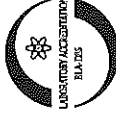


ภาคผนวก ค

ผลการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม

ภาคผนวก ค-1

คุณภาพอากาศจากแหล่งกำเนิด



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Banhai Road, Nong-Lok, Banhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437529
Date Received : Apr 09, 2024
Date Reported : Apr 19, 2024
Report Number: 2953295-1

Sample Number 2437529-1

Sample Date Apr 09, 2024

Sample Description Emission from Stationary Source
Location อู่ซ่อมรถจักรยานยนต์

Date Analysis Commenced Apr 10, 2024

Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description									
Ambient Pressure	752	mmHg	Diameter	0.94	m	Oxygen	20.9	%	
Ambient Temperature	33.0	°C	Shape	Circle		Carbon Dioxide	0.0	%	
Type of Process	Process		Stack Temperature	48.0	°C	Gas Velocity	6.4	m/s	
Type of Fuel	-		Moisture	3.19	%	Flow Rate (Actual O2)	14313	hm3/hr	
Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location	
Air Testing									
Total Suspended Particulate	12:15 PM - 01:09 PM	mg/m3	-	0.5	<0.5	400	United States Environmental Protection Agency, EPA Method 5	Rayong	

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

Sampled By : Sudamrong Chokpitthan

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

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Thantana Kulnirwong
Scientist (4)
โทรศัพท์ ๐-๓๒๓-๙-๙๔๔๗

Approved by

D. J. J.

Dej Changchon
Senior Manager
โทรศัพท์ ๐-๓๒๓-๙-๙๔๔๗

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2272-02

SUReport_Air Stack_GL.PP (3.04PM)

Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Banhai Road, Nong-Lok, Banhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437530
Date Received : Apr 09, 2024
Date Reported : Apr 23, 2024
Report Number: 2953325-1C1

Sample Number 2437530-1

Sample Date Apr 09, 2024

Sample Description Emission from Stationary Source
Location อู่ซ่อมรถจักรยานยนต์

Date Analysis Commenced Apr 10, 2024

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

Stack Description									
Ambient Pressure	752	mmHg	Diameter	0.50	m	Oxygen	7.9	%	
Ambient Temperature	33.0	°C	Shape	Circle		Carbon Dioxide	7.4	%	
Type of Process	Combustion		Stack Temperature	121	°C	Gas Velocity	1.8	m/s	
Type of Fuel	Natural Gas		Moisture	7.63	%	Flow Rate (Actual O2)	870	hm3/hr	
Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location	
Air Testing									
Oxides of Nitrogen *	11:15 AM - 11:25 AM	ppm	-	1.06	18.6	200	United States Environmental Protection Agency, EPA Method 7	Rayong	
Total Suspended Particulate	11:10 AM - 11:58 AM	mg/m3	-	0.5	1.5	320	United States Environmental Protection Agency, EPA Method 5	Rayong	

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

Sampled By : Sudamrong Chokpitthan

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.

Technical Management

Tharitat.

Thantana Kulnirwong
Scientist (4)
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2272-02



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: 2437548
Date Received : Apr 09, 2024
Date Reported : Apr 23, 2024
Report Number: 2953330-1C1

Page 1 of 1

Sample Number 2437548-1
Sample Date Apr 09, 2024
Sample Description Emission from Stationary Source
Location อุสาหกรรมยางวัลเลย์ 4
Date Analysis Commenced Apr 10, 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									
Analyte	Sampled Time	Unit	LOQ (LOR)	Result at 75% _{LOQ}	Guideline Limit	Method	Testing Location		
Air Testing	02:10 PM - 02:20 PM	ppm	-	1.06	2.22	United States Environmental Protection Agency, EPA Method 7	Rayong		
Oxides of Nitrogen *	02:10 PM - 02:20 PM	ppm	-	1.06	2.22	United States Environmental Protection Agency, EPA Method 7	Rayong		
Total Suspended Particulate	02:00 PM - 02:48 PM	mg/m3	-	0.5	<0.5	United States Environmental Protection Agency, EPA Method 5	Rayong		

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

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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: 2437554
Date Received : Apr 10, 2024
Date Reported : Apr 22, 2024
Report Number: 2953345-1

Page 1 of 1

Sample Number 2437554-1
Sample Date Apr 10, 2024
Sample Description Emission from Stationary Source
Location อุสาหกรรมยางวัลเลย์ 1-4
Date Analysis Commenced Apr 11, 2024
Condition of Sample Extracted into two amber plastic bottles, refrigerated

Stack Description									
Analyte	Sampled Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location		
Air Testing	01:30 PM - 02:12 PM	ppm	-	0.01	<0.01	United States Environmental Protection Agency, EPA Method 8	Rayong		
Sulfuric acid	01:30 PM - 02:12 PM	ppm	-	0.01	<0.01	United States Environmental Protection Agency, EPA Method 8	Rayong		

Guideline : Notification of the Ministry of Industry 2006 (B.E. 2549) Published in the Royal Government Gazette, Vol.123 Special Part 125 D, dated December 4, 2006 (B.E. 2549)
Sampled By : Suddamrong Chokphitnan
Remark :
- LOD : Limit of Detection
- " < " : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Technical Management
Thanitak.
Thantita Kulsiwong
Scientist (4)
msdunauwif -323-a-9447
Approved by
Dej Changchon
Senior Manager
msdunauwif -323-a-9442

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Analysis / Test Report

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

Lot ID: 2437554
Date Received : Apr 10, 2024
Date Reported : Apr 22, 2024
Report Number: 2953345-2

Page 1 of 1

Sample Number
2437554-1
Sample Date
Apr 10, 2024
Sample Description
Emission from Stationary Source
Location
14555555 Poly propylene filter April 1-4
Date Analysis Commenced
Apr 11, 2024
Condition of Sample
Extracted into two amber plastic bottles, refrigerated

Stack Description

Ambient Pressure	752	mmHg	Diameter	0.80	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	38.0	°C	Gas Velocity	3.2	m/s
Type of Fuel	-		Moisture	3.33	%	Flow Rate (Actual O2)	5260	Nm3/hr
Analyte		Sampled Time	Unit	LOD	Result	Method	Testing Location	

Air Testing
Phosphoric acid

01:30 PM - 02:00 PM

mg/m3

0.05

<0.05

United States Environmental Protection Agency, EPA Method 26

Bangkok

Sampled By : Sudamrong Chokphirak

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

Approved by

Orawan R.

Orawan Rakying
Scientist (3)

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. The results are valid only for the conditions stated. This report is not valid for any other purpose except as stated.

ภาคผนวก ค-2

คุณภาพอากาศในบรรยากาศ



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437342
Date Received : Apr 22, 2024
Date Reported : Apr 22, 2024
Report Number: 2953001-1

Page 1 of 1

Sample Description	Air Quality	2437342-1	2437342-2	2437342-3	2437342-4	2437342-5	2437342-6	2437342-7
Location	สถานีวัดคุณภาพอากาศ (A1) (GPS 47P 0742960, 1419452)							
Parameter	Nitrogen dioxide (ppm)							
Measurement Date	Apr 05, 2024 - Apr 12, 2024							
Measurement by	Anurak Tongkhaensakda							

Time	2437342-1	2437342-2	2437342-3	2437342-4	2437342-5	2437342-6	2437342-7
10:00 AM - 11:00 AM	<0.001	0.005	0.003	0.003	0.003	0.003	0.002
11:00 AM - 12:00 PM	0.003	0.001	0.003	0.002	0.002	0.002	0.002
12:00 PM - 01:00 PM	0.004	0.001	0.002	0.003	0.002	0.002	0.003
01:00 PM - 02:00 PM	0.002	0.001	0.003	0.003	0.003	0.002	0.003
02:00 PM - 03:00 PM	0.003	<0.001	0.002	0.003	0.002	0.002	0.003
03:00 PM - 04:00 PM	<0.001	<0.001	0.002	0.003	0.002	0.002	0.004
04:00 PM - 05:00 PM	0.002	0.002	0.002	0.003	0.002	0.004	0.004
05:00 PM - 06:00 PM	0.001	0.001	0.001	0.002	0.002	0.002	0.003
06:00 PM - 07:00 PM	0.002	0.002	0.001	0.003	0.002	0.002	0.002
07:00 PM - 08:00 PM	0.002	0.003	0.001	0.001	0.003	0.003	0.002
08:00 PM - 09:00 PM	0.001	0.002	0.002	0.002	0.002	0.003	0.002
09:00 PM - 10:00 PM	0.001	0.002	0.001	0.002	0.001	0.002	0.002
10:00 PM - 11:00 PM	0.001	0.002	0.002	0.002	0.002	0.003	0.001
11:00 PM - 12:00 AM	0.001	0.002	0.002	0.002	0.002	0.003	0.003
12:00 AM - 01:00 AM	0.003	0.002	0.002	0.002	0.002	0.003	0.002
01:00 AM - 02:00 AM	0.001	0.002	0.001	0.001	0.002	0.002	0.002
02:00 AM - 03:00 AM	<0.001	0.002	0.002	0.002	0.002	0.001	0.002
03:00 AM - 04:00 AM	0.001	0.002	0.002	<0.001	0.001	0.001	0.001
04:00 AM - 05:00 AM	<0.001	0.001	0.002	0.002	0.002	0.002	0.001
05:00 AM - 06:00 AM	<0.001	0.002	0.002	0.001	0.002	0.002	0.001
06:00 AM - 07:00 AM	<0.001	0.002	0.002	0.002	0.001	0.002	0.003
07:00 AM - 08:00 AM	0.001	0.002	0.001	0.002	0.002	0.002	0.001
08:00 AM - 09:00 AM	0.002	0.002	0.004	0.001	0.003	0.003	0.001
09:00 AM - 10:00 AM	0.003	0.002	0.003	0.002	0.002	0.001	0.002
Average	0.002	0.002	0.002	0.002	0.002	0.002	0.002
1hr - Maximum	0.004	0.005	0.004	0.003	0.003	0.004	0.004
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170	0.170	0.170
Standard							
Reference Method							

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



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437342
Date Received : Apr 12, 2024
Date Reported : Apr 22, 2024
Report Number: 2969898-1

Page 1 of 1

Sample Description	Air Quality	2437342-8	2437342-9	2437342-10	2437342-11	2437342-12	2437342-13	2437342-14
Location	สถานีวัดอากาศ (A2) (GPS 47P 0742003, 1417397)							
Parameter	Nitrogen dioxide (ppm)							
Measurement Date	Apr 05, 2024 - Apr 12, 2024							
Measurement by	Anurak Tongkhaensakda							

Time	2437342-8	2437342-9	2437342-10	2437342-11	2437342-12	2437342-13	2437342-14
09:00 AM - 10:00 AM	0.002	0.002	0.004	0.003	0.001	0.001	0.017
10:00 AM - 11:00 AM	0.002	0.002	0.003	0.002	0.001	<0.001	0.012
11:00 AM - 12:00 PM	0.001	0.001	0.002	0.001	<0.001	<0.001	0.005
12:00 PM - 01:00 PM	0.002	0.001	0.002	0.001	<0.001	<0.001	0.001
01:00 PM - 02:00 PM	0.001	0.001	0.002	<0.001	<0.001	0.001	0.003
02:00 PM - 03:00 PM	0.001	0.003	0.001	0.001	<0.001	<0.001	0.004
03:00 PM - 04:00 PM	0.003	0.003	0.002	0.001	<0.001	0.001	0.002
04:00 PM - 05:00 PM	0.001	0.001	0.002	<0.001	<0.001	0.001	0.002
05:00 PM - 06:00 PM	0.003	0.003	0.001	0.003	0.001	<0.001	0.002
06:00 PM - 07:00 PM	0.002	<0.001	0.003	0.001	<0.001	<0.001	0.004
07:00 PM - 08:00 PM	0.002	<0.001	0.003	<0.001	<0.001	0.002	0.003
08:00 PM - 09:00 PM	0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.004
09:00 PM - 10:00 PM	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.001
10:00 PM - 11:00 PM	<0.001	0.001	<0.001	<0.001	<0.001	0.002	0.001
11:00 PM - 12:00 AM	0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.001
12:00 AM - 01:00 AM	0.002	<0.001	<0.001	<0.001	0.001	0.002	0.004
01:00 AM - 02:00 AM	0.001	0.001	<0.001	0.001	0.001	0.002	0.004
02:00 AM - 03:00 AM	0.002	<0.001	0.001	<0.001	0.006	0.002	0.002
03:00 AM - 04:00 AM	0.002	0.001	0.003	0.003	0.001	0.001	0.004
04:00 AM - 05:00 AM	0.002	0.001	0.002	0.006	0.002	0.005	0.004
05:00 AM - 06:00 AM	0.002	0.001	0.005	0.004	0.002	0.008	0.002
06:00 AM - 07:00 AM	0.002	<0.001	0.007	0.004	0.003	0.010	0.002
07:00 AM - 08:00 AM	0.002	0.002	0.006	<0.001	0.012	0.005	0.005
08:00 AM - 09:00 AM	0.002	0.010	0.004	0.001	0.002	0.015	0.005
Average	0.002	0.002	0.002	0.002	0.001	0.003	0.004
1hr - Maximum	0.003	0.010	0.007	0.006	0.006	0.015	0.017
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170	0.170	0.170
Standard							
Reference Method							

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 Phased strongly recommends that this report be used for the intended purpose only.

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



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O :
Date Received : Apr 12, 2024
Date Reported : Apr 22, 2024
Report Number: 2968991-1
Project Name : Environment : EIA
Project Location :

Lot ID: 2437342

Page 1 of 1

Sample Description	Air Quality	2437342-15	2437342-16	2437342-17	2437342-18	2437342-19	2437342-20	2437342-21
Location	สารนิเวศ (A3) (GPS 47P 0744066, 1420470)							
Parameter	Nitrogen dioxide (ppm)							
Measurement Date	Apr 05, 2024 - Apr 12, 2024							
Measurement by	Anurak Tongkajonsakda							
Time		2437342-15	2437342-16	2437342-17	2437342-18	2437342-19	2437342-20	2437342-21
12:00 PM - 01:00 PM	0.002	0.002	0.005	0.012	0.012	0.012	0.009	0.008
01:00 PM - 02:00 PM	0.001	0.002	0.007	0.011	0.011	0.012	0.006	0.003
02:00 PM - 03:00 PM	0.001	0.002	0.007	0.008	0.008	0.011	0.006	0.003
03:00 PM - 04:00 PM	0.002	0.002	0.006	0.010	0.010	0.013	0.006	0.002
04:00 PM - 05:00 PM	0.001	0.003	0.006	0.011	0.011	0.007	0.006	0.002
05:00 PM - 06:00 PM	0.001	0.009	0.004	0.010	0.010	0.006	0.005	0.002
06:00 PM - 07:00 PM	0.001	0.011	0.006	0.006	0.006	0.004	0.004	0.002
07:00 PM - 08:00 PM	0.001	0.007	0.002	0.004	0.004	0.005	0.003	0.002
08:00 PM - 09:00 PM	0.002	0.004	0.003	0.005	0.005	0.005	0.006	0.003
09:00 PM - 10:00 PM	0.002	0.004	0.003	0.006	0.006	0.006	0.006	0.004
10:00 PM - 11:00 PM	0.002	0.003	0.004	0.010	0.010	0.006	0.005	0.004
11:00 PM - 12:00 AM	0.001	0.003	0.005	0.010	0.010	0.011	0.004	0.003
12:00 AM - 01:00 AM	<0.001	0.004	0.004	0.011	0.011	0.012	0.003	0.002
01:00 AM - 02:00 AM	<0.001	0.004	0.004	0.003	0.003	0.003	0.003	0.001
02:00 AM - 03:00 AM	<0.001	0.007	0.005	0.008	0.008	0.012	0.003	0.001
03:00 AM - 04:00 AM	<0.001	0.010	0.005	0.005	0.005	0.013	0.003	0.001
04:00 AM - 05:00 AM	<0.001	0.007	0.005	0.004	0.011	0.011	0.002	<0.001
05:00 AM - 06:00 AM	<0.001	0.005	0.004	0.004	0.009	0.009	0.004	<0.001
06:00 AM - 07:00 AM	<0.001	0.004	0.004	0.009	0.012	0.009	0.003	<0.001
07:00 AM - 08:00 AM	<0.001	0.004	0.004	0.010	0.010	0.003	0.003	0.001
08:00 AM - 09:00 AM	<0.001	0.003	0.003	0.010	0.010	0.010	0.003	0.001
09:00 AM - 10:00 AM	<0.001	0.003	0.007	0.008	0.008	0.010	0.005	0.004
10:00 AM - 11:00 AM	<0.001	0.004	0.013	0.009	0.009	0.013	0.008	0.008
11:00 AM - 12:00 PM	0.002	0.004	0.010	0.012	0.012	0.008	0.006	0.003
Average	0.001	0.005	0.005	0.009	0.009	0.010	0.005	0.003
1hr - Maximum	0.002	0.011	0.013	0.012	0.012	0.013	0.009	0.008
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
Standard								
Reference Method		: Notification of the National Environment Board No. 33, 2009 (B.E. 2552).						
		Reference Method : US EPA Method Part 50 App. F (Chemiluminescence)						

