14 Sep 2024

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 - 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 22035270.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.054	20.1	0.0	0.064
80	25.053	25.1	0.0	0.099
80	30.043	30.1	0.1	0.099
80	35.033	35.1	0.1	0.099
80	40.018	40.1	0.1	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276 2 S/N: 22035462.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.054	20.1	0.0	0.099
110	25.053	25.1	0.1	0.16
110	30.043	30.2	0.2	0.099
110	35.033	35.2	0.2	0.099
110	40.018	40.2	0.2	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015499.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.054	20.3	0.2	0.099
75	25.053	25.2	0.1	0.099
75	30.043	30.0	0.0	0.099
75	35.033	35.0	0.0	0.099
75	40.019	39.8	-0.2	0.099

UUC*: Unit Under Calibration

Remark: The reported uncertainty of measurement is 0.16, based on standard uncertainty multiplied by a coverage factor k=2.21
providing a level of confidence of approximately 95%

End of Certificate of Calibration



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

CERTIFICATE OF CALIBRATION

Certificate No. : CDT-055-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 15006714
ID NUMBER : RYG_F50219
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 12 Feb 2024
MEASUREMENT DATE : 15 Feb 2024
ISSUE DATE : 20 Feb 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values

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

Traceability:
The measurement results are traceable to the
international system of units (SI) through
National Institute of Metrology Thailand (NIMT)
Certificate number: TT-0028-23, Certificate
number: ER-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 AS00, Serial No.: 667682-09,
Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTI-1000 A MK II, Serial No.: 671407-
00591 Due date: 14 Sep 2024

Uncertainty of Measurement:
The reported uncertainty of measurement is
based on the standard uncertainty multiplied by a
coverage factor $k=2$, which for a normal
distribution corresponds to a coverage
probability of approximately 95%. The standard
uncertainty has been determined in accordance
with the GUM Evaluation of measurement data
Guide to the expression of uncertainty in
measurement

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 - 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 22035263.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.063	20.4	0.3	0.099
80	25.054	25.4	0.3	0.099
80	30.040	30.4	0.4	0.099
80	35.026	35.4	0.4	0.099
80	40.018	40.4	0.4	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 17023217.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.064	20.3	0.2	0.099
110	25.054	25.3	0.2	0.099
110	30.040	30.3	0.3	0.099
110	35.027	35.3	0.3	0.099
110	40.018	40.3	0.3	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015491.
Dimension: Diameter 3.3 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.064	20.5	0.4	0.099
75	25.054	25.4	0.3	0.099
75	30.041	30.4	0.4	0.099
75	35.026	35.3	0.3	0.099
75	40.018	40.2	0.2	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration

Calibrated by:
☐ Mr. Saravit Thachalad
☐ Miss Jittaporn Lertsomphol
☒ Miss Ruangsri Phoommit



Approved signatory: Mr. Parinya Booncharoen
Calibration Department Manager

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

CERTIFICATE OF CALIBRATION

Certificate No. : CDT-056-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 15006720
ID NUMBER : RYG_F50224
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 : 12 Feb 2024
MEASUREMENT DATE : 16 Feb 2024
ISSUE DATE : 20 Feb 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values

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

Traceability:
The measurement results are traceable to the
international system of units (SI) through
National Institute of Metrology Thailand (NIMT)
Certificate number: TT-0028-23, Certificate
number: ER-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 AS00, Serial No.: 667682-09,
Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTI-1000 A MK II, Serial No.: 671407-
00591 Due date: 14 Sep 2024

Uncertainty of Measurement:
The reported uncertainty of measurement is
based on the standard uncertainty multiplied by a
coverage factor $k=2$, which for a normal
distribution corresponds to a coverage
probability of approximately 95%. The standard
uncertainty has been determined in accordance
with the GUM Evaluation of measurement data
Guide to the expression of uncertainty in
measurement

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 - 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 15015854.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.054	19.7	-0.4	0.099
80	25.054	24.7	-0.4	0.099
80	30.041	29.7	-0.3	0.099
80	35.032	34.7	-0.3	0.099
80	40.020	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	20.054	20.1	0.0	0.099
110	25.055	25.1	0.0	0.099
110	30.041	30.1	0.1	0.099
110	35.032	35.1	0.1	0.099
110	40.020	40.2	0.2	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015498.
Dimension: Diameter 3.3 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.054	20.3	0.2	0.099
75	25.054	25.2	0.1	0.099
75	30.041	30.1	0.1	0.099
75	35.032	35.0	0.0	0.099
75	40.019	39.9	-0.1	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration

Calibrated by:
☐ Mr. Saravit Thachalad
☐ Miss Jittaporn Lertsomphol
☒ Miss Ruangsri Phoommit



Approved signatory: Mr. Parinya Booncharoen
Calibration Department Manager

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

CERTIFICATE OF CALIBRATION

Certificate No. : CDT-057-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 15006726
ID NUMBER : RVG_F50225
CONDITION AS-RECEIVED : Used Item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khuang Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 12 Feb 2024
MEASUREMENT DATE : 16 Feb 2024
ISSUE DATE : 20 Feb 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibration procedure:
The temperature calibration was done by in-house calibration method as per WH-CL-001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale use was based on ITS-90.

Traceability:
The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT) Certificate number: TT-0036-23, Certificate number: ER-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 A500, Serial No.: 667682 09,
Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTI-1000 A MK II, Serial No.: 671407
00591 Due date: 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. Sorawit Thachalad
☐ Miss J. Jiraporn Lertsamchol
☒ Miss Ruangrumpai Phoommit



Approved signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

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

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 – 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 15015841.
Dimension: Diameter 3.3 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.054	20.0	-0.1	0.099
80	25.055	25.0	-0.1	0.099
80	30.041	30.0	0.0	0.099
80	35.032	35.0	0.0	0.099
80	40.018	40.0	0.0	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276 2 S/N: 20008282.
Dimension: Diameter 3.3 mm, Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.054	20.0	-0.1	0.099
110	25.055	25.1	0.0	0.099
110	30.041	30.1	0.1	0.099
110	35.032	35.1	0.1	0.099
110	40.018	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015494.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.054	20.2	0.1	0.099
75	25.054	25.0	-0.1	0.099
75	30.041	29.9	-0.1	0.099
75	35.032	34.8	-0.2	0.099
75	40.018	39.7	-0.3	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-058-67

Page 1 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 15020736
ID NUMBER : RVG_F50232
CONDITION AS-RECEIVED : Used Item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khuang Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 12 Feb 2024
MEASUREMENT DATE : 16 Feb 2024
ISSUE DATE : 20 Feb 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibration procedure:
The temperature calibration was done by in-house calibration method as per WH-CL-001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale use was based on ITS-90.

Traceability:
The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT) Certificate number: TT-0036-23, Certificate number: ER-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 A500, Serial No.: 667682 09,
Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTI-1000 A MK II, Serial No.: 671407
00591 Due date: 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. Sorawit Thachalad
☐ Miss J. Jiraporn Lertsamchol
☒ Miss Ruangrumpai Phoommit



Approved signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

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Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 – 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 15027737.
Dimension: Diameter 3.3 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.064	20.2	0.1	0.099
80	25.053	25.1	0.0	0.099
80	30.041	30.1	0.1	0.099
80	35.026	35.1	0.1	0.099
80	40.017	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	20.064	20.1	0.0	0.099
110	25.054	25.3	0.2	0.099
110	30.040	30.1	0.1	0.099
110	35.026	35.1	0.1	0.099
110	40.018	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	20.064	20.2	0.1	0.099
75	25.053	25.0	-0.1	0.099
75	30.040	29.9	-0.1	0.099
75	35.026	34.7	-0.3	0.099
75	40.018	39.6	-0.4	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-085-67

Page 2 of 2 Pages

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 15030244
ID NUMBER : RYG_F50236
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 : 15 May 2024
MEASUREMENT DATE : 17 May 2024
ISSUE DATE : 21 May 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 in 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 Thailand (NIMT).
Certificate number: TT 004724. Certificate
number: ER-0103.23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: S15 100 AS00, Serial No.: 07582 09,
Due date: 26 Mar 2025
2. Digital Temperature Indicator
Model: DTI 1000 A MK II, Serial No.: 671407,
Due date: 24 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
in order to the expression of uncertainty in
measurement.