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22742



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O :
Date Received : Apr 12, 2024
Date Reported : Apr 22, 2024
Report Number: 2968991-1
Project Name : Environment : EIA
Project Location :

Lot ID: 2437342

Page 1 of 1

Sample Description	Air Quality	2437342-22	2437342-23	2437342-24	2437342-25	2437342-26	2437342-27	2437342-28
Location	สารนิเวศ (A4) (GPS 47P 0747515, 1419157)							
Parameter	Nitrogen dioxide (ppm)							
Measurement Date	Apr 05, 2024 - Apr 12, 2024							
Measurement by	Anurak Tongkajonsakda							
Time		2437342-22	2437342-23	2437342-24	2437342-25	2437342-26	2437342-27	2437342-28
11:00 AM - 12:00 PM	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001
12:00 PM - 01:00 PM	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.002
01:00 PM - 02:00 PM	0.002	0.002	0.001	<0.001	0.001	0.001	0.001	0.002
02:00 PM - 03:00 PM	0.001	0.001	<0.001	<0.001	0.001	0.001	0.002	0.002
03:00 PM - 04:00 PM	0.001	0.001	<0.001	<0.001	<0.001	0.001	0.004	0.002
04:00 PM - 05:00 PM	0.001	0.001	<0.001	<0.001	0.001	0.001	0.003	0.001
05:00 PM - 06:00 PM	0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002	0.001
06:00 PM - 07:00 PM	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.003	0.001
07:00 PM - 08:00 PM	<0.001	<0.001	<0.001	<0.001	0.002	0.002	0.004	0.002
08:00 PM - 09:00 PM	<0.001	<0.001	<0.001	0.001	0.001	0.004	0.001	0.003
09:00 PM - 10:00 PM	0.001	0.001	<0.001	0.002	0.002	0.001	0.004	0.003
10:00 PM - 11:00 AM	0.001	0.001	0.001	0.002	0.002	0.002	0.005	0.002
11:00 PM - 12:00 AM	0.001	0.001	0.001	0.002	0.002	0.001	0.002	0.003
12:00 AM - 01:00 AM	0.001	0.001	0.001	0.002	0.004	0.001	0.003	0.003
01:00 AM - 02:00 AM	0.001	0.001	0.002	0.002	0.002	0.001	0.002	0.002
02:00 AM - 03:00 AM	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.003
03:00 AM - 04:00 AM	0.003	0.001	0.002	0.002	0.001	0.001	0.002	0.003
04:00 AM - 05:00 AM	0.003	0.001	0.001	0.001	0.002	0.001	0.002	0.002
05:00 AM - 06:00 AM	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.002
06:00 AM - 07:00 AM	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.002
07:00 AM - 08:00 AM	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.002
08:00 AM - 09:00 AM	0.003	0.002	0.002	0.002	0.001	0.001	0.002	0.002
09:00 AM - 10:00 AM	0.003	0.002	0.002	0.002	0.001	0.001	<0.001	0.002
10:00 AM - 11:00 AM	0.002	0.002	0.001	0.001	0.001	0.001	<0.001	0.001
Average	0.002	0.002	0.001	0.001	0.002	0.002	0.002	0.002
1hr - Maximum	0.003	0.003	0.002	0.002	0.004	0.006	0.005	0.003
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
Standard								
Reference Method		: Notification of the National Environment Board No. 33, 2009 (B.E. 2552).						
		Reference Method : US EPA Method Part 50 App. F (Chemiluminescence)						

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Orawan R.
Orawan Rakying
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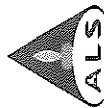
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22742



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: 2437346

Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

TESTING
No.0042

Page 1 of 25

Sample Number	2437346-1
Sample Date	Apr 05, 2024
Sample Description	Air Quality
Location	บริเวณทางเข้าโรงงาน (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced	Apr 18, 2024
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	05/04/24 - 06/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	05/04/24 - 06/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	05/04/24 - 06/04/24	mg/m3	-	0.002	0.041	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 : Anurak Tongkajonsakida

Remark :

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2279 Q2



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: 2437346

Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

TESTING
No.0042

Page 2 of 25

Sample Number	2437346-2
Sample Date	Apr 05, 2024
Sample Description	Air Quality
Location	บริเวณทางเข้าโรงงาน (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced	Apr 18, 2024
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	06/04/24 - 07/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	06/04/24 - 07/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	06/04/24 - 07/04/24	mg/m3	-	0.002	0.028	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 : Anurak Tongkajonsakida

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2279 Q2



Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak, Bankhai, Rayong Thailand
21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 3 of 29

Sample Number 2437346-3
Sampled Date Apr 07, 2024
Sample Description Air Quality
Location กรุงเทพมหานคร (AI) (GPS 47P 0742960, 1419452)
Date Analysis Commenced Apr 18, 2024
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	07/04/24 - 08/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	07/04/24 - 08/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	07/04/24 - 08/04/24	mg/m3	-	0.002	0.032	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 : Anurak Tongthajonsakda

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Chontichak

Chonticha Subongkotch
Scientist (3)

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2272-63



Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak, Bankhai, Rayong Thailand
21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 4 of 29

Sample Number 2437346-4
Sampled Date Apr 08, 2024
Sample Description Air Quality
Location กรุงเทพมหานคร (AI) (GPS 47P 0742960, 1419452)
Date Analysis Commenced Apr 18, 2024
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	08/04/24 - 09/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	08/04/24 - 09/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	08/04/24 - 09/04/24	mg/m3	-	0.002	0.031	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

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Chonticha Subongkotch
Scientist (3)

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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: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 5 of 29

Sample Number 2437346-5
Sample Date Apr 09, 2024
Sample Description Air Quality
Location ถนนสุขุมวิท (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced Apr 18, 2024
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	09/04/24 - 10/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	09/04/24 - 10/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	09/04/24 - 10/04/24	mg/m3	-	0.002	0.045	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24-Rayong	

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

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Chonticha Subongkotch
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22792



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: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 6 of 29

Sample Number 2437346-6
Sample Date Apr 10, 2024
Sample Description Air Quality
Location ถนนสุขุมวิท (A1) (GPS 47P 0742960, 1419452)
Date Analysis Commenced Apr 18, 2024
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	10/04/24 - 11/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	10/04/24 - 11/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	10/04/24 - 11/04/24	mg/m3	-	0.002	0.048	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24-Rayong	

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

Remark :
LOD : Limit of Detection
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Approved by
Chonticha Subongkotch
Scientist (3)

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Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak, Bankhai, Rayong Thailand
21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 7 of 28

Sample Number	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
2437346-7	Apr 11, 2024	Air Quality						
Sample Description	Air Quality							
Location	ถนนสุขุมวิท (A1) (GPS 47P 0742960, 1419452)							
Date Analysis Commenced	Apr 18, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	11/04/24 - 12/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	11/04/24 - 12/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	11/04/24 - 12/04/24	mg/m3	-	0.002	0.049	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 : Anurak Tongthajomsakda

Remark :

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Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak, Bankhai, Rayong Thailand
21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 8 of 28

Sample Number	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
2437346-8	Apr 05, 2024	Air Quality						
Sample Description	Air Quality							
Location	ถนนสุขุมวิท (A2) (GPS 47P 0742003, 1417397)							
Date Analysis Commenced	Apr 18, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	05/04/24 - 06/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	05/04/24 - 06/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	05/04/24 - 06/04/24	mg/m3	-	0.002	0.030	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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

P/O :

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 2437346

Date Received : Apr 12, 2024

Date Reported : Apr 27, 2024

Report Number : 2953014-1

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Sample Number	2437346-9
Sample Date	Apr 06, 2024
Sample Description	Air Quality
Location	Thuan'luon (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced	Apr 18, 2024
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	06/04/24 - 07/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	06/04/24 - 07/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	06/04/24 - 07/04/24	mg/m3	-	0.002	0.062	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 : Anurak Tongkhajonsakda

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21120

P/O :

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 2437346

Date Received : Apr 12, 2024

Date Reported : Apr 27, 2024

Report Number : 2953014-1

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Sample Number	2437346-10
Sample Date	Apr 07, 2024
Sample Description	Air Quality
Location	Thuan'luon (A2) (GPS 47P 0742003, 1417397)
Date Analysis Commenced	Apr 18, 2024
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	07/04/24 - 08/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	07/04/24 - 08/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	07/04/24 - 08/04/24	mg/m3	-	0.002	0.037	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24-Rayong	

Guideline :

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21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

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Sample Number	2437346-11								
Sampled Date	Apr 08, 2024								
Sample Description	Air Quality								
Location	ถนนสุขุมวิท (A2) (GPS 47P 0742003, 1417397)								
Date Analysis Commenced	Apr 18, 2024								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	08/04/24 - 09/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	08/04/24 - 09/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended	08/04/24 - 09/04/24	mg/m3	-	0.002	0.019	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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Analysis / Test Report

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21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

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Sample Number	2437346-12									
Sampled Date	Apr 09, 2024									
Sample Description	Air Quality									
Location	ถนนสุขุมวิท (A2) (GPS 47P 0742003, 1417397)									
Date Analysis Commenced	Apr 18, 2024									
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated									
Barometric Pressure	757 mmHg									
Atmospheric Temperature	31.0 °C									
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location	
Air Testing										
Phosphoric acid *	09/04/24 - 10/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok	
Sulfuric acid *	09/04/24 - 10/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok	
Total Suspended Particulate	09/04/24 - 10/04/24	mg/m3	-	0.002	0.031	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong		

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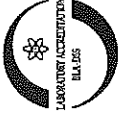
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P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 2437346

Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

TESTING
No.0042

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Sample Number	2437346-13							
Sample Date	Apr 10, 2024							
Sample Description	Air Quality							
Location	thuanbun (A2) (GPS 47P 0742003, 1417397)							
Date Analysis Commenced	Apr 18, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid *	10/04/24 - 11/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	10/04/24 - 11/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	10/04/24 - 11/04/24	mg/m3	-	0.002	0.033	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

Guideline :
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P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 2437346

Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Analysis / Test Report

TESTING
No.0042

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Sample Number	2437346-14							
Sample Date	Apr 11, 2024							
Sample Description	Air Quality							
Location	บริเวณด้าน (A2) (GPS 47P 0742003, 1417397)							
Date Analysis Commenced	Apr 18, 2024							
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated							
Barometric Pressure	757 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	11/04/24 - 12/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	11/04/24 - 12/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	11/04/24 - 12/04/24	mg/m3	-	0.002	0.044	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

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21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1
Page 15 of 28

Sample Number 2437346-15
Sampled Date Apr 05, 2024
Sample Description Air Quality
Location Banruay (A3) (GPS 47P 0744066, 1420470)
Date Analysis Commenced Apr 18, 2024
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	05/04/24 - 06/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	05/04/24 - 06/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	05/04/24 - 06/04/24	mg/m3	-	0.002	0.045	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

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

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21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1
Page 16 of 28

Sample Number 2437346-16
Sampled Date Apr 06, 2024
Sample Description Air Quality
Location Banruay (A3) (GPS 47P 0744066, 1420470)
Date Analysis Commenced Apr 18, 2024
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	06/04/24 - 07/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	06/04/24 - 07/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	06/04/24 - 07/04/24	mg/m3	-	0.002	0.040	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

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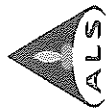
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P/O : Project Name : Environment : EIA

Project Location :

Lot ID: 2437346

Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

TESTING
No.0042

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Sample Number	2437346-17
Sample Date	Apr 07, 2024
Sample Description	Air Quality
Location	ทางหลวง (A3) (GPS 47P 0744066, 1420470)
Date Analysis Commenced	Apr 18, 2024
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD (LOQ)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing								
Phosphoric acid *	07/04/24 - 08/04/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	07/04/24 - 08/04/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	07/04/24 - 08/04/24	mg/m3	0.002	0.057	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

Guideline :

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P/O : Project Name : Environment : EIA

Project Location :

Lot ID: 2437346

Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

TESTING
No.0042

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Sample Number	2437346-18
Sample Date	Apr 08, 2024
Sample Description	Air Quality
Location	ทางหลวง (A3) (GPS 47P 0744066, 1420470)
Date Analysis Commenced	Apr 18, 2024
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/Time	Unit	LOD (LOQ)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing								
Phosphoric acid *	08/04/24 - 09/04/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	08/04/24 - 09/04/24	mg/m3	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	08/04/24 - 09/04/24	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 : Anurak Tongkhajonsakda

Remark :

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27743



Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.

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

P/O : 21120

Project Name : Environment : EIA

Project Location :

Lot ID: 2437346

Date Received : Apr 12, 2024

Date Reported : Apr 27, 2024

Report Number : 2953014-1

Page 13 of 28

Sample Number 2437346-19
Sampled Date Apr 09, 2024
Sample Description Air Quality
Location 129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand
Date Analysis Commenced Apr 18, 2024
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	09/04/24 - 10/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	09/04/24 - 10/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	09/04/24 - 10/04/24	mg/m3	-	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 : Anurak Tongkijajonsakda

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2274-62

Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.

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

P/O :

Project Name : Environment : EIA

Project Location :

Lot ID: 2437346

Date Received : Apr 12, 2024

Date Reported : Apr 27, 2024

Report Number : 2953014-1

Page 26 of 28

Sample Number 2437346-20
Sampled Date Apr 10, 2024
Sample Description Air Quality
Location 129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand
Date Analysis Commenced Apr 18, 2024
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	10/04/24 - 11/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	10/04/24 - 11/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	10/04/24 - 11/04/24	mg/m3	-	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 : Anurak Tongkijajonsakda

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Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand
21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 21 of 25

Sample Number 2437346-21
Sample Date Apr 11, 2024
Sample Description Air Quality
Location ๑๕๖๖๖๖๖๖ (A3) (GPS 47P 0744066, 1420470)
Date Analysis Commenced Apr 18, 2024
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOB)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	11/04/24 - 12/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	11/04/24 - 12/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	11/04/24 - 12/04/24	mg/m3	-	0.002	0.160	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 : Anurak Tongkajonphoskida

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Chonticha Subongkloch
Scientist (3)

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Analysis / Test Report

TESTING
No.0042

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand
21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 22 of 26

Sample Number 2437346-22
Sample Date Apr 05, 2024
Sample Description Air Quality
Location ๑๕๖๖๖๖๖๖ (A4) (GPS 47P 0747515, 1419157)
Date Analysis Commenced Apr 18, 2024
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOB)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	05/04/24 - 06/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	05/04/24 - 06/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	05/04/24 - 06/04/24	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 : Anurak Tongkajonphoskida

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TESTING
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Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Rayong Thailand
21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 23 of 28

Sample Number	2437346-23								
Sampled Date	Apr 06, 2024								
Sample Description	Air Quality								
Location	ถนนสาย 1 (A4) (GPS 47P 0747515, 1419157)								
Date Analysis Commenced	Apr 18, 2024								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOB)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	06/04/24 - 07/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	06/04/24 - 07/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended	06/04/24 - 07/04/24	mg/m3	-	0.002	0.030	0.33	US EPA 40 CFR Part 50,	NEB No.24 Rayong	

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

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21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 24 of 28

Sample Number	2437346-24								
Sampled Date	Apr 07, 2024								
Sample Description	Air Quality								
Location	ถนนสาย 1 (A4) (GPS 47P 0747515, 1419157)								
Date Analysis Commenced	Apr 18, 2024								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOB)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	07/04/24 - 08/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	07/04/24 - 08/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	07/04/24 - 08/04/24	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
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21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 25 of 25

Sample Number	2437346-25								
Sampled Date	Apr 08, 2024								
Sample Description	Air Quality								
Location	บริเวณด้านใน (A4) (GPS 47P 0747515, 1419157)								
Date Analysis Commenced	Apr 18, 2024								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	08/04/24 - 09/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	08/04/24 - 09/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	08/04/24 - 09/04/24	mg/m3	-	0.002	0.018	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 : Anurak Tongkhaonsakda

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Chonticha Subongkhot
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Analysis / Test Report

TESTING
No.0042

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129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Bangkok, Rayong Thailand
21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 26 of 26

Sample Number	2437346-26								
Sampled Date	Apr 09, 2024								
Sample Description	Air Quality								
Location	บริเวณด้านใน (A4) (GPS 47P 0747515, 1419157)								
Date Analysis Commenced	Apr 18, 2024								
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated								
Barometric Pressure	757 mmHg								
Atmospheric Temperature	31.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Phosphoric acid *	09/04/24 - 10/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Sulfuric acid *	09/04/24 - 10/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	-	Bangkok
Total Suspended Particulate	09/04/24 - 10/04/24	mg/m3	-	0.002	0.027	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong	

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

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Analysis / Test Report

TESTING
No.0042

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129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok, Bankhai, Rayong Thailand
21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 27 of 29

Sample Number 2437346-27
Sample Date Apr 10, 2024
Sample Description Air Quality
Location หมู่บ้านบ้านใหม่ (A4) (GPS 47P 0747515, 1419157)
Date Analysis Commenced Apr 18, 2024
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	10/04/24 - 11/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	10/04/24 - 11/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	10/04/24 - 11/04/24	mg/m3	-	0.002	0.034	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 : Anurak Tongthajonsakda

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Analysis / Test Report

TESTING
No.0042

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21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2437346
Date Received : Apr 12, 2024
Date Reported : Apr 27, 2024
Report Number : 2953014-1

Page 28 of 29

Sample Number 2437346-28
Sample Date Apr 11, 2024
Sample Description Air Quality
Location หมู่บ้านบ้านใหม่ (A4) (GPS 47P 0747515, 1419157)
Date Analysis Commenced Apr 18, 2024
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and two sorbent tubes, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid *	11/04/24 - 12/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid *	11/04/24 - 12/04/24	mg/m3	-	0.05	<0.05	No Standard	Based on OSHA, ID-174-SG	Bangkok
Total Suspended Particulate	11/04/24 - 12/04/24	mg/m3	-	0.002	0.038	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Rayong

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

Sampled By : Anurak Tongthajonsakda

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.