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: 20030506
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.056	20.1	0.0	0.099
80	25.047	25.1	0.1	0.099
80	30.042	30.1	0.1	0.099
80	35.035	35.1	0.1	0.099
80	40.025	40.1	0.1	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3207.2 S/N: 17009684
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.058	20.0	0.1	0.099
110	25.047	25.0	0.0	0.099
110	30.042	30.0	0.0	0.099
110	35.035	35.0	0.0	0.099
110	40.025	40.0	0.1	0.16

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15033223
Dimension: Diameter 14 mm. Length 150 mm.

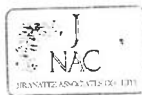
Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.059	20.1	0.0	0.099
75	25.047	25.0	0.0	0.099
75	30.043	29.8	-0.2	0.099
75	35.035	34.7	-0.3	0.099
75	40.024	39.6	-0.4	0.099

UUC* UUC: 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

Calibrated by:
☒ Mr. Sorawit Thachalad
☒ Mr. Jiraporn Lertsomphol
☒ Mr. Ruangrump Phoommit



Approved signature:

Mr. Parinya Booncharan
Calibration Department Manager



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IN WRITING FROM THE LABORATORY

BKK_EL0037

Agilent
CrossLab
From Insight to Outcome

Agilent CrossLab Start Up Services

**Agilent 5100 5110 ICP-OES
Preventive Maintenance**

REVIEW BY	Thitima B.
APPROVED BY	Sorawit Thachalad
NEXT CAL DATE	24/02/2025

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies. Agilent Preventive Maintenance provides what you need to reduce unplanned downtime and keep your systems operating at their peak performance.

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.

Agilent 5100, 5110 Preventive Maintenance Checklist

Agilent
CrossLab
From Insight to Outcome

Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.
- For customers using HF applications, the instrument should be returned to its standard sample introduction system

Important Customer Web Links

- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
 - Sample Prep and Containment
 - Chemical Standards
 - Analysis
 - Service and Support
 - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>.
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>.
- Need to place a service call? Flexible Repair Options | Agilent

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Service not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page.
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Completion section.
- Ask the customer to sign the Service Verification section including the customer's and your signature.

Instrument Maintenance

System Information

- ☒ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	83010A / M71610005
Instrument System Site and Location	ALS Laboratory Group (Thailand) Co., Ltd.

List System Component Product Numbers	List the Serial Numbers of each Component
1 64010A	FW 16010005
2 84100A	NU 1544-0764
3 3041 - 30401	2004 - 00150
4	
5	
6	
7	
8	
9	

ICP-OES Configuration Table	Circle the type or write in the type if other
Nebulizer Type	<u>Spray</u> (OneJet) (Conical) (Other)
Spray Chamber	<u>Cyclonic Single Pass</u> (Cyclonic Double Pass) (Other)
Torch	<u>Radial Dual View</u> (Other)
Torch Type	<u>One Piece</u> (Semi-Disassemblable) (Fully Disassemblable) (Other)
Injector Diameter	<u>2.4mm</u> 1.8mm 1.4mm 1.0mm 0.8mm 0.6mm
Injector Material	<u>Quartz</u> (Ceramic) (Other)

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and implementation of Service Notes.
- ☒ Check for required firmware/software updates and verify with customers if they would like them installed.
- ☒ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it.
- ☒ Ask the customer to remove any samples from the ICP-OES sample introduction area, auto sampler or around the ICP-OES.

Preventive Maintenance Procedures

Record Pre-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table - Pre-PM

Clean and inspect ICP-OES system

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window.
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to ensure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☒ Replace high capacity air inlet dust filter element if installed.
- ☒ Remove and clean instrument water inlet filter.

Agilent Water Recirculator

- ☐ Service not applicable
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir.
- ☒ Remove, clean and reinstall water inlet metal mesh filter if present.
- ☒ Re fill with Agilent Cool Clear cooling fluid.
- ☒ Clean the cooling system Air filter and the condenser.

SPS 3 Auto Sampler

- ☒ Service not applicable
- ☐ Power cycle the autosampler and verify successful initialization.
- ☐ Inspect X and Z axis belts for wear. Replace if necessary.
- ☐ Clean X and Z axis slide shafts.
- ☐ Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and rinse port, ensure that the probe is approximately centered in the vial.

SPS 4 Auto sampler

- ☐ Service not applicable
- ☒ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☒ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner.
- ☒ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☒ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☒ Pump Tubing Replacement: Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles.
- ☒ Test using customer's tray and move the sample probe to the sample vial 1, wash vial and rinse port and ensure that the probe is centered in the vial. If not use calibration wizard and calibrate the position.

AVS 4, 6, 7 Advanced Valve System

- ☒ Service not applicable
- ☐ Replace valve rotor seal.
- ☐ Check fittings for signs of leaks.
- ☐ Check tubing including autosampler tubing for kinks or excessive wear.
- ☐ Check high flow pump for signs of leaks.

ICP-OES adjustment

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.

Record Post-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above, run the following Instrument tests:
 - ☒ Subsystem Communications Test
 - ☒ Air Flow
 - ☒ Water Flow
 - ☒ Gas Flows
 - ☒ RF Generator
 - ☒ Camera Test
 - ☒ Optics Test
 - ☒ Nebulizer Test
- ☒ Record the result in the Instrument Test Results Table.

Restore Instrument

- ☒ For HF applications, ask the customer to reinstall their sample introduction system.
- ☒ Leave system in an idle state, on and purging.
- ☒ Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset Instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☒ Complete the Signature Page with both Service Engineer and Customer signatures.

Test Results

Instrument Performance Test Results Table

Note: These measurements do not form part of any specification and are for reference only.

	Pre PM Sensitivity Check		Post PM Sensitivity Check	
	Radial	Axial*	Radial	Axial*
Zn 213.457 nm SRBR	1511.2	3446.5	1500.0	3421.6
Mn 257.610 nm SRBR	1351.1	1956.4	1349.3	1959.3
Al 396.152 nm SBR	2.2	16.0	5.8	10.3
K 766.491 nm SBR	5.5	60.0	5.4	91.2

* Axial result is not applicable for G8016AA, G8012AA Radial View instruments

Instrument Test Results Table

Note: The Instrument Test results are for systems using ICP Expert version 7.3 and above only.

Instrument Test	Result
Subsystem Communications Test	PASS
Air Flow	PASS
Water Flow	PASS
Gas Flows	PASS
RF Generator	PASS
Camera Test	PASS
Optics Test	PASS
Nebulizer Test	PASS

ICP-OES Status Results Table

Note: These measurements do not form part of any specification and are for reference only.

Measurement	Steady Mode	Plasma On
Minus Voltage	215.31 V	VAC
Main Current	0.096 A	0.113 A
Instrument Temperature	21.1 °C	23.2 °C
RF Air Flow (sensor speed)	14.0 Hz	23.0 Hz
Plasma Exhaust Temperature	No measurement	50.1 °C
Water Flow Oscillator	No measurement	1.20 L/min
Water Flow Detector	1.14 L/min	1.09 L/min
Water Inlet Temperature	22.3 °C	23.6 °C
Polychromator Temperature	35.0 °C	35.0 °C
CCD Temperature	-40.1 °C	-40.0 °C
Thermal Stabilizer	31.3 °C	34.4 °C
Argon Supply Pressure	614.4 kPa	551.70 kPa
Purge Gas Supply Pressure*1	610.6 kPa	554.30 kPa
Option Gas Supply Pressure*1	- kPa	- kPa
Nebulizer Flow	No measurement	0.70 L/min
Nebulizer Back Pressure	No measurement	2.16.06 kPa
Plasma Gas Flow	No measurement	11.89 L/min
Auxiliary Gas Flow	No measurement	1.00 L/min
RF Power	No measurement	1148.6 W
RF Supply Current	No measurement	5.64 A
RF Supply Voltage	No measurement	14.41 V