Result apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This part of the report may be reproduced for internal use only. It is not to be used for any other purpose without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommend that this report is not reproduced except in full.

Approved by

Chonticha Subongkoch
Scientist (3)

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227242



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: 2437347

Date Received : Apr 12, 2024

Date Reported : Apr 23, 2024

Report Number : 2953015-1

Sample Number : 2437347-1 to 7

Parameter : Wind Speed / Wind Direction

Location : อำเภอวังจันทร์ (A1) (GPS 47P 0742560, 1419452)

Sampling Date : Apr 05 - Apr 12, 2024

Sampling by : Anurak Tongkijjongsakda

Time	Apr 05 - Apr 05, 2024		Apr 06 - Apr 06, 2024		Apr 07 - Apr 07, 2024		Apr 08 - Apr 08, 2024		Apr 09 - Apr 09, 2024		Apr 10 - Apr 10, 2024		Apr 11 - Apr 11, 2024		Apr 12 - Apr 12, 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)	WS (m/s)	WD (deg)					
10:00 AM - 11:00 AM	1.7	233.0	SW	1.5	227.0	SW	2.6	258.0	WSW	1.1	204.0	SSW	2.0	216.0	SW	0.6	186.0	S	1.6	41.0	NE
11:00 AM - 12:00 PM	0.9	183.0	S	0.9	232.0	SW	1.9	210.0	SSW	0.4	222.0	SW	1.3	216.0	SW	0.9	20.0	NNE	0.3	198.0	SSW
12:00 PM - 01:00 PM	1.2	148.0	SSE	1.2	209.0	SSW	1.3	205.0	SSW	1.0	236.0	SW	2.6	193.0	SSW	1.5	215.0	SW	0.9	204.0	SSW
01:00 PM - 02:00 PM	2.5	143.0	SE	0.7	189.0	S	1.3	219.0	SW	1.3	125.0	SE	0.7	208.0	SSW	0.9	209.0	SSW	1.7	217.0	SW
02:00 PM - 03:00 PM	1.4	206.0	SSW	0.8	160.0	SSE	0.9	197.0	SSW	1.0	147.0	SSE	0.8	217.0	SW	1.2	193.0	SSW	2.3	295.0	WNW
03:00 PM - 04:00 PM	1.4	234.0	SW	1.2	189.0	S	2.0	214.0	SW	1.2	225.0	SW	2.1	178.0	S	0.5	321.0	NW	2.4	242.0	WSW
04:00 PM - 05:00 PM	1.4	192.0	SSW	0.7	170.0	S	0.9	184.0	S	0.9	187.0	S	1.5	198.0	SSW	2.0	233.0	SW	2.5	193.0	SSW
05:00 PM - 06:00 PM	0.6	180.0	S	1.0	175.0	S	0.8	189.0	S	1.1	207.0	SSW	0.5	261.0	W	2.1	217.0	SW	0.7	223.0	SW
06:00 PM - 07:00 PM	0.3	220.0	SW	1.9	171.0	S	1.1	181.0	S	0.3	162.0	SSE	0.9	276.0	W	0.9	200.0	SSW	0.5	227.0	SW
07:00 PM - 08:00 PM	0.3	244.0	WSW	0.5	217.0	SW	0.8	214.0	SW	0.3	221.0	SW	0.5	266.0	W	0.6	215.0	SW	0.9	264.0	W
08:00 PM - 09:00 PM	0.5	207.0	SSW	0.4	208.0	SSW	0.3	211.0	SSW	0.3	215.0	SW	0.7	223.0	SW	0.6	184.0	S	1.6	223.0	SW
09:00 PM - 10:00 PM	0.6	248.0	WSW	0.4	201.0	SSW	0.5	109.0	ESE	0.4	216.0	SW	0.9	224.0	SW	0.3	190.0	S	0.5	241.0	WSW
11:00 PM - 12:00 AM	0.5	233.0	SW	0.6	212.0	SSW	0.5	192.0	SSW	0.9	198.0	SSW	0.9	279.0	W	0.6	211.0	SSW	0.3	185.0	S
12:00 PM - 01:00 AM	0.6	217.0	SW	0.8	203.0	SSW	0.3	227.0	SW	0.5	359.0	N	0.5	220.0	SW	0.4	213.0	SSW	0.3	230.0	SW
01:00 AM - 02:00 AM	0.3	215.0	SW	0.3	210.0	SSW	0.3	220.0	SW	0.3	224.0	SW	0.3	260.0	W	0.3	231.0	SW	0.3	208.0	SSW
02:00 AM - 03:00 AM	0.3	231.0	SW	0.6	181.0	S	0.5	172.0	S	0.6	239.0	WSW	0.3	198.0	SSW	0.3	15.0	NNE	0.3	225.0	SW
03:00 AM - 04:00 AM	0.5	223.0	SW	0.5	204.0	SSW	0.6	213.0	SSW	0.3	357.0	N	0.3	321.0	NW	0.6	307.0	NW	0.9	225.0	SW
04:00 AM - 05:00 AM	0.6	216.0	SW	0.3	241.0	WSW	0.3	220.0	SW	0.5	357.0	N	0.5	357.0	N	0.8	326.0	NW	0.5	285.0	WNW
05:00 AM - 06:00 AM	0.4	194.0	SSW	0.3	239.0	SW	0.5	217.0	SW	0.3	333.0	NNW	0.9	14.0	NNE	0.3	61.0	ENE	0.6	9.0	N
06:00 AM - 07:00 AM	0.4	207.0	SSW	0.5	202.0	SSW	0.9	217.0	SW	0.6	164.0	SSE	0.3	355.0	N	0.6	359.0	N	0.5	0.0	N
07:00 AM - 08:00 AM	0.4	179.0	S	1.0	177.0	S	0.3	193.0	SSW	1.0	173.0	S	0.6	341.0	NNW	0.5	63.0	ENE	0.4	13.0	NNE
08:00 AM - 09:00 AM	2.2	211.0	SSW	0.7	157.0	SSE	0.5	120.0	ESE	0.7	153.0	SSE	0.3	125.0	SE	0.5	341.0	NNW	0.6	19.0	NNE
09:00 AM - 10:00 AM	1.9	201.0	SSW	2.4	206.0	SSW	1.2	208.0	SSW	0.3	205.0	SSW	1.1	165.0	SSE	0.7	13.0	NNE	0.3	22.0	NNE

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

The above results are valid only for the analysis and testing samples as indicated in this report. No part of this report or test data may be reproduced in any form without written consent from the Laboratory. ALS Laboratory Group (Thailand) Co., Ltd. is hereby recommended that this report is not reproduced except in full.

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Sarayuth Jitranont

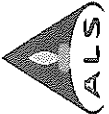
Assistant General Manager

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Sarayuth Jitranont

Assistant General Manager



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

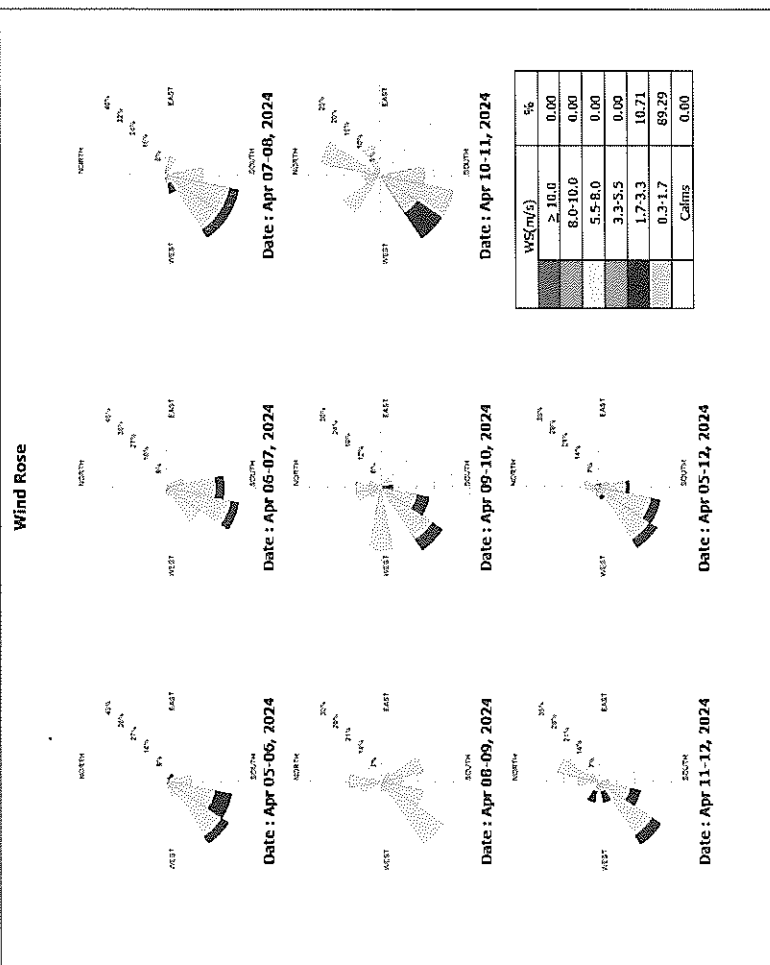
Project Location :

Lot ID: 2437347

Date Received : Apr 12, 2024

Date Reported : Apr 23, 2024

Report Number : 2953015-1



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Assistant General Manager



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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

Lot ID: 2437347

Date Received : Apr 12, 2024

Date Reported : Apr 23, 2024

Report Number : 2953015-1

P/O : .

Project Name : Environment : EIA

Project Location :

Sample Number 2437347-8 to 14

Parameter Wind Speed / Wind Direction

Location บ้านท่าช้าง (A2) (GPS 479 0742003, 1417397)

Sampling Date Apr 05 - Apr 12, 2024

Sampling by Anurak Tongkijensakda

Page 1 of 2

Time	Apr 05 - Apr 06, 2024	Apr 06 - Apr 07, 2024	Apr 07 - Apr 08, 2024	Apr 08 - Apr 09, 2024	Apr 09 - Apr 10, 2024	Apr 10 - Apr 11, 2024	Apr 11 - Apr 12, 2024
WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)
09:00 AM - 10:00 AM	0.4 257.0 W	0.6 146.0 SE	0.3 144.0 SE	0.9 152.0 SSE	1.3 155.0 SSE	0.4 138.0 SE	0.3 310.0 NW
10:00 AM - 11:00 AM	1.6 284.0 WNW	0.5 145.0 SE	0.8 144.0 SE	1.3 135.0 SE	0.6 199.0 SSE	0.3 136.0 SE	0.3 308.0 NW
11:00 AM - 12:00 PM	0.6 192.0 SSW	0.3 135.0 SE	1.6 130.0 SE	0.5 136.0 SE	0.4 160.0 SSE	0.3 138.0 SE	0.3 307.0 NW
12:00 PM - 01:00 PM	2.1 149.0 SSE	0.3 162.0 SSE	2.4 137.0 SE	0.6 128.0 SE	1.0 148.0 SE	0.9 137.0 SE	0.5 308.0 NW
01:00 PM - 02:00 PM	1.4 242.0 WSW	1.7 289.0 WNW	0.6 250.0 WNW	1.3 169.0 S	1.0 101.0 E	1.2 166.0 SSE	0.3 286.0 WNW
02:00 PM - 03:00 PM	0.9 230.0 SW	0.9 148.0 SSE	0.3 111.0 ESE	0.3 129.0 SE	0.3 207.0 SSW	0.3 222.0 SW	0.9 85.0 E
03:00 PM - 04:00 PM	0.3 257.0 WSW	1.3 101.0 E	0.3 208.0 SSW	0.4 126.0 SE	2.5 346.0 WNW	3.3 112.0 ESE	0.5 324.0 NW
04:00 PM - 05:00 PM	1.8 142.0 SE	0.8 114.0 ESE	0.6 256.0 WSW	2.1 128.0 SE	1.4 116.0 ESE	1.2 133.0 SE	0.3 329.0 NW
05:00 PM - 06:00 PM	1.3 240.0 WSW	0.8 267.0 WSW	0.3 145.0 SE	1.3 150.0 SSE	1.9 297.0 WNW	2.6 263.0 WNW	1.0 329.0 NW
06:00 PM - 07:00 PM	1.2 295.0 WNW	1.4 133.0 SE	2.4 213.0 SSW	0.4 143.0 SE	1.1 237.0 WSW	1.0 237.0 WSW	1.4 142.0 SE
07:00 PM - 08:00 PM	0.9 244.0 SSW	1.5 130.0 SE	0.9 133.0 SE	0.5 51.0 NE	0.8 157.0 SSE	0.4 222.0 SW	1.0 355.0 N
08:00 PM - 09:00 PM	0.9 141.0 SE	0.7 153.0 SSE	1.4 233.0 SW	0.4 193.0 SSW	2.2 335.0 N	0.8 201.0 SSW	0.6 129.0 SE
09:00 PM - 10:00 PM	1.6 126.0 SE	1.6 399.0 WNW	0.3 228.0 SW	0.6 196.0 SSW	0.3 355.0 N	0.8 337.0 WNW	0.6 222.0 SW
10:00 PM - 11:00 PM	1.2 324.0 NW	0.4 204.0 SSW	0.3 285.0 WNW	0.9 183.0 S	0.3 216.0 SW	0.3 0.0 N	0.4 311.0 NW
11:00 PM - 12:00 AM	1.3 153.0 SSE	0.8 112.0 ESE	0.6 352.0 N	0.5 95.0 E	0.6 171.0 S	0.6 342.0 WNW	0.3 40.0 NE
12:00 AM - 01:00 AM	0.9 168.0 SSE	0.7 140.0 SE	0.5 179.0 S	0.5 141.0 SE	0.8 141.0 SE	0.3 20.0 NNE	0.3 318.0 NW
01:00 AM - 02:00 AM	0.6 164.0 SSE	0.8 139.0 SE	0.3 161.0 SSE	0.8 153.0 SSE	0.8 146.0 SE	0.3 20.0 NNE	0.5 155.0 SSE
02:00 AM - 03:00 AM	0.6 140.0 SE	0.3 154.0 SSE	0.3 144.0 SE	0.3 142.0 SE	0.6 138.0 SE	0.9 320.0 WNW	0.5 156.0 SSE
03:00 AM - 04:00 AM	0.3 163.0 SSE	0.3 149.0 SSE	0.6 146.0 SE	0.3 158.0 SSE	1.1 148.0 SSE	0.4 274.0 W	0.6 140.0 SE
04:00 AM - 05:00 AM	0.3 164.0 SE	0.6 148.0 SSE	0.5 146.0 SE	0.5 158.0 SSE	0.7 222.0 SW	0.5 309.0 NW	0.3 144.0 SE
05:00 AM - 06:00 AM	0.3 107.0 ESE	0.3 146.0 SE	0.5 146.0 SE	0.4 157.0 SSE	0.6 147.0 SSE	0.6 307.0 NW	0.3 142.0 SE
06:00 AM - 07:00 AM	0.6 105.0 ESE	0.6 245.0 WSW	0.4 145.0 SE	0.8 159.0 SSE	0.3 145.0 SE	0.8 308.0 NW	0.6 148.0 SE
07:00 AM - 08:00 AM	1.0 106.0 ESE	0.5 131.0 SE	0.6 235.0 SW	0.6 156.0 SSE	0.3 140.0 SE	0.3 309.0 NW	0.3 143.0 SE
08:00 AM - 09:00 AM	0.5 157.0 SSE	0.3 138.0 SE	0.8 143.0 SE	1.0 157.0 SSE	0.5 137.0 SE	0.5 307.0 NW	0.5 145.0 SE

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

The above results are valid only for the wind direction and speed (WS) as indicated in the Laboratory Report. The results are not valid for other parameters without written consent from the Laboratory. ALS is not responsible for any errors or omissions in the report. ALS is not responsible for any errors or omissions in the report.