*1 If option installed

Consumed PM Parts

Part Description	Part Number	Product or Model# where used	Quantity consumed
Acrylic Pre-Optic Window	G8010-68014	G8010A, G8011A, G8014A/G8015A	1
Radial Pre-Optic Window	G8010-68015	All	1
Agilent Cool Clear Coolant Fluid	3799-0037	Agilent Water Regulator	1
Purge Gas Filter	G8010-60136	All	1
Air Inlet Filter	G8000-68002	All	1
High Capacity Air Filter	G8010-60189	Optional	-
Rotor seal for 5/7 port valve for AVS4/7	G8494-60302	G8494A/G8495	-
Rotor seal for 4 port valve for AVS4	G8193-60302	G8493A	-
Raise solution to raise dilution 7.5mm i.d. x 1m	G8410-82123	SPS 4	1
Bolt connector 2.5mm i.d. x 5mm i.d.	G8410-82124	SPS 4	1
PVC waste tubing 6mm o.d. x 5mm i.d. 2m	G8410-82122	SPS 4	1
Additional Parts may be required from engineer's stock			
X-axis drive belt	5410047500	SPS 3	-
Z-axis drive belt	5410047400	SPS 3	-
Peristaltic pump tubing PVC SolvaFlex 3 bridged	3710049099	SPS 4	-

Consumed Parts Reference
(Purchased by customer, not included as part of PM)

☒ Section Not Applicable

Part Description	Part Number	Product or Model# where used	Quantity consumed
------------------	-------------	------------------------------	-------------------

Signature Page

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

Service Verification

Service Request Number:

600 66 02 534

Service Engineer Name:

Nilsson, Tord Bengtsson

Service Engineer Signature:

Nilsson, T.

Total number of pages in this document:

16

Date Service Completed:

Feb 20, 2024


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

Customer Signature:

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 : ALS Laboratory Group (Thailand) Co.,Ltd.
 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
 Khet Suan Luang, Bangkok 10250
Customer Location : Acid Digestion Lab
Date of Receipt : 13 September 2023
Calibrated By : Sane Musikawan (Site Calibration Manager)
Approved By :  / Sujar Naknaked (Site Calibration Manager)
Date of Issue : 26 SEP 2023

REVIEW BY 
 APPROVED BY 
 NEXT CAL. DATE 22/03/25

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-L12 109/30-05-57

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 :

- This equipment was calibrated by insert 20 standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20.
 All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .
- Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN21-TN30	T230014	17 January 2024
TC	TYPE T	TN31-TN40	T230014	17 January 2024
DATA LOGGER	34970A	T151	T230014	17 January 2024
- 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 2 Hour 20 Minute At 95 °C
 Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available
- Adjustment :
 () without adjustment (X) after adjustment

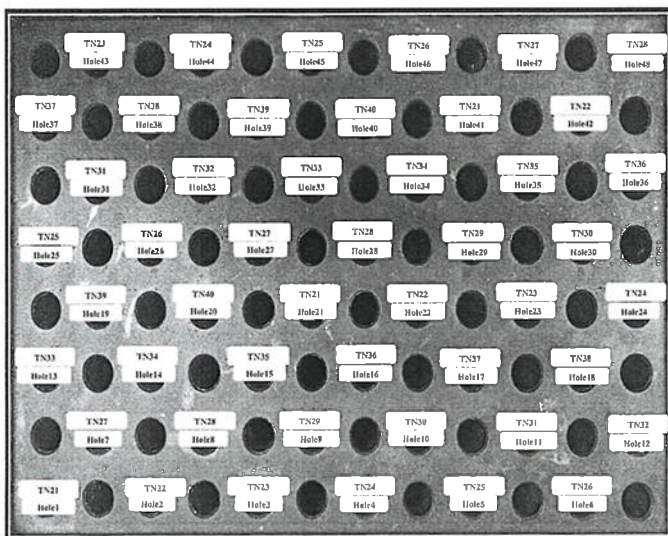
Approved By 

FM-L13 108/30-05-57

Certificate No. T231676

Page 3 of 6

Calibration Report



FRONT CONTROL

Approved By 

FM-L13 108/30-05-57

Certificate No T231676

Page 4 of 6

Calibration Report

Measurement Results							
Calibration Point		Average Standard Reading at each position (°C)					
R1 Hole1-Hole6		TN21	TN22	TN23	TN24	TN25	TN26
CAL POINT	Max	95.01	94.41	95.20	95.41	94.51	95.17
95	Min	94.57	93.95	94.75	94.92	94.00	94.72
	Average	94.79	94.18	94.98	95.17	94.26	94.95
R2 Hole7-Hole12		TN27	TN28	TN29	TN30	TN31	TN32
	Max	95.26	95.45	95.19	95.16	95.35	94.97
	Min	94.94	94.95	94.72	94.71	94.90	94.57
	Average	95.15	95.19	94.96	94.94	95.13	94.77
R3 Hole13-Hole18		TN33	TN34	TN35	TN36	TN37	TN38
	Max	95.37	95.50	95.22	95.21	95.33	95.31
	Min	94.99	95.09	94.78	94.82	94.88	94.96
	Average	95.18	95.30	95.00	95.02	95.11	95.13
R4 Hole19-Hole24		TN39	TN40	TN21	TN22	TN23	TN24
	Max	95.59	94.42	94.52	94.24	94.63	94.67
	Min	95.21	94.06	94.13	93.88	94.28	94.27
	Average	95.40	94.24	94.33	94.06	94.45	94.47
R5 Hole25-Hole30		TN25	TN26	TN27	TN28	TN29	TN30
	Max	95.19	95.38	92.93	95.30	95.14	95.03
	Min	94.83	95.03	92.56	94.95	94.79	94.70
	Average	95.01	95.20	92.75	95.12	94.96	94.87
R6 Hole31-Hole36		TN31	TN32	TN33	TN34	TN35	TN36
	Max	94.63	94.90	94.77	94.31	94.24	93.87
	Min	94.24	94.55	94.44	93.98	93.92	93.56
	Average	94.43	94.72	94.60	94.14	94.08	93.71
R7 Hole37-Hole42		TN37	TN38	TN39	TN40	TN21	TN22
	Max	94.30	94.44	94.04	93.81	94.89	95.35
	Min	93.95	94.05	93.67	93.48	94.39	94.90
	Average	94.13	94.24	93.86	93.65	94.64	95.12
R8 Hole43-Hole48		TN23	TN24	TN25	TN26	TN27	TN28
	Max	95.99	95.63	95.28	95.29	95.45	94.87
	Min	95.57	95.15	94.82	94.84	94.99	94.48
	Average	95.78	95.39	95.05	95.07	95.22	94.68

Approved By 

FM-L13 108/30-05-57

Calibration Report

Measurement Results		Average Standard Reading at each position (°C)					
Calibration Point		TN21	TN22	TN23	TN24	TN25	TN26
R1 Hole1-Hole6	Max	105.23	104.32	105.43	105.25	104.44	105.27
	Min	104.94	103.95	105.15	105.04	104.11	104.96
	Average	105.09	104.13	105.29	105.15	104.28	105.12
R2 Hole7-Hole12	Max	105.30	105.12	105.18	105.22	105.12	105.16
	Min	105.11	104.92	104.96	105.00	104.92	104.97
	Average	105.20	105.02	105.07	105.11	105.02	105.06
R3 Hole13-Hole18	Max	105.37	105.63	105.02	104.80	104.69	105.19
	Min	105.17	105.37	104.75	104.59	104.50	105.00
	Average	105.27	105.50	104.88	104.69	104.60	105.09
R4 Hole19-Hole24	Max	105.31	104.43	106.41	104.71	105.63	105.82
	Min	105.08	104.22	106.15	104.41	105.37	105.56
	Average	105.19	104.33	106.28	104.56	105.50	105.69
R5 Hole25-Hole30	Max	104.95	106.26	103.34	105.78	105.59	105.87
	Min	104.67	105.96	103.08	105.56	105.36	105.68
	Average	104.81	106.11	103.21	105.67	105.48	105.77
R6 Hole31-Hole36	Max	104.75	104.86	104.80	105.20	104.50	104.39
	Min	104.54	104.63	104.59	105.00	104.32	104.18
	Average	104.65	104.75	104.69	105.10	104.41	104.28
R7 Hole37-Hole42	Max	104.30	104.90	104.85	104.65	104.88	104.85
	Min	104.09	104.72	104.66	104.49	104.63	104.52
	Average	104.19	104.81	104.75	104.57	104.76	104.68
R8 Hole43-Hole48	Max	105.71	105.85	105.39	105.61	105.42	105.19
	Min	105.45	105.61	105.14	105.27	105.18	104.94
	Average	105.58	105.73	105.27	105.44	105.30	105.07

Approved By:

FM-L13 108-30-05-57

Calibration Report

Measurement Results:

HEATING BLOCK			Temperature Distribution	
Setting (°C)	Reading (°C)		Stability (±°C)	Uncertainty (±°C)
	Min, Max	Average		
100.0	100.3, 100.5	100.4	0.26	0.81
107.0	107.0, 107.1	107.1	0.19	0.78

* The quoted uncertainty exclude " uniformity "

The calibration result apply only the above calibrated item


The result of test was found accurate as shown on date and place of test only.

 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor *k* which for a t-distribution, providing a level of confidence of approximately 95 %.

Approved By:

FM-L13 108-30-05-57

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.

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 WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986).
 All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN161-TN170	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-TIS-TIS 17025 CALIBRATION 0244).

4. Condition of calibrated item : good

Equipment Description :

Time Constant : 1 Hour 30 Minute At 3 °C
 Fresh Air Damper : ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

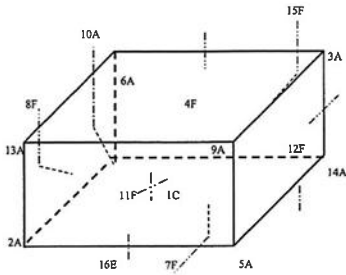
5. Adjustment :

(X) without adjustment () after adjustment

Approved By:



Calibration Report



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

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								
	3.33	3.39	3.15	3.43						

Setting (°C)	Reading (°C)		Temperature Distribution				Coverage Factor k
	Min, Max	Average	Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	
3.0	2.8, 4.1	3.5	3.36	1.10	2.00	1.90	2.09

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

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484

Certificate of Calibration

Cert.No.: 24CH621
Page.: 1 of 2

Equipment : pH Meier
Manufacturer : Mettler Toledo
Model : Seven2Go S2
Serial No. : C023488819
ID No. : RYG_FS0477
Condition As-Received: Used Item
Received Date : 29 May 2024
Calibration Date : 30 May 2024
Reference : 2405-0993DSC-1
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
(Rayong Branch)
616/10 Moo 5, T.Meenam Khu,
A.Pluakaeng, Rayong 21140, Thailand

Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In-house method :
- CP-CH5 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)

Calibrated by : Warakorn Lemgagrakul

Approved by :

() Unnopphol Harachai
() Ponpan Paipim
(✓) Sathip Meangmai

Issue Date : 31 May 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.Cer.No.: 24CH621
Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	23E2802	27 Aug 2024

This certification is traceable to the International System of Unit maintained through:-

- Technology Promotion Association (Thailand-Japan)

2. Certified Reference Materials

The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	970851	25 Apr 2026
pH 6.986	CPA chem	970852	25 Apr 2025
pH 9.997	CPA chem	970853	25 Apr 2025

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

Calibration Results

Function : mV Measurement

Performing standard curve by Document Process Calibrator at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement	Coverage factor
	pH	mV	mV	pH	(±mV)	k
pH Meter S/N.: C023488819	4.000	177.48	177	4.000	0.577	2.00
	7.000	0.00	0	7.000	0.577	2.00
	10.000	-177.48	-177	10.000	0.577	2.00

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor k
pH Electrode S/N.: 3190903	4.008	4.01	165	0.008	2.00
	6.986	6.99	-9	0.010	2.00
	9.997	10.00	-184	0.009	2.00


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

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Certificate of Calibration

Cert.No.: 24LM81
Page.: 1 of 2

Equipment : pH Meter with Sensor
Manufacturer : Mettler Toledo
Model : SevenGo S2
Serial No. : C023488819
ID No. : RYG_FS0477
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
(Rayong Branch)
616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng,
Rayong 21140, Thailand
Location : TPA Chemisby Calibration Laboratory
Received Order : 30 May 2024
Calibrated Date : 30 May 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Preecha Hahib
Approved by : 
Approved Signatory
() Ponpan Palpim
() Suwit Imjai
(✓) Kunchit Promprat
Issue Date : 7 June 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 : 2405-0993DSC-2
Procedure Used :-

Cert.No.: 24LM81
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	A52847	2311222	TPA	10 Oct 2024

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certificate 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: 3293238

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
25.0	100	25.006	25.0	-0.006	0.16	2.00
30.0	100	30.001	30.1	0.099	0.16	2.00
40.0	100	40.005	40.1	0.095	0.16	2.00
50.0	100	50.007	50.1	0.093	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 %.

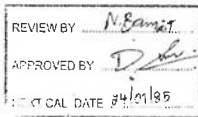
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Cert.No.: 23TW168
Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102796
ID No. : RYG_EN0032
Received Date : 21 July 2023
Test Date : 24 July 2023
Reference : 2307-0713DSC-1
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
Rayong Branch
616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng,
Rayong 21140, Thailand
Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In - house method : CP-CH9
by Comparison Technique with Azide Modification Method
Tested by : Walalak Sirilhean
Approved by : 
Approved Signatory
() Malee Bulkruea
(✓) Sathip Meangmai
() Warakorn Lerngagtrekul
Issue Date : 26 July 2023



Cert.No.: 23TW168
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1) Burette	-	130BU10	23CG1172	22 Mar 2025
2) Balance	1126143764	140RC004	22MM50	20 Sep 2023

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No. : 15E100464

Titration Method (Azide Modification Method) (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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Cert. No.: 23LM125
Page: 1 of 2

Certificate of Calibration

Equipment : DO Meter with Sensor
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102796
ID No. : RYG_EN0032
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
Rayong Branch
616/10 Moo 5 T. Maenam Khu, A. Pluakdaeng
Rayong 21140 Thailand
Location : TPA On Site Calibration Laboratory
Received Order : 25 July 2023
Calibrated Date : 27 July 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Preecha Hlahib
Approved by :
() Pornhippa Tameyakul
() Malee Butkruea
(✓) Suwit Imjai
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.

A 0053616



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 (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	221285	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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Cert. No.: 24TM1663
Page: 1 of 3

Certificate of Calibration

Equipment : Low Temp. Incubator
Manufacturer : Memmert
Model : IPP750
Serial No. : V818.0084
ID No. : RYG_EN0154
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. Rayong Branch
616/10 Moo 5, T. Maenam Khu, A. 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 :
() Ponpan Paipim
() Suwit Imjai
(✓) Kunchit Promprat

Issue Date : 07 November 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 : 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.

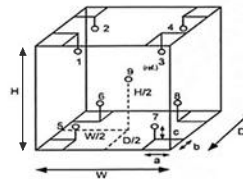
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	24	25
REL.Humid. (%)	55	53
AC Supply (Volt)	220	221



Probe Installation Details :

a = 10 cm
b = 10 cm
c = 10 cm

Dimension of Chamber :

D = 0.60 m
W = 1.0 m
H = 1.2 m
Capacity = 0.72 m³

Position :	Ref. Std. ID No.:
1	1RTD-2/1
2	1RTD-2/2
3	22-01RTD-03
4	1RTD-2/4
5	1RTD-2/5
6	1RTD-2/6
7	23-01RTD-07
8	1RTD-2/8
9 (ref.)	23-01RTD-09



Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2411-002OC-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
20.0	20.0	20.0	0.026	0.26	0.53	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	Position									
	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 %.