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Sarayuth Ultrarant

Assistant General Manager

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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

Lot ID: 2437347

Date Received : Apr 12, 2024

Date Reported : Apr 23, 2024

Report Number : 2953015-1

P/O :

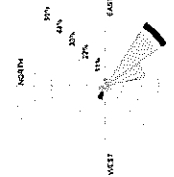
Project Name : Environment : EIA

Project Location :

Wind Rose



Date : Apr 05-06, 2024



Date : Apr 06-07, 2024



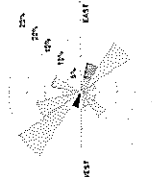
Date : Apr 07-08, 2024



Date : Apr 08-09, 2024



Date : Apr 09-10, 2024



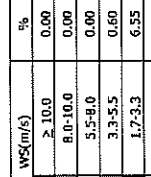
Date : Apr 10-11, 2024



Date : Apr 11-12, 2024



Date : Apr 12-13, 2024



Date : Apr 13-14, 2024

WS (m/s)	%
0-10.0	0.00
10.0-15.0	0.00
15.0-20.0	0.00
20.0-25.0	0.00
25.0-30.0	0.00
30.0-35.0	0.00
35.0-40.0	0.00
40.0-45.0	0.00
45.0-50.0	0.00
50.0-55.0	0.00
55.0-60.0	0.00
60.0-65.0	0.00
65.0-70.0	0.00
70.0-75.0	0.00
75.0-80.0	0.00
80.0-85.0	0.00
85.0-90.0	0.00
90.0-95.0	0.00
95.0-100.0	0.00
100.0-105.0	0.00
105.0-110.0	0.00
110.0-115.0	0.00
115.0-120.0	0.00
120.0-125.0	0.00
125.0-130.0	0.00
130.0-135.0	0.00
135.0-140.0	0.00
140.0-145.0	0.00
145.0-150.0	0.00
150.0-155.0	0.00
155.0-160.0	0.00
160.0-165.0	0.00
165.0-170.0	0.00
170.0-175.0	0.00
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180.0-185.0	0.00
185.0-190.0	0.00
190.0-195.0	0.00
195.0-200.0	0.00
200.0-205.0	0.00
205.0-210.0	0.00
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215.0-220.0	0.00
220.0-225.0	0.00
225.0-230.0	0.00
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355.0-360.0	0.00
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735.0-740.0	0.00
740.0-745.0	0.00
745.0-750.0	0.00
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755.0-760.0	0.00
760.0-765.0	0.00
765.0-770.0	0.00
770.0-775.0	0.00
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785.0-790.0	0.00
790.0-795.0	0.00
795.0-800.0	0.00
800.0-805.0	0.00
805.0-810.0	0.00
810.0-815.0	0.00
815.0-820.0	0.00
820.0-825.0	0.00
825.0-830.0	0.00
830.0-835.0	0.00
835.0-840.0	0.00
840.0-845.0	0.00
845.0-850.0	0.00
850.0-855.0	0.00
855.0-860.0	0.00
860.0-865.0	0.00
865.0-870.0	0.00
870.0-875.0	0.00
875.0-880.0	0.00
880.0-885.0	0.00
885.0-890.0	0.00
890.0-895.0	0.00
895.0-900.0	0.00
900.0-905.0	0.00
905.0-910.0	0.00
910.0-915.0	0.00
915.0-920.0	0.00
920.0-925.0	0.00
925.0-930.0	0.00
930.0-935.0	0.00
935.0-940.0	0.00
940.0-945.0	0.00
945.0-950.0	0.00
950.0-955.0	0.00
955.0-960.0	0.00
960.0-965.0	0.00
965.0-970.0	0.00
970.0-975.0	0.00
975.0-980.0	0.00
980.0-985.0	0.00
985.0-990.0	0.00
990.0-995.0	0.00
995.0-1000.0	0.00

The above results are valid only for the wind direction and speed (WS) as indicated in the Laboratory Report. The results are not valid for other parameters without written consent from the Laboratory. ALS is not responsible for any errors or omissions in the report. ALS is not responsible for any errors or omissions in the report.

Approved by

Sarayuth Ultrarant

Assistant General Manager



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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

Lot ID: 2437347

Date Received : Apr 12, 2024

Date Reported : Apr 23, 2024

Report Number : 2953015-1

P/O :

Project Name : Environment : EIA

Project Location :

Sample Number : 2437347-15 to 21

Parameter : Wind Speed / Wind Direction

Location : ต.บ้านนา (A3) (GPS 477 074066, 1420470)

Sampling Date : Apr 05 - Apr 12, 2024

Sampling by : Anurak Tongkijjongsakda

Time	Apr 05 - Apr 06, 2024		Apr 06 - Apr 07, 2024		Apr 07 - Apr 08, 2024		Apr 08 - Apr 09, 2024		Apr 09 - Apr 10, 2024		Apr 10 - Apr 11, 2024		Apr 11 - Apr 12, 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	1.9	203.0	SSW	0.9	203.0	WNW	1.0	281.0	W	0.9	309.0	NW	0.3	220.0	SW
01:00 PM - 02:00 PM	0.8	246.0	WSW	1.4	257.0	WSW	0.9	274.0	W	0.3	253.0	WSW	0.5	172.0	S
02:00 PM - 03:00 PM	0.5	256.0	WSW	1.0	291.0	WNW	1.7	224.0	SW	1.0	210.0	SSW	0.3	204.0	SSW
03:00 PM - 04:00 PM	0.9	274.0	W	1.0	265.0	W	0.5	253.0	WSW	1.1	215.0	SW	0.3	220.0	SW
04:00 PM - 05:00 PM	0.8	263.0	W	0.3	237.0	WSW	1.7	237.0	WSW	2.0	219.0	SW	0.3	241.0	WSW
05:00 PM - 06:00 PM	0.3	247.0	WSW	1.0	228.0	SW	1.7	265.0	W	2.1	224.0	SW	0.3	217.0	SW
06:00 PM - 07:00 PM	1.1	246.0	WSW	0.8	273.0	W	1.2	202.0	SSW	0.3	146.0	SE	0.3	217.0	SW
07:00 PM - 08:00 PM	0.9	231.0	SW	0.9	232.0	SW	0.5	210.0	SSW	0.4	169.0	S	0.5	193.0	SSW
08:00 PM - 09:00 PM	1.4	227.0	SW	0.6	261.0	W	0.5	206.0	SSW	0.3	220.0	SW	0.5	120.0	ESE
09:00 PM - 10:00 PM	2.0	165.0	SSW	2.4	281.0	W	0.9	158.0	SSW	1.6	245.0	WSW	1.2	208.0	SSW
10:00 PM - 11:00 PM	2.7	223.0	SW	2.9	237.0	WSW	1.3	203.0	SSW	0.8	248.0	WSW	1.1	204.0	SSW
11:00 PM - 12:00 AM	1.4	311.0	NW	2.0	255.0	WSW	3.6	159.0	SSE	2.7	213.0	SSW	0.4	222.0	SW
12:00 AM - 01:00 AM	1.0	266.0	W	1.8	229.0	SW	1.8	317.0	NW	1.0	316.0	NW	1.0	236.0	SW
01:00 AM - 02:00 AM	1.0	253.0	WSW	1.5	174.0	S	1.0	226.0	SW	0.9	236.0	SW	1.3	125.0	SE
02:00 AM - 03:00 AM	1.2	287.0	WNW	0.7	151.0	SSE	3.0	176.0	S	1.0	224.0	SW	1.0	147.0	SSE
03:00 AM - 04:00 AM	0.6	235.0	SW	0.7	144.0	SE	0.7	282.0	WNW	0.4	194.0	SSW	1.2	225.0	SW
04:00 AM - 05:00 AM	0.4	245.0	WSW	1.5	154.0	SSE	2.4	177.0	S	2.3	231.0	SW	0.9	187.0	S
05:00 AM - 06:00 AM	1.0	175.0	S	0.9	205.0	SSW	1.2	230.0	SW	2.3	168.0	S	1.1	207.0	SSW
06:00 AM - 07:00 AM	1.4	156.0	SSE	0.7	197.0	SSW	0.4	240.0	WSW	1.0	235.0	SW	0.3	162.0	SSE
07:00 AM - 08:00 AM	3.0	165.0	SSE	1.9	191.0	S	0.3	246.0	WSW	1.8	152.0	SSE	0.3	221.0	SW
08:00 AM - 09:00 AM	1.5	163.0	SSE	1.5	184.0	S	1.3	215.0	SW	0.6	255.0	WSW	0.3	215.0	SW
09:00 AM - 10:00 AM	0.6	229.0	SW	0.6	97.0	E	0.3	241.0	WSW	1.6	201.0	SSW	0.4	216.0	SW
10:00 AM - 11:00 AM	0.7	172.0	S	1.1	256.0	WSW	0.4	171.0	S	1.2	291.0	WNW	0.8	198.0	SSW
11:00 AM - 12:00 PM	1.2	216.0	SW	1.7	266.0	W	0.8	224.0	SW	0.3	227.0	SW	0.6	217.0	SW

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

The above results are valid only for the wind speed and direction as indicated in this report. No part of this report or the data may be reproduced in any form without the prior written permission of ALS. The results are for information only and should not be used for any purpose other than that for which they were intended.

Approved by

Sarayuth Jitranont

Assistant General Manager

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

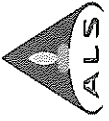
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บริการวิเคราะห์และทดสอบ



Analysis / Test Report

Client : Michelin Siam Co., Ltd.

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

Lot ID: 2437347

Date Received : Apr 12, 2024

Date Reported : Apr 23, 2024

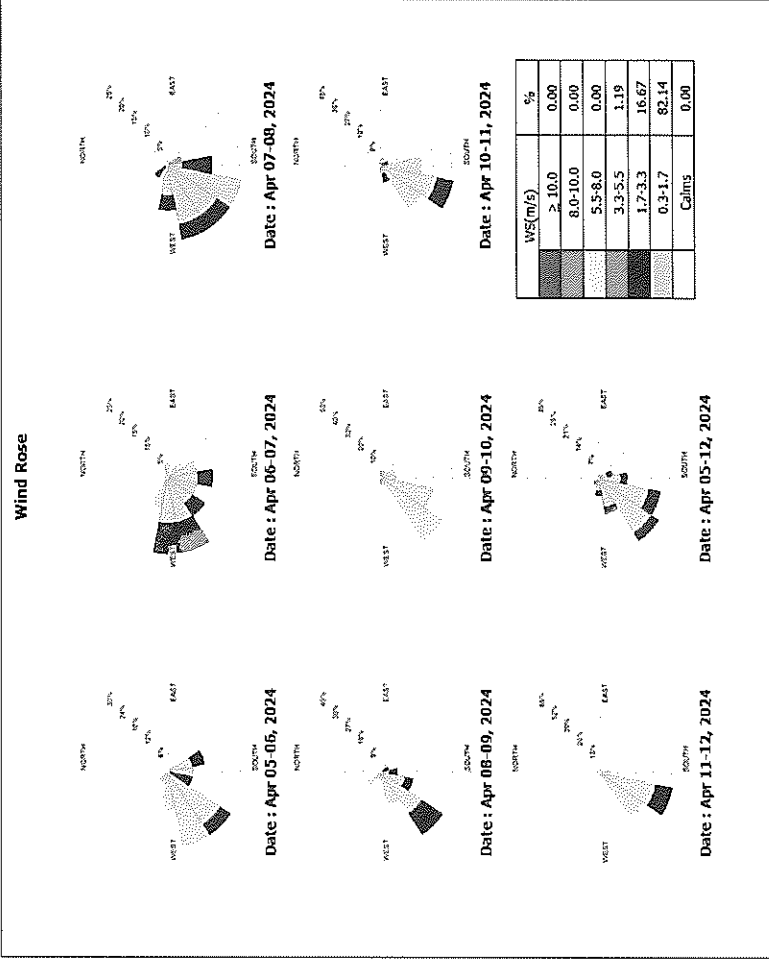
Report Number : 2953015-1

P/O :

Project Name : Environment : EIA

Project Location :

Page 1 of 2





Analysis / Test Report

Client : Nicheln 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: 2437347
Date Received : Apr 12, 2024
Date Reported : Apr 23, 2024
Report Number : 2953015-1

Page 1 of 2

Sample Number : 2437347-22 to 28
Parameter : Wind Speed / Wind Direction
Location : อุบลราชธานี (A4) (GPS 47P D747515, 1419157)
Sampling Date : Apr 05 - Apr 12, 2024
Sampling by : Anurak Tongkhaonsakda