-000-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL 0-2717-3000-29 FAX 0-2719-9484



Certificate of Calibration

Cert.No.: 24CG3711
Page: 1 of 2

Equipment :	Burette
Capacity :	50 mL
Serial No. :	-
ID. No. :	RYG_EN0216
Manufacturer :	Witeg
Made in :	Germany
Submitted by :	ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch 616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng Rayong 21140, Thailand
Ambient Temperature :	(20 ± 2.5) °C
Relative Humidity :	(50 ± 10) %
Barometric Pressure :	756 mmHg
Calibration Procedure :	ASTM E 542 - 01
Calibrated by :	Sa-ngeunkam Wongsu
Approved by :	 Approved Signatory
(√) Srisuda Khamtha () Porpan Palpim () Unnopphol Harachai	
Issue Date :	24 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 : 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 certification is traceable to SI Unit

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

3. True value is converted to true volume at the standard temperature of 20 °C

Calibration result :

Nominal capacity (mL)	Reading (mL)	Uncertainty (± mL)	k Factor
10	10.0259	0.0082	2.00
20	20.0214	0.0085	2.00
30	30.0006	0.0089	2.00
40	40.0003	0.0094	2.00
50	49.9988	0.011	2.00

Remark mL = cm³

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

-000-

Sartorius (Thailand) Co., Ltd.

129 Rama 9 Road, Huaywang, Huaywang, Bangkok 10010
Tel +66 2943 0361-8, e-mail: service.thailand@sartorius.com



SARTORIUS

Certificate of Calibration

REVIEW BY	Mr. Hall
APPROVED BY	
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. : 24BC0059
Issued Date : Friday, February 23, 2024
Reference No. : 229198
Page No. : 1 of 2

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

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

Calibrated By : Mr.Chonchai Inthana

Calibration Date : Thursday, February 22, 2024

Calibration Procedure No. : This calibration was conducted by using in-house calibration procedure number (WI-003)

Based on UKAS LAB 14 : 2019

Metrological data : Capacity : 220 g Readability : 0.0001 g

Ambients Conditions : Temperature : 24.2 °C ± 5.0 °C

Humidity : 57.0 % RH ± 10.0 % RH

Pressure : ±

Reasons for calibration : ☐ New Installation ☐ Service / Repair ☒ Re-calibration/ Maintenance ☐ Good Operate ☐ Fail

Measurement Method UKAS Publication Ref :Lab 14

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

Traceability:

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

This certificate relate and apply this equipment only.

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Sartorius (Thailand) Co., Ltd.

SOP FM 33 03 February 2022

Mr.Chonchai Inthana(Technical Manager)




Certificate of Calibration

Model Number : MSE224S-100-DU
Description : Analytical Balance
Serial Number : 0028207038
ID No. : RYG_EN0002
Manufacturer : Sartorius

Certificate No. : 24BCI0059
Issued Date : Friday, February 23, 2024
Reference No. : 229196
Page No. : 2 of 2

Calibration Results : Without Adjustment

Repeatability		
The reproducibility is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.		
Nominal Value : (Low Load)	20.0000	199.9999
20 g	20.0000	200.0000
Tolerance	20.0001	200.0000
0.0001 g	20.0000	199.9999
	20.0001	200.0000
Nominal Value : (High Load)	19.9999	200.0000
200 g	20.0000	200.0000
Tolerance	20.0000	199.9999
0.0001 g	19.9999	200.0001
	19.9999	200.0000
Standard Deviation	0.00007	0.00006

Eccentricity (Off-center loading error)			
The off-center loading error is yielded by the difference between the radius of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76).			
Nominal value :	100	g	
Tolerance	0.0004	g	
		Difference	
		1	-
		2	-0.0001
		3	-0.0001
		4	0.0000
		5	-0.0001
		6	-

Linearity				
The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.				
Tolerance	0.0002	g		
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
0.01	0.0100	0.0100	0.0000	0.00018
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



Certificate of Calibration


Cert. No. : 24TM632
Page : 1 of 3

Equipment : Hot Air Oven
Manufacturer : Memmert
Model : UFE 500
Serial No. : G511.1572
ID No. : RYG_EN0010

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

Received Order : 21 March 2024
Calibration Date : 21 March 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %

Calibrated by : Man Pattanasongpalboon

Approved by : 
Approved Signatory

() Pornthippa Tameyakul
() Unnopphol Harachai
(x) Suwit Imjai

Issue Date : 22 March 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2403-0563OC-1
Cert. No. : 24TM632
Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

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

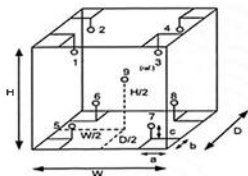
3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



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

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
Cert. No. : 24TM632
Page : 3 of 3

Result of Calibration :-

Function of UUC* : (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (°C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
104.0	104.0	104.0	0.051	0.59	0.62	2
180.0	180.0	180.0	0.15	1.3	1.7	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (±°C)
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	103.921	103.786	103.757	103.759	103.950	103.817	104.213	103.672	103.673	0.42
180.0	179.614	179.270	179.145	179.599	180.001	180.423	180.293	180.629	179.429	1.1

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location, which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

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

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Certificate of Calibration

Cert. No.: 24TM634
Page : 1 of 3

Equipment : Hot Air Oven
Manufacturer : Memmert
Model : UF 110
Serial No. : B423,0853
ID No. : RYG_EN0213
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5 T. Maenam Khu,
A. Pluakdaeng,
Rayong 21140 Thailand
Location : Oven Room
Received Order : 21 March 2024
Calibration Date : 21 - 22 March 2024
Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$
Calibrated by : Man Pattanapongpalboon
Approved by :
() Pornthipha Tameyakul
() Unnopphol Harachai
(x) Suwit Imjai
Issue Date : 23 March 2024

REVIEW BY
APPROVED BY
NEXT CAL DATE 21/03/25



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2403-0563OC-3
Procedure Used :-

Cert. No.: 24TM634
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.

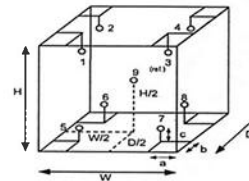
3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :-

Function of UUC* : (*) Without Adjustment
Temperature Source
Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	27	27
REL.Humid. (%)	59	59
AC Supply (Volt)	224	223



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

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

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2403-0563OC-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 24TM634
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
104.0	104.0	104.0	0.065	0.52	0.90	2
180.0	180.0	180.0	0.20	1.2	2.0	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	104.169	103.506	103.898	103.712	103.772	103.730	104.289	103.805	103.798	0.42
180.0	180.701	179.238	179.935	179.999	180.127	180.138	180.895	179.313	180.211	1.1

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

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Certificate of Calibration

Cert. No.: 24TM635
Page : 1 of 3

Equipment : Water Bath
Manufacturer : Memmert
Model : WNB22
Serial No. : L513.0648
ID No. : RYG_EN0061
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5, T. Maenam Khu,
A. Pluakdaeng,
Rayong 21140, Thailand
Location : Wet Chemistry Lab
Received Order : 21 March 2024
Calibration Date : 21 March 2024
Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$
Calibrated by : Man Pattanapongpalboon
Approved by :
() Pornthipha Tameyakul
() Unnopphol Harachai
(x) Suwit Imjai
Issue Date : 23 March 2024

REVIEW BY
APPROVED BY
NEXT CAL DATE 21/09/25

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

Cert. No.: 24TM635
Page : 2 of 3

Procedure Used :-

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 certificate is traceable to the International System of Unit.

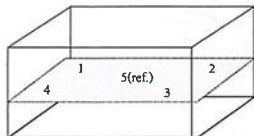
Remark : TPA : Technology Promotion Association (Thailand - Japan)

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	0.18

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
85.0	0.19	0.11	2

Average* : The average of 30 values in each position.

Uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

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

-00-

BKK_EL0026



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Email : ccc@agilent.com
Website : www.agilent.com/thai

Service Confirmation Number: 6905338201
Service Confirmation Date: 12.12.2023

Customer Contact:

AG Laboratory Group (Thailand) Co.
Ltd.
Head Office
104 Phatthanakan 40 Phatthanakan Rd
Bangkok Phatthanakan Road Station
TAX ID : 016554003850
Chanatjan Imchom@aglab.com
2780385

Invoice To:

AG Laboratory Group (Thailand) Co.
Ltd.
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104 Phatthanakan 40 Phatthanakan Rd
Bangkok Phatthanakan Road Station

Delivery Site:

AG Laboratory Group (Thailand) Co.
Ltd.
Head Office
104 Phatthanakan 40 Phatthanakan Rd
Bangkok Phatthanakan Road Station

Location:

Room
Bldg
Lab
Dept

SERVICE REPORT

Customer Purchase Order Number: 70371013
Customer Number: 70371013
Service Request: Service Request Date:
Service Order: 6060041283 Service Confirmation: 6905338201

REVIEW BY: Suphan P.
APPROVED BY: Suphan P.
NEXT CAL. DATE: 12/06/2025

Direct Inquiries to:
Contact Name: Ccc@agilent.com
Contact E-mail: ccc@agilent.com
Contact Telephone: +662 572 5263
Contact Fax: +662 572 4334

Service Instrument:

Model Number	Model Description	Serial Number	System Handle	Parent Asset
SYS-IM-7700-E	ICPMS 7700 System Enhanced		ICP MS 7700 (HPLC)	
G1316A	1260 Thermostatted Column Compartment	DEACN12300	ICP MS 7700 (HPLC)	SYS-IM-7700-E
G1329B	1260 Standard Autosampler	DEAAC11088	ICP MS 7700 (HPLC)	SYS-IM-7700-E
G1311B	1260 Quaternary Pump	DEAB704380	ICP MS 7700 (HPLC)	SYS-IM-7700-E
G3281A	Agilent 7700x ICP-MS	JP12081612	ICP MS 7700 (HPLC)	SYS-IM-7700-E

Service Items:

Item	Service/Part #	Description	Qty	Entitlement	Service Start	Service End
1000	EQO	Enterprise Operational Qualification	1.00	Agreement Entitlement - 100 % covered	12.12.2023	12.12.2023
1010	5185-5850	ICP-MS Checkout Solutions	1.00	Agreement Entitlement - 100 % covered		

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Products | Applications | Software | Services

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Tel ID : 016554003850

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5th Floor 4th Road Sukhumvit Road
Bangkok 10560 Thailand
Tel ID : 016554003850
Customer & Service Branch
110/110/110 Bldg. 20th Floor A/D
5th Floor 4th Road Sukhumvit Road
Bangkok 10560 Thailand
Tel ID : 016554003850



Service Information:

Problem Description: WU-DG-IM/HPLC-7700-6001143313		
Service Provided: Perform OQ Hardware control test CSD Ingon, Autosample, ISIS, Auto tune, BG and Stability. After done the instrument BKK_EL0028 calibrated pass all.		
Service Overview Code: Reason Code: Scheduled Service Diagnosis Code: Scheduled Service Resolution Code: Scheduled Service		
Reported Hours: 6.0	Travel Hours: 1.0	
Customer Field Service Representative Name: Panthep Kurosathala	Customer Field Service Representative Signature: 	Date: 12 Dec 2023
Customer Name: Supakwan Mak	Customer Signature: 	Date: 12 Dec 2023
Additional Comments:		

Certificate of Calibration

Cert.No.: 23CH1088
Page: 1 of 2

Equipment :	Conductivity Meter
Manufacturer :	Mettler Toledo
Model :	S230
Serial No. :	B241407147
ID No. :	RYG_EN0029
Condition As-Received:	Used Item
Received Date :	01 September 2023
Calibration Date :	04 September 2023
Reference :	2309-0010DSC-7
Submitted by :	ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch 618/10 Moo 5, T.Maenam Khu, A.Pluakdaeng, Rayong 21140, Thailand
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(50 ± 15) %
Calibration Procedure:	In-house method : - CP-CH6 : based on direct measurement by using certified reference material (CRM)
Calibrated by :	Warakorn Lemgagrakul
Approved by :	 Approved Signatory
(✓) Sathip Meangmai () Warakorn Lemgagrakul () Ponpan Palpin	
Issue Date :	7 September 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 & Equipment Calibration and Testing Services

A 0058059



Cert.No.: 23CH1088

Page: 2 of 2

Condition of this result of calibration

1. Reference Standard Instrument :-

Instrument	Serial No.	ID No.	Certificate No.	Due date
1) Thermometer	9549224	130RC003	231435	10 Apr 2024

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials :-

- Conductivity calibration solution, CPA chem Ltd., The measurement results are traceable to SI through CPA chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Conductivity Solution	Manufacturer	Lot No.	Exp. date
84.000 µS/cm	CPA Chem	885120	28 Mar 2024
1413.0 µS/cm	CPA Chem	913596	14 July 2024
12.880 mS/cm	CPA Chem	885123	28 Mar 2024

- Control Conductivity calibration solution temperature by Water bath (25±0.1) °C

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

Calibration results

Function : Conductivity Measurement

(*) After Adjustment at 1413.0 µS/cm

Conductivity Electrode Serial No.: 5823251000

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement (±)	Coverage factor k
84.000 µS/cm	83.8 µS/cm	85.3 µS/cm	0.62 µS/cm	2.00
1413.0 µS/cm	1388 µS/cm	1413 µS/cm	9.2 µS/cm	2.00
12.880 mS/cm	12.41 mS/cm	12.63 mS/cm	0.086 mS/cm	2.00

Remark : - UUC* = Unit Under Calibration

- Cell constant = 0.545371 cm⁻¹

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

-000-

ภาคผนวก จ

สำเนาหนังสือใบอนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

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

40 Manganese...

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

น้ำดื่ม...

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

18 Bis(2-ethylhexyl)phthalate...

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

36 Chrysene...

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

56 1,3-Dichloropropene...

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

76 γ-HCH...

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

94 N-Nitrosodiphenylamine...

ลำดับที่	สารเคมี	วิธีการตรวจ
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
95	N-Nitrosodi-n-Propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB 1242 - PCB 1248 - PCB 1254 - PCB 1260	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
98	pH	Electrometric Method ⁽⁴⁾
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
100	Phenol	1) Distillation, Chloroform Extraction Method ⁽⁴⁾ 2) Distillation, Direct Photometric Method ⁽⁴⁾ 3) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
102	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
103	Silver	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
104	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
105	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
106	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
107	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
108	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
109	TPH (C ₈ -C ₁₆)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾

110 TPH (C₈-C₁₆)...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
110	TPH (C ₈ -C ₁₆)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,22)
111	TPH (C ₁₆ -C ₃₃)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,22)
112	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
113	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
114	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
115	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
118	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
119	Vanadium	1) Digestion, Inductively Coupled Plasma Method ⁽²⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁴⁾
120	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
121	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
122	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
123	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
124	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
125	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
126	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁴⁾

อากาศเสีย...

อากาศเสีย (ปล่องระบาย) จำนวน 28 รายการ

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

15 Lead...

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

27 Vanadium...

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

สิ่งปกคลุมหรือวัสดุที่ไม่ใช่ตัว จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,16) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,16) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,16) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)

5 Beryllium...

ลำดับที่	สารเคมี	วิธีการวิเคราะห์
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^(1,19) 2) Alkaline Digestion, Colorimetric Method ^(1,19)
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,16) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,16) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,24)

2) Soxhlet

ลำดับที่	สารพิษ	วิธีการบำบัด
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1,6,20) 2) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^(1,6,20) 3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽²⁰⁾ 4) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽²⁰⁾ 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ⁽²¹⁾
23	Methoxychlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction Gas Chromatographic/Mass Spectrometric Method ^(1,9,28) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,128)
24	Mirex	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction Gas Chromatographic/Mass Spectrometric Method ^(1,9,28) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,128)
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
27	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,24) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,24) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(1,124)

- 2-ChlorobiphenylL

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	- 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5-Trichlorobiphenyl - 2,4',5-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,2',3,4',6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5',6-Heptachlorobiphenyl - 2,2',3,4',5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24) Electrometric Method ^(23,24) 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
29	pH	
30	Selenium	

31 Silver...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
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 ^(7,14) 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 ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)

ดิน...

ดิน จำนวน 125 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
2	Acetone	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(15,23) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ⁽¹³⁾
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
4	Anthracene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
8	Barium	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
9	Benz(a)anthracene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(15,23)

11 Benzo(b)fluoranthene

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
11	Benzo(b)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
12	Benzo(k)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
13	Benzoic acid	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
14	Benzo(a)pyrene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
15	Benzo(g,h,i)perylene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
17	Bis(2-chloroethyl)ether	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
18	Bis(2-ethylhexyl)phthalate	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(15,23)
20	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(15,23)
21	Butanol	Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(13,23)
22	Butyl Benzyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,24) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,24)

23 Cadmium...

ลำดับที่	สารเคมี	วิธีการตรวจ
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
24	Carbazole	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
28	p-Chloroaniline	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
32	2-Chlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7,8,16,19) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7,8,17,19)
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^(8,19)

36 Chrysene...

ลำดับที่	สารเคมี	วิธีการตรวจ
36	Chrysene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
37	Cyanide	Extraction, Distillation, Colorimetric Method ^(22,28,29)
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
39	DDD	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
40	DDE	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
41	DDT	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
42	Dibenz(a,h)anthracene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
43	Di-n-Butyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
47	3,3-Dichlorobenzidine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)

49 1,2-Dichloroethane...

ลำดับที่	สารเคมี	วิธีการตรวจ
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
53	2,4-Dichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
58	Diethyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
59	2,4-Dimethylphenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
60	2,4-Dinitrophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
61	2,4-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
62	2,6-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)

63 Di-n-Octyl Phthalate...

ลำดับที่	สารเคมี	วิธีการตรวจ
63	Di-n-Octyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
67	Fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
68	Fluorene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
70	Heptachlor epoxide	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,24)
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23)
73	n-Hexane	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,23) 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ⁽¹³⁾

73 n-Hexane...

ลำดับที่	สารเคมี	วิธีการวิเคราะห์
74	α -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
75	β -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
76	γ -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
77	Hexachlorocyclopentadiene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
78	Hexachloroethane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
79	Indeno(1,2,3-cd)pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
80	Isophorone	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
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 ⁽²⁸⁾ 2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry ⁽²¹⁾ 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽²⁰⁾

84 Methanol...

ลำดับที่	สารเคมี	วิธีการวิเคราะห์
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25) 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
88	2-methylphenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
89	2-Methylnaphthalene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
91	Naphthalene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
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 ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
94	N-Nitrosodiphenylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
95	N-Nitrosodi-n-propylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)

96 Polychlorinated biphenyls (PCBs)

ลำดับที่	สารเคมี	วิธีการวิเคราะห์
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3,3',4,6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6'-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5,6'-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
97	Pentachlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
98	Phenanthrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)

99 Phenol...

ลำดับที่	สารเคมี	วิธีการวิเคราะห์
99	Phenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
100	Pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
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 ^(15,25)
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
106	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,28) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
108	TPH (C ₅ -C ₆)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
109	TPH (C ₈ -C ₁₆)	1) Automate Extraction, Gas Chromatographic Method ^(11,22) 2) Solvent Extraction, Gas Chromatographic Method ^(11,22) 3) Ultrasonic Extraction, Gas Chromatographic Method ^(22,31)
110	TPH (C ₁₆ -C ₃₅)	1) Automate Extraction, Gas Chromatographic Method ^(11,22) 2) Solvent Extraction, Gas Chromatographic Method ^(11,22) 3) Ultrasonic Extraction, Gas Chromatographic Method ^(22,31)
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)

115 2,4,5-Trichlorophenol...

3/11/21

5. United States...

- 3/1/19

20. United States...

- ବାଉଁ -

07. *Sumner*



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๒ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒๕ เมษายน ๒๕๖๗

เรียน: กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กริป (ประเทศไทย) จำกัด

ลงวันที่ ๒๘ มีนาคม ๒๕๖๓

๕๓๕ เอกชน เสขพระเวียง ๓-๒๐๔

๑. ให้อุยกเลิกร้างร่ำที่ประจำห้องปฏิบัติการวิเคราะห์

๑) นางสาวพรรณิศา เนื่อง ทะเบียนเลขที่ ๖

- | | |
|--|----------------------------|
| ๑) นางสาวพรพรรณ นุ่มนง | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๐๒๕ |
| ๒) นายคำตัน สุทธิธ | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๒๑ |
| ๓) นางสาวศุภรดา ปิ่นนุมา | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๑๘ |
| ๔) ให้เกียรติเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกสาร จำนวน ๑๒ ราย | |
| ๑) นางสาวฐิติมา กลิ่นเขียว | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๑๘ |
| ๒) นางสาววิมลปฎิพัทธ์ กล้วยคำ | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๑๘ |
| ๓) นางสาวณัฐรัตน์ กิ่งทาวงศ์ | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๑๘ |
| ๔) นายคำตัน วัชร-เกษม | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๑๘ |
| ๕) นายภูษณพล ปิฎกวงษ์ | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๑๘ |
| ๖) นายเสกสรรค์ นรนาถ | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๑๘ |
| ๗) นายวัชรินทร์ ผ่องใสสวน | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๑๘ |
| ๘) นายณัฐพงศ์ โสภะ | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๑๘ |
| ๙) นายคำตันรังสี ปานทิ้ง | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๑๐ |
| ๑๐) นายณัฐพล พุฒิน | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๑๓ |
| ๑๑) นายอนัน สุภาพานธุ์ | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๑๒ |
| ๑๒) นายบรรณ แก้วพวงง่า | ทะเบียนเลขที่ ๖-๒๐๕-๖-๐๑๑๓ |

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และกระบวนการผลิต กอวิจัยและเดือนกุมภาพันธ์โรงงาน กรมโรงงานอุตสาหกรรม โทร. ๐ ๒๔๓๐ ๒๖๖๒ ต่อ ๒๔๓๐๔๕

อนึ่ง หนังสือฉบับนี้จะสามตามาพร้อมกับหนังสือต่ออายุวีซ่าและใบอนุญาตประกอบกิจการวิเคราะห์เอกชน
ในวันที่ ๒ กันยายน ๒๕๖๔

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายพรชัย กออ่อนทอง)
นายกเทศมนตรี กรุงเทพมหานคร
และกรรมการบริหารมูลนิธิ

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๐๐๓-๕
โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๐๕๕๕
ไปรษณีย์อิเล็กทรอนิกส์ sarabangdiw@mail.go.th



ที่ ๒๑ ๐๓๓๐(๑)/๑๒๓๖ ๘

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๘ ธันวาคม ๒๕๖๓

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒ ธันวาคม ๒๕๖๓

ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ
เขตสวนหลวง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ไต่ถามเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์
จำนวน ๘ ราย ได้แก่

๑) นายประจักษ์ วรรณชัย	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๒๐
๒) นายจิรณัฐ ขวละอ	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๐๓๒
๓) นายพิทักษ์ ก่ำคำ	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๑๑
๔) นางสาวอรุณ ค้ำคล้อง	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๓๔
๕) นายกิตติพงศ์ แซ่ลี	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๔๔
๖) นายจิรเมธ ประเสริฐศิริพงศ์	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๖๐
๗) นายภัทรพงษ์ มณฑาทอง	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๖๗
๘) นางสาวจารุวรรณ กระจำพันธ์	ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๑๘๑

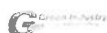
จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายธีรศักดิ์ อิศรางกูร ณ อยุธยา)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๐๐๓-๕
โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๐๕๕๕
ไปรษณีย์อิเล็กทรอนิกส์ sarabangdiw@mail.go.th

“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



-๒-

ที่ อก ๐๒๒๐/ ๗ ๕๓ ๘

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๐๔ สิงหาคม ๒๕๖๓

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์
เอกชน ลงวันที่ ๒๓ พฤษภาคม ๒๕๖๓

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด จำนวน ๓ แผ่น

ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุ
หนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๓ สถานที่ตั้งเลขที่ ๖๒๖/๑๐ หมู่ที่ ๕
ตำบลแม่ไม้ อำเภอลำปาง จังหวัดลำปาง โดยกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว รับบริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย)
จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน

๑) นายเดช ช้างชน	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๐๑
๒) นายสุวิทย์ วิจิตรพงศ์	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๐๒
๓) นายสุพรรณ สลามเตชะ	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๐๓

ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน

๑) นายณัฐพงษ์ เพ็ชรวัฒนา	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๐๔
๒) นางสาวกัญญารัตน์ จักลิ	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๐๕
๓) นางสาวจุฑารัตน์ สีทองฉาย	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๐๖
๔) นางสาวสุภาภรณ์ ประทีปสุข	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๐๗
๕) นายสุรเชษฐ์ คุญเกษม	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๐๘
๖) นายณัฐวัฒน์ ออมพรมราช	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๐๙
๗) นายจิตรกร สีระสา	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๑๐
๘) นายณัฐวัฒน์ สุวรรณรัตน์	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๑๑
๙) นายสิทธิวัฒน์ เสมาพิตร	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๑๒
๑๐) นายอนุวัฒน์ เสนา	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๑๓
๑๑) นายสุรสิทธิ์ นราพร	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๑๔
๑๒) นายณัฐพล เขียวรุ่งรงค์	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๑๕
๑๓) นายชานนท์ บุญชื่น	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๑๖
๑๔) นายณัฐวัฒน์ วงศ์อินทร์	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๑๗
๑๕) นายอานนท์ ไพโรจน์ทอง	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๑๘

๑๖) นายณัฐพล ...