Time	Apr 05 - Apr 06, 2024	Apr 06 - Apr 07, 2024	Apr 07 - Apr 08, 2024	Apr 08 - Apr 09, 2024	Apr 09 - Apr 10, 2024	Apr 10 - Apr 11, 2024	Apr 11 - Apr 12, 2024
WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)
11:00 AM - 12:00 PM	0.4 170.0 S	0.3 116.0 ESE	0.6 131.0 SE	0.5 129.0 SE	0.6 60.0 ENE	0.3 79.0 E	0.5 101.0 E
12:00 PM - 01:00 PM	0.4 195.0 SSW	0.3 118.0 ESE	0.3 130.0 SE	0.6 128.0 SE	0.3 58.0 ENE	0.5 76.0 ENE	0.3 98.0 E
01:00 PM - 02:00 PM	0.3 243.0 WSW	0.5 119.0 ESE	0.3 192.0 SSW	0.5 104.0 ESE	0.9 113.0 ESE	0.9 43.0 NE	0.5 106.0 ESE
02:00 PM - 03:00 PM	0.7 203.0 SSW	2.7 111.0 ESE	0.3 164.0 SSE	1.0 109.0 ESE	1.1 186.0 S	1.3 51.0 NE	0.4 22.0 NNE
03:00 PM - 04:00 PM	0.6 180.0 S	0.9 196.0 SSW	0.4 51.0 NE	1.0 164.0 SSE	1.6 102.0 ESE	1.8 146.0 SE	0.3 114.0 ESE
04:00 PM - 05:00 PM	0.5 229.0 SW	1.3 111.0 ESE	1.2 169.0 S	1.0 245.0 WSW	0.8 200.0 SSW	1.2 165.0 SSE	1.2 313.0 NW
05:00 PM - 06:00 PM	0.3 177.0 S	0.4 42.0 NE	1.8 195.0 SSW	1.0 206.0 SSW	1.2 150.0 SSE	0.3 197.0 SSW	1.1 209.0 SSW
06:00 PM - 07:00 PM	0.7 181.0 S	1.9 197.0 SSW	0.3 180.0 S	1.6 210.0 SSW	1.1 105.0 ESE	1.1 202.0 SSW	0.9 165.0 SSE
07:00 PM - 08:00 PM	0.8 214.0 SW	1.2 223.0 SW	0.5 145.0 SE	0.6 246.0 WSW	1.3 238.0 SW	0.5 96.0 E	0.9 202.0 SSW
08:00 PM - 09:00 PM	1.6 97.0 E	2.8 212.0 SSW	1.3 133.0 SE	2.6 107.0 ESE	0.3 239.0 WSW	1.3 76.0 ENE	1.5 137.0 SE
09:00 PM - 10:00 PM	1.3 134.0 SE	1.2 116.0 ESE	0.7 177.0 S	1.4 177.0 S	1.8 211.0 SSW	0.7 170.0 S	0.7 97.0 E
10:00 PM - 11:00 PM	2.2 184.0 S	1.2 215.0 SW	1.2 202.0 SSW	0.5 139.0 SE	0.4 299.0 W	1.4 220.0 SW	1.1 187.0 S
11:00 PM - 12:00 AM	0.7 98.0 E	0.3 130.0 SE	0.8 179.0 S	0.3 120.0 ESE	0.3 105.0 ESE	0.3 205.0 SSW	0.9 176.0 SE
01:00 AM - 02:00 AM	0.4 128.0 SE	0.5 115.0 ESE	0.6 164.0 SSE	0.3 93.0 E	0.6 113.0 ESE	0.6 64.0 ENE	0.3 97.0 E
02:00 AM - 03:00 AM	0.4 126.0 SE	0.5 108.0 ESE	0.5 127.0 SE	0.3 93.0 E	0.3 111.0 ESE	0.4 103.0 ESE	0.5 96.0 E
03:00 AM - 04:00 AM	0.3 120.0 ESE	0.6 108.0 ESE	0.5 126.0 SE	1.0 106.0 ESE	0.3 120.0 ESE	1.3 104.0 ESE	0.3 99.0 E
04:00 AM - 05:00 AM	0.6 117.0 ESE	0.3 131.0 SE	0.3 126.0 SE	0.6 59.0 ENE	0.3 232.0 SW	0.6 103.0 ESE	0.3 97.0 E
05:00 AM - 06:00 AM	0.3 118.0 ESE	0.3 131.0 SE	0.3 126.0 SE	0.6 60.0 ENE	0.4 107.0 ESE	0.3 103.0 ESE	0.5 97.0 E
06:00 AM - 07:00 AM	0.3 116.0 ESE	0.3 133.0 SE	0.6 130.0 SE	0.5 59.0 ENE	1.0 130.0 SE	0.3 102.0 ESE	0.5 95.0 E
07:00 AM - 08:00 AM	0.5 118.0 ESE	0.4 131.0 SE	0.8 126.0 SE	0.8 61.0 ENE	0.9 131.0 SE	0.6 100.0 E	0.6 99.0 E
08:00 AM - 09:00 AM	0.6 118.0 ESE	0.5 129.0 SE	0.9 128.0 SE	0.7 61.0 ENE	0.5 131.0 SE	0.6 100.0 E	0.3 60.0 ENE
09:00 AM - 10:00 AM	0.9 116.0 ESE	0.6 133.0 SE	1.3 128.0 SE	0.3 59.0 ENE	0.6 130.0 SE	0.3 103.0 ESE	0.3 59.0 ENE
10:00 AM - 11:00 AM	1.2 118.0 ESE	0.3 132.0 SE	0.3 128.0 SE	0.3 60.0 ENE	0.3 132.0 SE	0.3 100.0 E	0.5 59.0 ENE

Reference Method : Cup Anemometer & Anodized Aluminum Vane Method

The above results are valid only for the analyzed samples (as indicated in the report) and are not to be used for any other purpose without written consent from the Laboratory. ALS Laboratory Group (Thailand) Ltd. strongly recommends that this report is not reproduced except in full.

Approved by

Sirayuth Jitranont
Assistant General Manager

Approved by

Sirayuth Jitranont
Assistant General Manager

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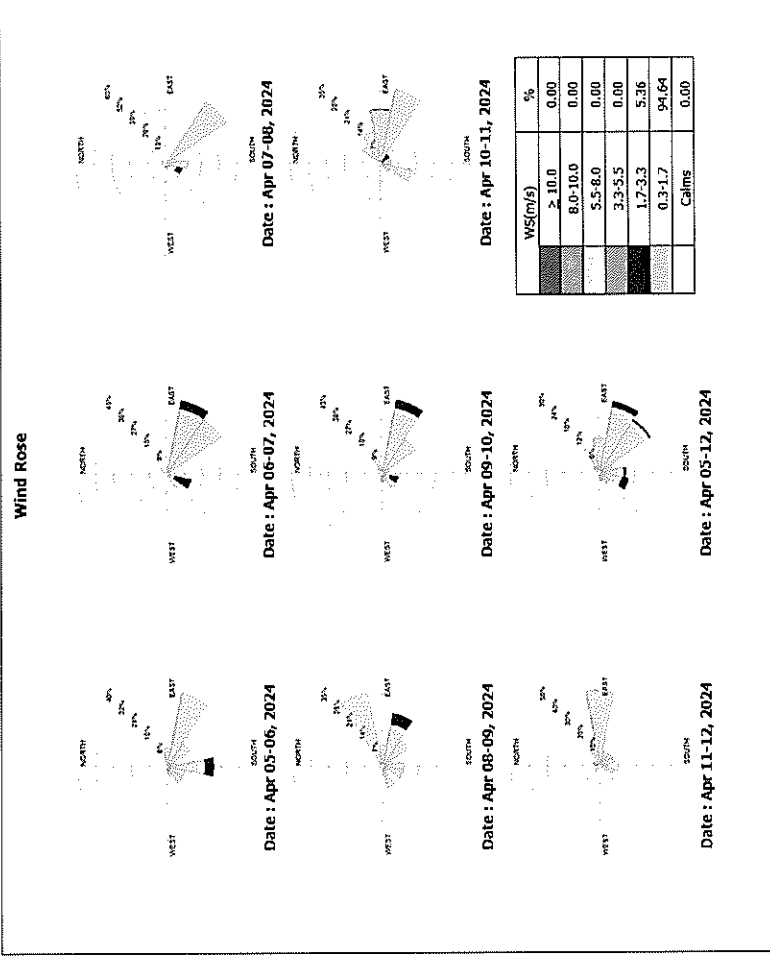
Analysis / Test Report

Client : Nicheln 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: 2437347
Date Received : Apr 12, 2024
Date Reported : Apr 23, 2024
Report Number : 2953015-1

Page 2 of 2



The above results are valid only for the analyzed samples (as indicated in the report) and are not to be used for any other purpose without written consent from the Laboratory. ALS Laboratory Group (Thailand) Ltd. strongly recommends that this report is not reproduced except in full.

Approved by

Sirayuth Jitranont
Assistant General Manager

ภาคผนวก ค-3

ระดับเสียงโดยทั่วไป



TESTING
No.0042

Lot ID: 2437520

Date Received : Apr 12, 2024
Date Reported : Apr 22, 2024
Report Number: 2966467-1

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 :
Project Name : Environment : EIA
Project Location :

Page 1 of 1

Sample Number	2437520-1
Parameter	Noise (Leq 24 hrs.)
Location	ชั้นโถงรถบรรทุกสินค้าฝั่ง (GPS 47P 0743667, 1419318)
Measurement Date	Apr 05 - Apr 05, 2024
Measurement by	Anurak Tongkhajonsakda
Sound Level meter	Serial No. 734220

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	54.8	71.2	52.6
01:00 PM - 02:00 PM	55.0	73.7	52.4
02:00 PM - 03:00 PM	55.0	71.0	52.8
03:00 PM - 04:00 PM	55.4	71.5	53.1
04:00 PM - 05:00 PM	57.7	87.0	51.2
05:00 PM - 06:00 PM	56.7	75.8	53.3
06:00 PM - 07:00 PM	56.9	77.5	53.5
07:00 PM - 08:00 PM	56.7	70.3	54.5
08:00 PM - 09:00 PM	61.1	92.3	54.5
09:00 PM - 10:00 PM	55.1	76.5	54.4
10:00 PM - 11:00 PM	55.8	72.6	53.4
11:00 PM - 12:00 AM	55.9	71.4	54.5
12:00 AM - 01:00 AM	55.4	63.4	54.3
01:00 AM - 02:00 AM	53.9	68.2	52.1
02:00 AM - 03:00 AM	56.4	65.4	54.1
03:00 AM - 04:00 AM	59.7	77.5	56.8
04:00 AM - 05:00 AM	56.9	63.4	54.1
05:00 AM - 06:00 AM	55.9	80.4	53.9
06:00 AM - 07:00 AM	55.5	75.6	53.8
07:00 AM - 08:00 AM	57.6	81.2	53.0
08:00 AM - 09:00 AM	55.6	79.0	52.0
09:00 AM - 10:00 AM	53.4	69.6	50.7
10:00 AM - 11:00 AM	52.5	70.1	50.2
11:00 AM - 12:00 PM	52.7	68.2	50.3

Leq Average 24 hrs. (dB(A))	56.4
Lmax (dB(A))	92.3
L90 (dB(A))	53.3
Ldn (dB(A))	
Standard (dB(A))	70
Reference Method : ISO1996-1 and 1996-2	
Standard	1. วิธีการคำนวณค่าเฉลี่ยแบบถ่วงน้ำหนักด้วย 15 (น.ท. 2540) ใช้กำหนดมาตรฐานระดับเสียงในอาคาร 2. วิธีการตรวจวัดค่าความดันเสียงแบบต่อเนื่องแบบอัตโนมัติด้วยเครื่องวัดค่าความดันเสียงอัตโนมัติ
Remark	1. ตาม ม.ร.ท. 2540 2. The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Tharitat.

Technical Management
Thantida Kulsunwong
Scientist (4)

Approved by

Supt S.

Supot Salameh
Section Head

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S.Vipornsai, Air Noise pr (10.35AM)

2372-637/EMAIL



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 :

Page 1 of 1

Sample Number	2437520-2
Parameter	Noise (Leq 24 hrs.)
Location	ชั้นโถงรถบรรทุกสินค้าฝั่ง (GPS 47P 0743667, 1419318)
Measurement Date	Apr 05 - Apr 07, 2024
Measurement by	Anurak Tongkhajonsakda
Sound Level meter	Serial No. 734220

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	53.6	74.8	49.7
01:00 PM - 02:00 PM	52.2	68.1	49.9
02:00 PM - 03:00 PM	53.6	74.1	50.1
03:00 PM - 04:00 PM	55.0	76.1	50.1
04:00 PM - 05:00 PM	55.5	79.9	50.5
05:00 PM - 06:00 PM	55.1	79.3	51.5
06:00 PM - 07:00 PM	55.3	74.6	51.2
07:00 PM - 08:00 PM	55.8	72.3	53.8
08:00 PM - 09:00 PM	56.4	78.9	53.9
09:00 PM - 10:00 PM	55.3	70.2	54.3
10:00 PM - 11:00 PM	55.3	69.8	54.4
11:00 PM - 12:00 AM	55.1	67.5	54.0
12:00 AM - 01:00 AM	55.5	65.7	54.5
01:00 AM - 02:00 AM	55.6	69.6	54.6
02:00 AM - 03:00 AM	55.2	64.6	52.6
03:00 AM - 04:00 AM	56.2	65.1	53.7
04:00 AM - 05:00 AM	55.8	68.7	53.6
05:00 AM - 06:00 AM	55.7	73.8	53.5
06:00 AM - 07:00 AM	57.1	79.2	53.5
07:00 AM - 08:00 AM	57.3	81.8	52.4
08:00 AM - 09:00 AM	56.6	78.8	51.9
09:00 AM - 10:00 AM	55.8	72.9	51.0
10:00 AM - 11:00 AM	54.9	72.9	52.9
11:00 AM - 12:00 PM	55.0	80.3	52.3

Leq Average 24 hrs. (dB(A))	55.5
Lmax (dB(A))	81.8
L90 (dB(A))	62.1
Ldn (dB(A))	
Standard (dB(A))	70
Reference Method : ISO1996-1 and 1996-2	
Standard	1. วิธีการคำนวณค่าเฉลี่ยแบบถ่วงน้ำหนักด้วย 15 (น.ท. 2540) ใช้กำหนดมาตรฐานระดับเสียงในอาคาร 2. วิธีการตรวจวัดค่าความดันเสียงแบบต่อเนื่องแบบอัตโนมัติด้วยเครื่องวัดค่าความดันเสียงอัตโนมัติ
Remark	1. ตาม ม.ร.ท. 2540 2. The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Tharitat.

Technical Management
Thantida Kulsunwong
Scientist (4)

Approved by

Supt S.

Supot Salameh
Section Head

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2372-637/EMAIL

S.Vipornsai, Air Noise pr (10.35AM)



TESTING
No.0042

Lot ID: 2437520

Date Received : Apr 12, 2024
Date Reported : Apr 22, 2024
Report Number: 2966469-1

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 :
Project Name : Environment : EIA
Project Location :

Sample Number	2437520-3
Parameter	Noise (Leq 24 hrs.)
Location	ตู้สินค้าบริเวณท่าเรือ (GPS 479 0743667, 1419318)
Measurement Date	Apr 07 - Apr 08, 2024
Measurement by	Anurak Tongkijjongsakda
Sound Level meter	Serial No. 734220

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	55.1	76.6	52.2
01:00 PM - 02:00 PM	54.6	78.0	52.5
02:00 PM - 03:00 PM	56.1	81.6	52.1
03:00 PM - 04:00 PM	54.3	76.4	52.2
04:00 PM - 05:00 PM	55.4	75.4	51.6
05:00 PM - 06:00 PM	58.0	78.2	52.5
06:00 PM - 07:00 PM	57.7	78.0	52.7
07:00 PM - 08:00 PM	55.7	78.5	53.2
08:00 PM - 09:00 PM	54.7	70.2	53.6
09:00 PM - 10:00 PM	55.6	68.6	54.4
10:00 PM - 11:00 PM	55.9	65.0	54.4
11:00 PM - 12:00 AM	56.3	69.3	55.1
12:00 AM - 01:00 AM	56.5	73.0	55.4
01:00 AM - 02:00 AM	56.5	61.6	53.7
02:00 AM - 03:00 AM	56.7	71.0	54.5
03:00 AM - 04:00 AM	58.2	67.9	55.9
04:00 AM - 05:00 AM	55.6	64.7	54.0
05:00 AM - 06:00 AM	56.1	75.3	53.7
06:00 AM - 07:00 AM	57.7	79.5	53.5
07:00 AM - 08:00 AM	58.9	80.8	54.2
08:00 AM - 09:00 AM	56.3	79.1	52.3
09:00 AM - 10:00 AM	55.4	70.6	53.1
10:00 AM - 11:00 AM	54.9	77.1	51.5
11:00 AM - 12:00 PM	54.2	74.4	50.4
Leq Average 24 hrs. (dB(A))	56.2		
Lmax (dB(A))	81.6		
L90 (dB(A))	53.2		
Ldn (dB(A))	62.9		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2
Standard : 1. ใช้มาตรฐานการวัดระดับความดังเสียงตามข้อกำหนดของกรมอนามัย (พ.ร.บ. 2540) สำหรับชุมชนและพื้นที่อยู่อาศัย
2. ใช้มาตรฐานการวัดระดับความดังเสียงตามข้อกำหนดของกรมอนามัย (พ.ร.บ. 2540) สำหรับพื้นที่อุตสาหกรรมและพื้นที่การค้า
15 ธันวาคม 2548
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management : *Thanitak.* Approved by : *Supt S.*
Thanita Kulsunwong Scientist (4) Supot Salanteh Section Head

ADDRESS 61/610 Moo 5 T. Maenam Khu A. Pluakdaeng Rayong 21140 Thailand PHONE +66 0 3304 8555 FAX +66 0 3304 8556
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TESTING
No.0042

Lot ID: 2437520

Date Received : Apr 12, 2024
Date Reported : Apr 22, 2024
Report Number: 2966470-1

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 :
Project Name : Environment : EIA
Project Location :

Sample Number	2437520-4
Parameter	Noise (Leq 24 hrs.)
Location	ตู้สินค้าบริเวณท่าเรือ (GPS 479 0743667, 1419318)
Measurement Date	Apr 08 - Apr 09, 2024
Measurement by	Anurak Tongkijjongsakda
Sound Level meter	Serial No. 734220

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	55.0	84.6	50.1
01:00 PM - 02:00 PM	53.3	76.5	50.1
02:00 PM - 03:00 PM	54.5	75.4	50.5
03:00 PM - 04:00 PM	53.9	77.3	50.4
04:00 PM - 05:00 PM	54.3	72.3	50.7
05:00 PM - 06:00 PM	55.5	76.7	51.1
06:00 PM - 07:00 PM	54.5	76.4	50.9
07:00 PM - 08:00 PM	57.3	77.7	53.1
08:00 PM - 09:00 PM	57.3	72.2	53.1
09:00 PM - 10:00 PM	56.2	77.9	53.8
10:00 PM - 11:00 PM	57.1	71.3	55.0
11:00 PM - 12:00 AM	57.4	66.6	55.3
12:00 AM - 01:00 AM	57.4	77.9	54.7
01:00 AM - 02:00 AM	56.9	71.1	54.5
02:00 AM - 03:00 AM	58.2	65.1	55.3
03:00 AM - 04:00 AM	58.8	65.2	56.1
04:00 AM - 05:00 AM	56.2	64.5	53.9
05:00 AM - 06:00 AM	55.7	64.5	54.1
06:00 AM - 07:00 AM	56.1	80.7	53.0
07:00 AM - 08:00 AM	58.0	76.1	53.5
08:00 AM - 09:00 AM	56.9	84.4	52.6
09:00 AM - 10:00 AM	56.2	83.1	52.4
10:00 AM - 11:00 AM	55.3	81.7	52.3
11:00 AM - 12:00 PM	54.3	71.9	51.5
Leq Average 24 hrs. (dB(A))	56.3	84.6	
Lmax (dB(A))			53.0
L90 (dB(A))	63.4		
Ldn (dB(A))	70	115	
Standard (dB(A))			

Reference Method : ISO1996-1 and 1996-2
Standard : 1. ใช้มาตรฐานการวัดระดับความดังเสียงตามข้อกำหนดของกรมอนามัย (พ.ร.บ. 2540) สำหรับชุมชนและพื้นที่อยู่อาศัย
2. ใช้มาตรฐานการวัดระดับความดังเสียงตามข้อกำหนดของกรมอนามัย (พ.ร.บ. 2540) สำหรับพื้นที่อุตสาหกรรมและพื้นที่การค้า
15 ธันวาคม 2548
Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management : *Thanitak.* Approved by : *Supt S.*
Thanita Kulsunwong Scientist (4) Supot Salanteh Section Head

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



Analysis / Test Report

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

P/O :

Project Name : Environment : EIA

Project Location :

Page 1 of 1

Sample Number	2437520-6			
Parameter	Noise (Leq 24 hrs.)			
Location	Tanjung Air Laut, Kuala Lumpur (GPS 47P 0743667, 1419318)			
Measurement Date	Apr 10 - Apr 11, 2024			
Measurement by	Anurak Tongkhajonsakda			
Sound Level meter	Serial No. 734720			
	Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
	12:00 PM - 01:00 PM	55.2	80.2	51.5
	01:00 PM - 02:00 PM	54.6	68.1	51.8
	02:00 PM - 03:00 PM	54.0	77.2	50.8
	03:00 PM - 04:00 PM	55.3	76.5	52.7
	04:00 PM - 05:00 PM	54.7	72.7	51.8
	05:00 PM - 06:00 PM	55.9	76.1	52.2
	06:00 PM - 07:00 PM	64.5	85.4	52.8
	07:00 PM - 08:00 PM	55.5	68.5	53.7
	08:00 PM - 09:00 PM	56.0	76.9	53.8
	09:00 PM - 10:00 PM	58.2	74.0	55.1
	10:00 PM - 11:00 PM	58.0	63.2	55.6
	11:00 PM - 12:00 AM	57.9	72.8	55.3
	12:00 AM - 01:00 AM	58.8	75.5	56.6
	01:00 AM - 02:00 AM	55.9	73.7	53.9
	02:00 AM - 03:00 AM	55.6	64.1	53.8
	03:00 AM - 04:00 AM	54.8	64.8	53.5
	04:00 AM - 05:00 AM	54.4	64.0	53.3
	05:00 AM - 06:00 AM	56.6	76.6	53.4
	06:00 AM - 07:00 AM	57.0	79.9	53.5
	07:00 AM - 08:00 AM	58.6	75.6	52.9
	08:00 AM - 09:00 AM	55.7	67.9	53.4
	09:00 AM - 10:00 AM	55.5	71.6	52.1
	10:00 AM - 11:00 AM	54.5	76.4	51.6
	11:00 AM - 12:00 PM	54.5	74.5	50.9

Leq Average 24 hrs. (dB(A))	57.1	
Lmax (dB(A))		85.4
L90 (dB(A))		53.3
Ldn (dB(A))	63.3	
Standard (dB(A))	70	115
Reference Method	: ISO 1996-1 and 1996-2	
Standard	: 1. มาตรฐานการวัดและประเมินผลเสียง 2. มาตรฐานการควบคุมการรบกวนจากเสียงในชุมชน โดย ม.ร.ว. 2548	
Remark	: The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.	

Technical Management	Tharitak, Thantra Kulswang Scientist (4)	Approved by	Supot Salmieteh Section Head	Supot S.
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S. Reports, Al. Noise rpt (10 364)



Analysis / Test Report

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

P/O :

Project Name : Environment : EIA

Project Location :

Page 1 of 1

Sample Number	2437520-6			
Parameter	Noise (Leq 24 hrs.)			
Location	Tanjung Air Laut, Kuala Lumpur (GPS 47P 0743667, 1419318)			
Measurement Date	Apr 10 - Apr 11, 2024			
Measurement by	Anurak Tongkhajonsakda			
Sound Level meter	Serial No. 734720			
	Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
	12:00 PM - 01:00 PM	55.2	80.2	51.5
	01:00 PM - 02:00 PM	54.6	68.1	51.8
	02:00 PM - 03:00 PM	54.0	77.2	50.8
	03:00 PM - 04:00 PM	55.3	76.5	52.7
	04:00 PM - 05:00 PM	54.7	72.7	51.8
	05:00 PM - 06:00 PM	55.9	76.1	52.2
	06:00 PM - 07:00 PM	64.5	85.4	52.8
	07:00 PM - 08:00 PM	55.5	68.5	53.7
	08:00 PM - 09:00 PM	56.0	76.9	53.8
	09:00 PM - 10:00 PM	58.2	74.0	55.1
	10:00 PM - 11:00 PM	58.0	63.2	55.6
	11:00 PM - 12:00 AM	57.9	72.8	55.3
	12:00 AM - 01:00 AM	58.8	75.5	56.6
	01:00 AM - 02:00 AM	55.9	73.7	53.9
	02:00 AM - 03:00 AM	55.6	64.1	53.8
	03:00 AM - 04:00 AM	54.8	64.8	53.5
	04:00 AM - 05:00 AM	54.4	64.0	53.3
	05:00 AM - 06:00 AM	56.6	76.6	53.4
	06:00 AM - 07:00 AM	57.0	79.9	53.5
	07:00 AM - 08:00 AM	58.6	75.6	52.9
	08:00 AM - 09:00 AM	55.7	67.9	53.4
	09:00 AM - 10:00 AM	55.5	71.6	52.1
	10:00 AM - 11:00 AM	54.5	76.4	51.6
	11:00 AM - 12:00 PM	54.5	74.5	50.9

Leq Average 24 hrs. (dB(A))	57.1	
Lmax (dB(A))		85.4
L90 (dB(A))		53.3
Ldn (dB(A))	63.3	
Standard (dB(A))	70	115
Reference Method	: ISO 1996-1 and 1996-2	
Standard	: 1. มาตรฐานการวัดและประเมินผลเสียง 2. มาตรฐานการควบคุมการรบกวนจากเสียงในชุมชน โดย ม.ร.ว. 2548	
Remark	: The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.	

Technical Management	Tharitak, Thantra Kulswang Scientist (4)	Approved by	Supot Salmieteh Section Head	Supot S.
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Analysis / Test Report

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

P/O :

Project Name : Environment : EIA

Project Location :

TESTING
No.0042

Lot ID: 2437520

Date Received : Apr 12, 2024

Date Reported : Apr 22, 2024

Report Number: 2966473-1

Page 1 of 1

Sample Number	2437520-7
Parameter	Noise (Leq 24 hrs.)
Location	ตู้เก็บขยะมูลฝอย (GPS 0743667, 1419318)
Measurement Date	Apr 11 - Apr 12, 2024
Measurement by	Anurak Tongkhajonsakda
Sound Level meter	Serial No. 734220
Time	Leq (dB(A)) Lmax (dB(A)) L90 (dB(A))
12:00 PM - 01:00 PM	53.4 69.2 49.9
01:00 PM - 02:00 PM	53.7 75.4 50.2
02:00 PM - 03:00 PM	55.3 77.1 50.0
03:00 PM - 04:00 PM	55.7 82.0 52.3
04:00 PM - 05:00 PM	56.8 78.4 51.8
05:00 PM - 06:00 PM	56.1 77.2 52.7
06:00 PM - 07:00 PM	56.2 76.3 52.6
07:00 PM - 08:00 PM	59.5 78.7 57.5
08:00 PM - 09:00 PM	58.2 80.0 55.1
09:00 PM - 10:00 PM	59.0 70.5 55.6
10:00 PM - 11:00 PM	58.0 69.2 55.9
11:00 PM - 12:00 AM	56.6 75.3 53.6
12:00 AM - 01:00 AM	56.4 75.3 54.0
01:00 AM - 02:00 AM	55.3 64.5 53.7
02:00 AM - 03:00 AM	54.5 61.4 53.7
03:00 AM - 04:00 AM	54.9 61.4 53.9
04:00 AM - 05:00 AM	54.9 66.5 53.8
05:00 AM - 06:00 AM	56.3 77.3 53.6
06:00 AM - 07:00 AM	56.1 81.4 53.4
07:00 AM - 08:00 AM	57.4 77.4 51.4
08:00 AM - 09:00 AM	55.1 78.3 52.4
09:00 AM - 10:00 AM	54.6 71.8 50.4
10:00 AM - 11:00 AM	54.4 74.4 50.4
11:00 AM - 12:00 PM	54.6 66.2 53.6
Leq Average 24 hrs. (dB(A))	56.3
Lmax (dB(A))	82.0
L90 (dB(A))	53.6
L01 (dB(A))	62.5
L05 (dB(A))	70
Standard (dB(A))	115

Reference Method : ISO1996-1 and 1996-2
Standard : 1. ใช้มาตรฐานการประเมินเสียงตามข้อกำหนด มอก. 2540 (พ.ศ. 2540) สำหรับการประเมินเสียงในชุมชน
2. ใช้มาตรฐานการประเมินเสียงตามข้อกำหนด มอก. 2540 (พ.ศ. 2540) สำหรับการประเมินเสียงในชุมชน

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

Technical Management
Tharitak.
Thanita Kulsumwong
Scientist (4)

Approved by

Supt S.
Supot Salameh
Section Head

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5 Report_Air Noise rpt 10-2640

ภาคผนวก ค-4

คุณภาพน้ำทิ้ง



Analysis / Test Report

TESTING
No.0042
Lot ID: 246738

Client : Michelin Siam Co., Ltd.

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

Project Name : Water Testing

Project Location : 246738-2

Client : Michelin Siam Co., Ltd.

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

Project Name : Water Testing

Project Location :

Page 1 of 2

Sample Number 246738-2

Sample Number	246738-2
Sample Date	Jan 19, 2024 9:34 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Jan 19, 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 (LOB)	Result	Guideline / Specification	Method	Testing Location
Water Testing							Rayong
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)	ADMT	-	5	9	≤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)	ADMT	-	5	9	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C	-	-	-	7.9	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-CI (F)	Rayong
Temperature *	Degree C	-	-	31.3	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1216	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong

Technical Management

N. Bangphit

Approved by

D. Chongchon

Narumon Banchoangkit
Supervisor
โทรศัพท์ 3-323-9-9445

Dej Chongchon
Senior Manager
โทรศัพท์ 3-323-9-9442

Results apply to the sample(s) 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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S. Waporn_LAS_Col (31-4449)

Analysis / Test Report

TESTING
No.0042
Lot ID: 246738

Client : Michelin Siam Co., Ltd.

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

Project Name : Water Testing

Project Location :

Page 2 of 2

Sample Number 246738-2

Sample Number	246738-2
Sample Date	Jan 19, 2024 9:34 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Jan 19, 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 (LOB)	Result	Guideline / Specification	Method	Testing Location
Water Testing							Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	12	≤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 : Natavut Attompranarat, โทรศัพท์ 3-323-9-0006, Patrapol Sawangjaleam, โทรศัพท์ 3-204-4-0002

Remark :

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

Technical Management

N. Bangphit

Approved by

D. Chongchon

Narumon Banchoangkit
Supervisor
โทรศัพท์ 3-323-9-9445

Dej Chongchon
Senior Manager
โทรศัพท์ 3-323-9-9442

Results apply to the sample(s) 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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S. Waporn_LAS_Col (31-4449)



Analysis / Test Report

Project Location:

TESTING
No. 0009

Lot ID: 246738
Date Received : Jan 19, 2024
Date Reported : Jan 26, 2024
Report Number : 2895864-3

Page 1 of 1

Sample Number		246738-2						
Sample Date		Jan 19, 2024 9:34 AM						
Sample Description		Wastewater						
Location		Effluent (Holding pond 5,000 m3)						
Date Analysis Commenced		Jan 20, 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 (LOB)	Result	Guideline / Specification	Method	Testing Location	
Metals Testing	Iron	mg/L	0.003	0.005	0.36	No Standard	Bangkok	
							Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	
Water Testing	Conductivity at 25 Degree C. *	micromhos/cm	-	0.5	1611	No Standard	Rayong	
							Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2510 B	
Dissolved Oxygen *		mg/L	-	0.1	6.0	No Standard	Rayong	
							Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Q (C)	

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

Remark:

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

Samitoo N.

**Sawilree Nongsiam
Manager**

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272-31

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Analysis / Test Report

Project location:

TESTING
No 0009

Lot ID: 246738
Date Received : Jan 19, 2024
Date Reported : Jan 26, 2024
Report Number : 2895864-2

Page 1 of 1

Sample Number	246738-2						
Sample Date	Jan 19, 2024 9:34 AM						
Sample Description	Wastewater						
Location	Effluent (Holding pond 5,000 m3)						
Date Analysis Commenced	Jan 20, 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 (LOB)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.11	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.62	≤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.2568 (2017).

Remark :

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Technical Management

Kurt Adler

Approved by

Kanokkorn Anek
Senior Manager

ทะเบียนเลขที่ 3-204-ค-61:1

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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 :

Date Received : Feb 15, 2024

Date Reported : Feb 22, 2024

Report Number : 291713-1

Project Name : Water Testing

Project Location :

Page 1 of 2

Sample Number	246771-2
Sample Date	Feb 15, 2024 9:30 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Feb 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 (LOB)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADNI	-	5	11	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADNI	-	5	9	≤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	-	-	-	7.8	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	-	-	31.6	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1660	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong

Technical Management

N. Banphit

Narumon Banchongkit

Supervisor

โทรศัพท์ 3-323-9-9445

Approved by

D. Chongchon

Dej Chongchon

Senior Manager

โทรศัพท์ 3-323-9-9442

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S. Waporn, ALS-QA, ver (10-12-04)

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 :

Date Received : Feb 15, 2024

Date Reported : Feb 22, 2024

Report Number : 291713-1

Project Name : Water Testing

Project Location :

Page 2 of 2

Sample Number	246771-2
Sample Date	Feb 15, 2024 9:30 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Feb 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 (LOB)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	15	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2550 (2007).