๑๖) นายณัฐพล ...	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๑๙
๑๗) นายสุภาณัฐ พิสิสัยพันธ์	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๒๐
๑๘) นายสันติ คันทิ	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๒๑
๑๙) นายวิญญู นิมาลี	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๒๒
๒๐) นายสุภาณัฐ สุกตฤณศิริศักดิ์	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๒๓
๒๑) นายเอกชัย หินทอง	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๒๔
๒๒) นายพงษ์เทพ สิทธิเสนา	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๒๕
๒๓) นายพิภกร กุมารชัย	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๒๖
๒๔) นางสาวปัทมา บุญชัย	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๒๗
๒๕) นายสิทธิชัย อันพิมาย	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๒๘
๒๖) นางสาวปัทมา พลอยทอง	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๒๙
๒๗) นางสาวพจนา สีดา	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๓๐
๒๘) นางสาวอนิศา กุลศิริวงศ์	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๓๑
๒๙) นายพิทยา ทองแดง	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๓๒
๓๐) นางสาวชัชชญา สูงเกษ	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๓๓
๓๑) ว่าที่ร้อยตรี รณชัย ม่วงมา	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๓๔
๓๒) นายวรวิทย์ พับพา	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๓๕
๓๓) นายศักดิ์รินทร์ จรัสกลาย	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๓๖
๓๔) นายสุรศักดิ์ ลาชื่น	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๓๗
๓๕) นายสรากร ภาแก้ว	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๓๘
๓๖) นายสุรศักดิ์ ไร่ทอง	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๓๙
๓๗) นายวิมล ทัพไชย	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๔๐
๓๘) นางสาววนิดา หริยบุตรกุล	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๔๑
๓๙) นายธนสิทธิ์ วงศ์ไชย	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๔๒
๔๐) นายชัชชญา เลิศนันทกุลชัย	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๔๓
๔๑) นายสุภาภรณ์ เพ็ชรแสง	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๔๔
๔๒) นายณัฐวัฒน์ มณีสัมพันธ์	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๔๕
๔๓) นายสุรสิทธิ์ อธิจินดา	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๔๖
๔๔) นายสุรชัย วงศ์สุริยา	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๔๗
๔๕) นายไผ่ พันธุ์	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๔๘
๔๖) นางสาวกิตติยา สัตยกุลวิภากร	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๔๙
๔๗) นางสาวอรรณพ ศิริมงคล	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๕๐
๔๘) นายพิพัฒน์ นิพัทธ์เศรษฐ์	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๕๑
๔๙) นายศิริวิทย์ เชื้อสม	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๕๒
๕๐) นายปารเมศ สัตยกุล	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๕๓
๕๑) นายณัฐพล ธรรมะโร	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๕๔
๕๒) นางสาวกัญรัตน์ โสจันทร์	ทะเบียนเลขที่ ๖-๒๐๓-๑-๐๐๕๕

๕๓) นายพรกร...

๕๒) นายพรกร เจ็งเจริญ
๕๓) นายทิวกร เชื้อมาก
๕๔) นายอนุรักษ ทองรงค์กล้า
๕๕) นายอภิชาติ วิลาศ
๕๖) นายจักรวรรดิ ศรีรักษา
๕๗) นายประสาธน์มิตร เขื่อนเพชร
๕๘) นายภาณุวัฒน์ วัฒน
๖๐) นายสินธุ์ จันทนะ
๖๑) นายทินกร กุลชาติ

ทะเบียนเลขที่ ๖-๓๐๓-๖-๐๐๕๔
ทะเบียนเลขที่ ๖-๓๐๓-๖-๐๐๕๕
ทะเบียนเลขที่ ๖-๓๐๓-๖-๐๐๕๖
ทะเบียนเลขที่ ๖-๓๐๓-๖-๐๐๕๗
ทะเบียนเลขที่ ๖-๓๐๓-๖-๐๐๕๘
ทะเบียนเลขที่ ๖-๓๐๓-๖-๐๐๕๙
ทะเบียนเลขที่ ๖-๓๐๓-๖-๐๐๖๐
ทะเบียนเลขที่ ๖-๓๐๓-๖-๐๐๖๑
ทะเบียนเลขที่ ๖-๓๐๓-๖-๐๐๖๒

๕. ขอข่ายข้อมูลสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะมีผลมาตั้งแต่ วันที่ ๒๘ มิถุนายน ๒๕๖๓ หากประสงค์จะต่ออายุหนังสือ ขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงาน อุตสาหกรรมภายใน ๖๐ วัน ก่อนวันสิ้นอายุของหนังสือขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ


(นายพรศักดิ์ กอนก่อง)
นายพรศักดิ์ กอนก่อง
ผู้อำนวยการศูนย์
ส่งเสริมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเฝ้าระวังมลพิษโรงงานภาคตะวันออก
โทร. ๐ ๓๓๓๓ ๖๐๕๙ หรือ ๕๖๐๑๑ ๒
ไปรษณีย์อิเล็กทรอนิกส์ env.eyw.oral.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แล็บอวาทอรี่ กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๓๒๓
ที่ ยก ๐๓๒๐/ ๗ ๕๓ ๘ ลงวันที่ ๐๔ สิงหาคม ๒๕๖๗

ขอข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๔ รายการ
น้ำเสีย จำนวน ๑๔ รายการ

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

น้ำใต้ดินจำนวน 3 รายการ

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
1	Cyanide	Distillation, Colorimetric Method ²⁾
2	pH	Electrometric Method ²⁾
3	Phenols	Distillation, Direct Photometric Method ²⁾

อากาศเสีย...

-2-

อากาศเสีย (ปล่อยระบาย) จำนวน 7 รายการ

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

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ที่ อก ๐๓๒๐/ ๑๐๐๙ ๙



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๙ ตุลาคม ๒๕๖๗

เรื่อง แก้อิระยข้อเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท แอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง หนังสือ บริษัท แอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขที่ Env 2024/005

ลงวันที่ ๓๐ สิงหาคม ๒๕๖๗

ตามหนังสือที่อ้างถึง บริษัท แอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๓๑๓ สถานที่ตั้งเลขที่ ๖๑๖/๑๐ หมู่ที่ ๕ ตำบลแม่ป่าคู่ อำเภอปลวกแดง จังหวัดระยอง ขอแก้ไขข้อเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน เนื่องจากมีความคลาดเคลื่อน ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรม ได้รับทราบและดำเนินการแก้ไขรายชื่อเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๕ ราย ตามที่แจ้งเรียบร้อยแล้ว เป็นดังนี้

ลำดับที่ ๒๗ นางพจนนา สิตา

ลำดับที่ ๒๘ นางสาวอนิศา กุลสุวิวงศ์

ลำดับที่ ๓๐ นางชลธิชา สุนทร

ลำดับที่ ๓๖ นายสุพริตดำรง โชคปิตินันท์

ลำดับที่ ๔๒ นายกันตภณ มณีสัมพันธ์

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ก

(นายพรยศ กสิกรอง)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

โทร. ๐ ๓๑๑๓ ๖๐๕๔ ต่อ ๕๐๐๓-๒

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บริษัท เอแอลเอส แลборาทอรี กรุ๊ป (ประเทศไทย) จำกัด (สำนักงานใหญ่)

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ติดต่อเรา