Sampling By : Natawat Athornprommarat โทรศัพท์ 3-323-9-0006, Thanasoun Namakuma โทรศัพท์ 3-204-4-8592

Remark :

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Technical Management

N. Banphit

Narumon Banchongkit

Supervisor

โทรศัพท์ 3-323-9-9445

Approved by

D. Chongchon

Dej Chongchon

Senior Manager

โทรศัพท์ 3-323-9-9442

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S. Waporn, ALS-QA, ver (10-12-04)



Analysis / Test Report

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

TESTING
No.0009
Lot ID: 246771
Date Received : Feb 15, 2024
Date Reported : Feb 22, 2024
Report Number : 2917713-2

Page 1 of 1

Sample Number	246771-2
Sampled Date	Feb 15, 2024 9:30 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Feb 16, 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	0.12	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.75	≤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 : Natasart Ahompramart รหัสประจำตัว 7-323-3-0005, Thanassun Namakuma รหัสประจำตัว 7-204-3-8592

Remark :
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Technical Management

Savitree N.
Savitree Nolsangiam
Manager
รหัสประจำตัว 7-204-3-4709

Approved by

Kanokorn Anuk.
Kanokorn Anuk
Senior Manager
รหัสประจำตัว 7-204-3-6111

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S. (Report) ALI Co., Ltd. (4.00PM)



Analysis / Test Report

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

TESTING
No.0009
Lot ID: 246771
Date Received : Feb 15, 2024
Date Reported : Feb 22, 2024
Report Number : 2917713-3

Page 1 of 1

Sample Number	246771-2
Sampled Date	Feb 15, 2024 9:30 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Feb 16, 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	0.86	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	micromhos/cm	-	0.5	2167	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	5.2	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Rayong

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

Sampling By : Natasart Ahompramart , Thanassun Namakuma

Remark :
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Approved by

Savitree N.
Savitree Nolsangiam
Manager

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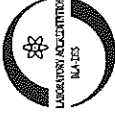
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S. (Report) ALI Co., Ltd. (4.00PM)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Rayong Thailand 21120
P/O :
Project Name : Water Testing
Project Location :
Sample Number : 2416628-2
Sampled Date : Mar 14, 2024 10:55 AM
Sample Description : Wastewater
Location : Effluent (Holding pond 5,000 m3)
Sampling period : 12 months
Guideline : MOI 2560
Date Analysis Commenced : Mar 14, 2024
Condition of Sample : Contained in one BOD bottle, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Page 1 of 2

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O-G	Rayong
COD	mg/L	1.5	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	8	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	7	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C	-	-	-	7.6	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Rayong
Temperature *	Degree C	-	-	33.0	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O-G	Rayong
COD	mg/L	1.5	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	8	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	7	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C	-	-	-	7.6	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Rayong
Temperature *	Degree C	-	-	33.0	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong

Technical Management : N. Banchongkit
Supervisor : Natamon Banchongkit
wattana@n-323-n-9445
Approved by : D. Changchon
Senior Manager : Dej Changchon
wattana@n-323-n-9445

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5. Report_ALS-01 (4.38P)

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Rayong Thailand 21120
P/O :
Project Name : Water Testing
Project Location :
Sample Number : 2416628-2
Sampled Date : Mar 14, 2024 10:55 AM
Sample Description : Wastewater
Location : Effluent (Holding pond 5,000 m3)
Sampling period : 12 months
Guideline : MOI 2560
Date Analysis Commenced : Mar 14, 2024
Condition of Sample : Contained in one BOD bottle, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Page 2 of 2

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1088	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	19	≤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 : Sansoen Kiatpoksri wattana@n-323-n-0005, Panupong Maik wattana@n-204-n-0109

Remark :

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Technical Management : N. Banchongkit
Supervisor : Natamon Banchongkit
wattana@n-323-n-9445
Approved by : D. Changchon
Senior Manager : Dej Changchon
wattana@n-323-n-9445

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5. Report_ALS-01 (4.38P)

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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 :
Lot ID: 2416628
No.0009
Date Received : Mar 14, 2024
Date Reported : Mar 21, 2024
Report Number : 2943360-2

Sample Number 2416628-2
Sampled Date Mar 14, 2024 10:55 AM
Sample Description Wastewater
Location Effluent (Holding pond 5,000 m3)
Sampling period : 12 months
Guideline : M01 2560
Date Analysis Commenced Mar 15, 2024
Condition of Sample Contained in one BOD bottle, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.10	≤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	0.0003	0.0005	0.73	≤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 : Sansoen Khuyoksui เวศนุสนธิ์ 3-323-3-0005 , Panupong Manit เวศนุสนธิ์ 3-204-3-0109

Remark :
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Technical Management

Chanatt L.

Chanattagom Inthong
Section Head

วณิชญานันท์ 3-204-3-0008

Approved by

Kanokorn Anek

Senior Manager
วณิชญานันท์ 3-204-3-0004

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Water Testing
Project Location :
Lot ID: 2416628
No.0009
Date Received : Mar 14, 2024
Date Reported : Mar 21, 2024
Report Number : 2943360-3

Sample Number 2416628-2
Sampled Date Mar 14, 2024 10:55 AM
Sample Description Wastewater
Location Effluent (Holding pond 5,000 m3)
Sampling period : 12 months
Guideline : M01 2560
Date Analysis Commenced Mar 15, 2024
Condition of Sample Contained in one BOD bottle, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.0003	0.0005	0.96	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	1456	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	2.6	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 : Sansoen Khuyoksui เวศนุสนธิ์ , Panupong Mani เวศนุสนธิ์

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

Approved by

Chanatt L.

Chanattagom Inthong
Section Head

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.

pro :

Project Name : Water Testing

Project Location:

Page 2 of 2

Sample Number 2430938-2

Sampled Date Apr 12, 2024 10:10 AM

Sample Description	Wastewater
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Location
Effluent (Holding pond 5,000 m³)

Date Analysis Commenced Apr 12, 2024

Condition of Sample: Contained in one BOD bottle; one amber glass bottle and four plastic bottles; sample containers comply to pretreatment - preservation standards (APHA - USEPA)

Analysis	Unit	LOD	LOQ (LOD)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	18	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

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

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

Narumon Banchongkit

Supervisor

ทะเบียนเลขที่ 7-323-2-9445

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Analysis / Test Report

TESTING
No.0009
Lot ID: 2430938

Date Received : Apr 12, 2024
Date Reported : Apr 23, 2024
Report Number : 2971338-3

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

Page 1 of 1

Sample Number	2430938-2
Sampled Date	Apr 12, 2024 10:10 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Apr 13, 2024
Condition of Sample	Contained in one BOD bottle, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	1.28	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	1840	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	4.9	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Rayong

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

Sampling By : Narurat Uthammasaro , Thanasoon Namakunna

Remark :

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Approved by

Savitree N.

Savitree Noinanglam
Manager

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S. Vajratanalab, CL-MS (13199)



Analysis / Test Report

TESTING
No.0009
Lot ID: 2430938

Date Received : Apr 12, 2024
Date Reported : Apr 23, 2024
Report Number : 2971338-2

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

Page 1 of 1

Sample Number	2430938-2
Sampled Date	Apr 12, 2024 10:10 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Apr 13, 2024
Condition of Sample	Contained in one BOD bottle, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.13	≤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	0.70	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

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

Sampling By : Narurat Uthammasaro วิสุณณารัตน์ ๖-323-๖-9477 , Thanasoon Namakunna วิสุณณารัตน์ ๖-204-๖-0101

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Technical Management

Savitree N.

Savitree Noinanglam
Manager

Approved by

Korakorn Anuk.

Korakorn Anuk
Senior Manager

วิสุณณารัตน์ ๖-204-๖-0004

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S. Vajratanalab, CL-MS (13199)



Analysis / Test Report

TESTING

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 :
Sample Number : 2439459-2
Sampled Date : May 14, 2024 9:40 AM
Sample Description : Wastewater
Location : Effluent (Holding pond 5,000 m3)
Date Analysis Commenced : May 14, 2024
Condition of Sample : Contained in one BOD bottle, one amber glass bottle, two glass vials and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Lot ID: 2439459
Date Received : May 14, 2024
Date Reported : May 21, 2024
Report Number : 2998055-1

Page 1 of 2

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Water Testing							Rayong
BOD (5 days at 20 Degree C)	mg/L	-	2.0	2.7	≤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	10	≤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	9	≤300	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C	-	-	-	7.7	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (D)	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	-	-	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	1216	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong

Technical Management

Approved by

Dej Changchon

Senior Manager
วิฑูรย์ 3-323-a-9442

Technical Management

Approved by

Photchanas S.

Scientist (4)
วิฑูรย์ 3-323-a-9446

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Analysis / Test Report

TESTING

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 :
Sample Number : 2439459-2
Sampled Date : May 14, 2024 9:40 AM
Sample Description : Wastewater
Location : Effluent (Holding pond 5,000 m3)
Date Analysis Commenced : May 14, 2024
Condition of Sample : Contained in one BOD bottle, one amber glass bottle, two glass vials and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Lot ID: 2439459
Date Received : May 14, 2024
Date Reported : May 21, 2024
Report Number : 2998055-1

Page 2 of 2

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Water Testing							Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	6	≤50	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 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 Resources and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07 A.E.2560 (2017).
Sampling By : Haruot Thummasano วิฑูรย์ 3-323-a-9477, Smart Khumpluee วิฑูรย์ 3-323-a-0084

Remark :
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Technical Management

Approved by

Photchanas S.

Scientist (4)
วิฑูรย์ 3-323-a-9446

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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.0009
Lot ID: 2439459
Date Received : May 14, 2024
Date Reported : May 21, 2024
Report Number : 2598055-2

Page 1 of 1

Sample Number	2439459-2
Sampled Date	May 14, 2024 9:40 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	May 15, 2024
Condition of Sample	Contained in one BOD bottle, one amber glass bottle, two glass vials and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.05	≤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	0.31	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

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

Sampling By : Narurat thammassaro รหัสประจำตัว 3-323-9-9477, Smart Khumphee รหัสประจำตัว 3-204-9-0084

Remark :

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Technical Management

Savitree N.

Savitree Nongsangam
Manager

Approved by

Kanokorn Anek

Senior Manager
รหัสประจำตัว 3-204-9-0004

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Water Testing
Project Location :
TESTING
No.0042
Lot ID: 2439459
Date Received : May 14, 2024
Date Reported : May 21, 2024
Report Number : 2598055-3

Page 1 of 1

Sample Number	2439459-2
Sampled Date	May 14, 2024 9:40 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	May 15, 2024
Condition of Sample	Contained in one BOD bottle, one amber glass bottle, two glass vials and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.46	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	1659	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	6.9	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Rayong

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

Sampling By : Narurat thammassaro , Smart Khumphee

Remark :

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Approved by

Savitree N.

Savitree Nongsangam
Manager

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Analysis / Test Report

TESTING
No.0042
Lot ID: 2465770

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 :
Sample Number : 2465770-2
Sampled Date : Jun 14, 2024 9:40 AM
Sample Description : Wastewater
Location : Effluent (Holding pond 5,000 m3)
Date Analysis Commenced : Jun 14, 2024
Condition of Sample : Contained in one amber glass bottle, one BOD bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Date Received : Jun 14, 2024
Date Reported : Jun 21, 2024
Report Number : 3032424-1

Page 1 of 2

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	3.7	≤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	27	≤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	10	≤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	10	≤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	-	-	-	7.4	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	-	-	35.4	≤40	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1164	≤3000	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	-	5	≤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 : Sanseen Khuyokun วิสุมานันท์ 3-323-9-0005 / Kordbundi Kitisupavanit วิสุมานันท์ 3-204-4-0001

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Technical Management

Approved by

Dej Changchon

Senior Manager
วิสุมานันท์ 3-323-9-9442

Photchanas S.

Photchanas Seeda
Scientist (4)
วิสุมานันท์ 3-323-9-9446

Technical Management

Approved by

Dej Changchon

Senior Manager
วิสุมานันท์ 3-323-9-9442

Photchanas S.

Photchanas Seeda
Scientist (4)
วิสุมานันท์ 3-323-9-9446

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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:

TESTING
No.0009
Lot ID: 2465770
Date Received : Jun 14, 2024
Date Reported : Jun 21, 2024
Report Number : 3032424-2

Page 1 of 1

Sample Number	2465770-2
Sampled Date	Jun 14, 2024 9:40 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Jun 17, 2024
Condition of Sample	Contained in one amber glass bottle, one BOD bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.06	≤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	0.51	≤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 : Sansoen Khuyoksui รหัสประจำตัว 3-323-0-0005, Karabundit Kitisupavan รหัสประจำตัว 3-204-0-0001

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

Technical Management

Savitree N.
Savitree Nongsangiam
Manager
รหัสประจำตัว 3-204-0-0007

Approved by

Kanokorn Anok
Kanokorn Anok
Senior Manager
รหัสประจำตัว 3-204-0-0004

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S (Report)_AU_GL.pdf (5.4799K)



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:

TESTING
No.0009
Lot ID: 2465770
Date Received : Jun 14, 2024
Date Reported : Jun 21, 2024
Report Number : 3032424-3

Page 1 of 1

Sample Number	2465770-2
Sampled Date	Jun 14, 2024 9:40 AM
Sample Description	Wastewater
Location	Effluent (Holding pond 5,000 m3)
Date Analysis Commenced	Jun 15, 2024
Condition of Sample	Contained in one amber glass bottle, one BOD bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.32	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Conductivity at 25 Degree C *	microhm/cm	-	0.5	1502	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2510 B	Rayong
Dissolved Oxygen *	mg/L	-	0.1	5.1	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Rayong

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

Sampling By : Sansoen Khuyoksui , Karabundit Kitisupavan

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 Nongsangiam
Manager

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ภาคผนวก ค-5

คุณภาพดิน



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Bankhai, Rayong Thailand 21120
P/O : 451051256
Project Name : Environment : EIA
Project Location :
Lot ID: 2447306
Date Received : May 14, 2024
Date Reported : May 23, 2024
Report Number : 3000747-1

Page 1 of 1

Sample Number 2447306-2
Sample Date May 14, 2024 10:05 AM
Sample Description Soil
Location S1 หน้าบ้านไร่ 2
Date Analysis Commenced May 16, 2024
Condition of Sample Packed in one glass bottle and one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/kg	-	1.00	89.6	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 : Samart Khumphlee

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

Result apply to this sample only. ALS is not responsible for the accuracy of the results if the sample is not properly prepared or if the sample is not representative of the material being tested. ALS is not responsible for the accuracy of the results if the sample is not properly prepared or if the sample is not representative of the material being tested. ALS is not responsible for the accuracy of the results if the sample is not properly prepared or if the sample is not representative of the material being tested.

Approved by

Savitree N.

Savitree Nongsangman
Manager

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2374-02/THAIL

S. Reports_AIS_GLP (8.2024)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Bankhai, Rayong Thailand 21120
P/O : 451051256
Project Name : Environment : EIA
Project Location :
Lot ID: 2447306
Date Received : May 14, 2024
Date Reported : May 23, 2024
Report Number : 3000747-2

Page 1 of 1

Sample Number 2447306-2
Sample Date May 14, 2024 10:05 AM
Sample Description Soil
Location S1 หน้าบ้านไร่ 2
Date Analysis Commenced May 15, 2024
Condition of Sample Packed in one glass bottle and one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/kg	-	1.00	31.3	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	8714	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Physical Parameters							
Moisture	%	-	0.1	10.1	No Standard	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 G	Bangkok

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

Note : Analysis Results expressed on dry basis.

Sampling By : Samart Khumphlee

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

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Approved by

Savitree N.

Savitree Nongsangman
Manager

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand 21120
Lot ID: 2447306
Date Received : May 14, 2024
Date Reported : May 23, 2024
Report Number : 3000749-1
P/O : 4510512526
Project Name : Environment : EIA
Project Location :

Page: 1 of 1

Sample Number 2447306-4
Sampled Date May 14, 2024 10:20 AM
Sample Description Soil
Location S1 หนองผืน 30 หนองผืน ตำบลท่าช้าง 2
Date Analysis Commenced May 16, 2024
Condition of Sample Packed in one glass bottle and one plastic 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	62.3	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 : Samart Khumphlee

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

Approved by

Sawitree N.
Manager

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2272-627 (EAIL)

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Analysis / Test Report

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Lot ID: 2447306
Date Received : May 14, 2024
Date Reported : May 23, 2024
Report Number : 3000749-2
P/O : 4510512526
Project Name : Environment : EIA
Project Location :

Page: 1 of 1

Sample Number 2447306-4
Sampled Date May 14, 2024 10:20 AM
Sample Description Soil
Location S1 หนองผืน 30 หนองผืน ตำบลท่าช้าง 2
Date Analysis Commenced May 15, 2024
Condition of Sample Packed in one glass bottle and one plastic 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	12.3	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	9809	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Physical Parameters							
Moisture	%	-	0.1	12.6	No Standard	In-house method based on Standard Methods for the Examination of Water and Wastewater, 23rd ed., 2017, part 2540 G	Bangkok

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

Note : Analysis Results expressed on dry basis.

Sampling By : Samart Khumphlee

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

Approved by

Sawitree N.
Manager

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2272-627 (EAIL)

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
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P/O : 4510512526
Date Received : May 14, 2024
Date Reported : May 23, 2024
Project Name : Environment : EIA
Report Number : 3000751-1
Project Location :

Lot ID: 2447306

Page 1 of 1

Sample Number 2447306-6
Sampled Date May 14, 2024 10:30 AM
Sample Description Soil
Location S2 หน้าบ้าน บ้านไร่ 2
Date Analysis Commenced May 16, 2024
Condition of Sample Packed in one glass bottle and one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/kg	-	1.00	59.3	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 : Samart Khumphlee

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Savitree N.

Savitree Nongsiam
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2272 02/ PMU

S. Reports, L. All, G. opt (B. 12PM)



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
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P/O : 4510512526
Date Received : May 14, 2024
Date Reported : May 23, 2024
Project Name : Environment : EIA
Report Number : 3000751-2
Project Location :

Lot ID: 2447306

Page 1 of 1

Sample Number 2447306-6
Sampled Date May 14, 2024 10:30 AM
Sample Description Soil
Location S2 หน้าบ้าน บ้านไร่ 2
Date Analysis Commenced May 15, 2024
Condition of Sample Packed in one glass bottle and one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/kg	-	1.00	15.6	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	4192	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Physical Parameters							
Moisture	%	-	0.1	10.4	No Standard	In-house method based on Standard Method for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 G	Bangkok

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

Note : Analysis Results expressed on dry basis.

Sampling By : Samart Khumphlee

Remark :
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Savitree N.

Savitree Nongsiam
Manager

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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 : 4510512576
Project Name : Environment : EIA
Project Location :
Lot ID: 2447306
Date Received : May 14, 2024
Date Reported : May 23, 2024
Report Number : 3000753-2

Page 1 of 1

Sample Number 2447306-8
Sample Date May 14, 2024 10:50 AM
Sample Description Soil
Location S2 หนองน้ำ 30 หนองน้ำ 2
Date Analysis Commenced May 15, 2024
Condition of Sample Packed in one glass bottle and one plastic 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	5.32	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	1924	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Physical Parameters							
Moisture	%	-	0.1	7.0	No Standard	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, 23rd Ed., 2540 G	Bangkok

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

Note : Analysis Results expressed on dry basis.

Sampling By : Samart Khumpluee

Remark :
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Approved by
Savitree N.
Savitree Nonsangam
Manager



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak, Bankhai, Rayong Thailand 21120
P/O : 4510512576
Project Name : Environment : EIA
Project Location :
Lot ID: 2447306
Date Received : May 14, 2024
Date Reported : May 23, 2024
Report Number : 3000753-1

Page 1 of 1

Sample Number 2447306-8
Sample Date May 14, 2024 10:50 AM
Sample Description Soil
Location S2 หนองน้ำ 30 หนองน้ำ 2
Date Analysis Commenced May 16, 2024
Condition of Sample Packed in one glass bottle and one plastic 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	18.5	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 : Samart Khumpluee

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Savitree N.
Savitree Nonsangam
Manager



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 : 4510512526
Project Name : Environment : EIA
Project Location :
Lot ID: 2447306
Date Received : May 14, 2024
Date Reported : May 23, 2024
Report Number : 3000755-1

Page 1 of 1

Sample Number	2447306-10
Sample Date	May 14, 2024 11:05 AM
Sample Description	Soil
Location	S3 หมู่บ้าน บ้านใหม่ 2
Date Analysis Commenced	May 16, 2024
Condition of Sample	Packed in one glass bottle and one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/kg	-	1.00	337	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 : Samart Khumplinee

Remark :
LOD : Limit of Detection
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Savitree N.

Approved by

Savitree Nongniam
Manager

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2272-67/HAUL

S. Reports_ML_01_01 (8.2019)



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 : 4510512526
Project Name : Environment : EIA
Project Location :
Lot ID: 2447306
Date Received : May 14, 2024
Date Reported : May 23, 2024
Report Number : 3000755-2

Page 1 of 1

Sample Number	2447306-10
Sample Date	May 14, 2024 11:05 AM
Sample Description	Soil
Location	S3 หมู่บ้าน บ้านใหม่ 2
Date Analysis Commenced	May 15, 2024
Condition of Sample	Packed in one glass bottle and one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOB)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/kg	-	1.00	66.1	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	10283	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Physical Parameters							
Moisture	%	-	0.1	13.0	No Standard	In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 G	Bangkok

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

Note : Analysis Results expressed on dry basis.

Sampling By : Samart Khumplinee

Remark :
LOD : Limit of Detection
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Savitree N.

Approved by

Savitree Nongniam
Manager

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510512526
Project Name : Environment : EIA
Project Location :
Lot ID: 2447306
Date Received : May 14, 2024
Date Reported : May 23, 2024
Report Number : 3000757-1

Page 1 of 1

Sample Number 2447306-12
Sampled Date May 14, 2024 11:25 AM
Sample Description Soil
Location S3 ๕๓๓๓๓ 30 ๕๓๓๓๓ ๕๓๓๓๓ 2
Date Analysis Commenced May 16, 2024
Condition of Sample Packed in one glass bottle and one plastic 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	57.4	1000	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures
Note : Analysis Results expressed on dry basis.
Sampling By : Samart Khumplinee

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

Approved by
Savitree N.
Savitree Nongsangam
Manager

Result apply to the sample(s) is submitted, unless the sample(s) 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 retransmitted except in full.

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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 : 4510512526
Project Name : Environment : EIA
Project Location :
Lot ID: 2447306
Date Received : May 14, 2024
Date Reported : May 23, 2024
Report Number : 3000757-2

Page 1 of 1

Sample Number 2447306-12
Sampled Date May 14, 2024 11:25 AM
Sample Description Soil
Location S3 ๕๓๓๓๓ 30 ๕๓๓๓๓ ๕๓๓๓๓ 2
Date Analysis Commenced May 15, 2024
Condition of Sample Packed in one glass bottle and one plastic 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	10.2	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Iron	mg/kg	-	1.00	9471	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok

Physical Parameters
Moisture %
- 0.1
11.0
No Standard
In-house method based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, 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 : Samart Khumplinee

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

Approved by
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Savitree Nongsangam
Manager

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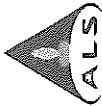
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ภาคผนวก ค-6

ระดับความร้อนในสถานที่ทำงาน



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lak-Bankhai Road, Nong-Lak-Lok, Bankhai, Rayong Thailand
21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2429525
Date Received : Mar 29, 2024
Date Reported : Apr 01, 2024
Report Number: 2937690-1

Page 1 of 6

Sample Number	2429525-1
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Mar 28, 2024
Measurement by	Chanon Booncheun
Location	ใกล้จาน 1 พื้น (ใกล้-จานเก่า ใกล้จาน : - อุณหภูมิ : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่หน้าอาคาร (H 1) (Boiler # R-Tech)	120	32.7	29.6	40.0	39.8

Average (WBGT)	32.7
Guideline WBGT (°C)	34.0

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Supt S.

Supot Salamtah
Section Head

Approved by

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21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2429525
Date Received : Mar 29, 2024
Date Reported : Apr 01, 2024
Report Number: 2937690-1

Page 2 of 6

Sample Number	2429525-2
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Mar 28, 2024
Measurement by	Chanon Booncheun
Location	ใกล้จาน 1 พื้น (ใกล้-จานเก่า ใกล้จาน : - อุณหภูมิ : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่หน้าอาคาร (H 2) (อาคาร ใช้งาน # RTG)	120	26.5	24.0	32.4	32.0

Average (WBGT)	26.5
Guideline WBGT (°C)	34.0

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

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21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2429525
Date Received : Mar 29, 2024
Date Reported : Apr 01, 2024
Report Number: 2937890-1

Page 3 of 6

Sample Number	2429525-3
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Mar 28, 2024
Measurement by	Chanon Booncheun
Location	บริเวณงาน 1 หลัง (ด้านหลังประตูด้าน : - ด้าน : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่กลางแจ้ง (H 3) (H 32(กลางแจ้ง) / RTD)	120	26.1	23.9	31.2	31.2
Average (WBGT)		26.1			
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

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P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2429525
Date Received : Mar 29, 2024
Date Reported : Apr 01, 2024
Report Number: 2937890-1

Page 4 of 6

Sample Number	2429525-4
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Mar 28, 2024
Measurement by	Chanon Booncheun
Location	บริเวณงาน 1 หลัง (ด้านหลังประตูด้าน : - ด้าน : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณพื้นที่กลางแจ้ง (H 4) (Wet Drawing # RCD.1)	120	24.9	22.4	30.8	30.8
Average (WBGT)		24.9			
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 :
Project Name : Environment : EIA
Project Location :
Lot ID: 2429525
Date Received : Mar 29, 2024
Date Reported : Apr 01, 2024
Report Number: 2937690-1

Page 5 of 6

Sample Number	2429525-5
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Mar 28, 2024
Measurement by	Charon Booncheun
Location	บริเวณ 1 หลัง (ดู-สนามหญ้า : - อุณหภูมิ : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณหลังคาสนามหญ้า (H 5) (Wet Drawing # RCD 2)	120	23.0	20.4	29.0	28.8
Average (WBGT)		23.0			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

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21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2429525
Date Received : Mar 29, 2024
Date Reported : Apr 01, 2024
Report Number: 2937690-1

Page 6 of 6

Sample Number	2429525-6
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Mar 28, 2024
Measurement by	Charon Booncheun
Location	บริเวณ 1 หลัง (ดู-สนามหญ้า : - อุณหภูมิ : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณหลังคาสนามหญ้า (H 6) (Wet Drawing # RCD 3)	120	24.0	21.2	30.5	30.4
Average (WBGT)		24.0			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

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129 Moo 3, Nong-Lok-Banhai Road, Nong-Lok, Bangkok, Rayong Thailand
21120
P/O : 4510512526
Project Name : Environment : EIA
Project Location :
Lot ID: 2468867
Date Received : Jun 21, 2024
Date Reported : Jun 24, 2024
Report Number: 3027402-1

Page 1 of 6

Sample Number	2468867-1					
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)					
Measurement Date	Jun 20, 2024					
Measurement by	Nattakam Vonginyoo					
Location	บริเวณ 1 หลัง (ด้านหลัง บัณฑิต : - unun : -)					
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)	
บริเวณ 1 หลัง (ด้านหลัง บัณฑิต : - unun : -)	120	33.9	29.7	43.6	43.6	
Average (WBGT)	33.9					
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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S. Vongpattana, Air Heat ref (4 0579)



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21120
P/O : 4510512526
Project Name : Environment : EIA
Project Location :
Lot ID: 2468867
Date Received : Jun 21, 2024
Date Reported : Jun 24, 2024
Report Number: 3027402-1

Page 2 of 6

Sample Number	2468867-2				
Parameter	Heat Stress (Sampling Time : 09.30 AM - 11.30 AM)				
Measurement Date	Jun 19, 2024				
Measurement by	Nattakam Vonginyoo				
Location	บริเวณงาน 1 หลัง (ด้านหลังอาคาร ฝึกซ้อม - มุม :-)				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณที่วัดอุณหภูมิและแสงแดด (H2) (ด้านหลังอาคาร # RTO)	120	27.5	24.8	33.8	33.6
Average (WBGT)		27.5			
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

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21120

P/O : 451051256

Project Name : Environment : EIA

Project Location :

Lot ID: 2468867

Date Received : Jun 21, 2024

Date Reported : Jun 24, 2024

Report Number: 3027402-1

Page 3 of 6

Sample Number 2468867-3

Parameter Heat Stress (Sampling Time : 09.30 AM - 11.30 AM)

Measurement Date Jun 19, 2024

Measurement by Nattakarn Yonginyoo

Location ฝั่งด้าน 1 ฝั่ง (ฝั่ง-สนามหญ้าฝั่งด้าน : - อุณหภูมิ : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณสนามหญ้าด้าน (H3) (ฝั่ง 32 (แนว) / RTD)	120	27.9	25.4	33.8	33.7

Average (WBGT) 27.9

Guideline WBGT (°C) 34.0

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

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3 (Version), Air Heat ref (4 (02/24))



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

21120

P/O : 451051256

Project Name : Environment : EIA

Project Location :

Lot ID: 2468867

Date Received : Jun 21, 2024

Date Reported : Jun 24, 2024

Report Number: 3027402-1

Page 4 of 6

Sample Number 2468867-4

Parameter Heat Stress (Sampling Time : 09.30 AM - 11.30 AM)

Measurement Date Jun 19, 2024

Measurement by Nattakarn Yonginyoo

Location ฝั่งด้าน 1 ฝั่ง (ฝั่ง-สนามหญ้าฝั่งด้าน : - อุณหภูมิ : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณสนามหญ้าด้านหน้า (H4) (Wet Drawing # RCD1)	120	23.9	21.7	29.0	28.1

Average (WBGT) 23.9

Guideline WBGT (°C) 34.0

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

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3 (Version), Air Heat ref (4 (02/24))



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Rayong Thailand
21120
P/O : 4510512526
Project Name : Environment : EIA
Project Location :
Lot ID: 2468867
Date Received : Jun 21, 2024
Date Reported : Jun 24, 2024
Report Number: 3027402-1

Page 5 of 6

Sample Number	2468867-5									
Parameter	Heat Stress (Sampling Time : 09.30 AM - 11.30 AM)									
Measurement Date	Jun 19, 2024									
Measurement by	Nattakarn Yonginyoo									
Location	บริเวณทางหลวงหมายเลข 309 (กม.ที่ 14+500) : - มุม : -									
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)					
บริเวณทางหลวงหมายเลข 309 (กม.ที่ 14+500) (H5) (Wet Drawing ± RCD2)	120	22.6	20.5	27.6	27.6					
Average (WBGT)						22.6				
Guideline WBGT (°C)						34.0				

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
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21120
P/O : 4510512526
Project Name : Environment : EIA
Project Location :
Lot ID: 2468867
Date Received : Jun 21, 2024
Date Reported : Jun 24, 2024
Report Number: 3027402-1

Page 6 of 6

Sample Number	2468867-6									
Parameter	Heat Stress (Sampling Time : 09.30 AM - 11.30 AM)									
Measurement Date	Jun 19, 2024									
Measurement by	Nattakarn Yonginyoo									
Location	บริเวณทางหลวงหมายเลข 309 (กม.ที่ 14+500) : - มุม : -)									
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)					
บริเวณทางหลวงหมายเลข 309 (กม.ที่ 14+500) (H8) (Wet Drawing # RCD3)	120	23.9	21.7	29.0	29.0					
Average (WBGT)	23.9									
Guideline WBGT (°C)	34.0									

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management

Supt S.

Supot Salamtah
Section Head

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

ภาคผนวก ค-7

คุณภาพอากาศในสถานประกอบการ



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lai-Lok-Bankhai Road, Nong-Lai-Lok, Bankhai, Rayong Thailand
21120
Lot ID: 2429527
Date Received : Mar 29, 2024
Date Reported : Jul 03, 2024
Report Number : 2937696-1 Rev. No.1
P/O : 4510512526
Project Name : Environment : EIA
Project Location :
Page 1 of 4

Sample Number	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
2429527-1	Mar 28, 2024							
Sample Description	Air Quality							
Location	พื้นที่บ้านนา D1							
Date Analysis Commenced	Apr 02, 2024							
Condition of Sample	Drawn into two filter papers placed in plastic cassette							
Barometric Pressure	759 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing								
Respirable Dust	10:00 AM - 12:00 PM	mg/m3	- 0.15	<0.15	5	Based on NIOSH (1998), 0600	OSHA	Rayong
Total Dust	10:00 AM - 12:00 PM	mg/m3	- 0.15	0.51	15	Based on NIOSH (1994), 0500	OSHA	Rayong

Guideline :
OSHA : Occupational Safety and Health Administration
Note : This Analysis test report is resubmitted to supersede report No.2937696-1, Date Reported : Apr 05, 2024 due to revise sample information.
Sampled By : Chanon Booncheun
Remark :
LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by
Saranya Chalerthamrong
Scientist (4)

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Analysis / Test Report

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21120
Lot ID: 2429527
Date Received : Mar 29, 2024
Date Reported : Jul 03, 2024
Report Number : 2937696-1 Rev. No.1
P/O : 4510512526
Project Name : Environment : EIA
Project Location :
Page 2 of 4

Sample Number	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
2429527-2	Mar 28, 2024							
Sample Description	Air Quality							
Location	พื้นที่บ้านนา D2							
Date Analysis Commenced	Apr 02, 2024							
Condition of Sample	Drawn into two filter papers placed in plastic cassette							
Barometric Pressure	759 mmHg							
Atmospheric Temperature	31.0 °C							
Analyte	Sampled Date/Time	Unit	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing								
Respirable Dust	10:00 AM - 12:00 PM	mg/m3	- 0.15	<0.15	5	Based on NIOSH (1998), 0600	OSHA	Rayong
Total Dust	10:00 AM - 12:00 PM	mg/m3	- 0.15	0.42	15	Based on NIOSH (1994), 0500	OSHA	Rayong

Guideline :
OSHA : Occupational Safety and Health Administration
Note : This Analysis test report is resubmitted to supersede report No.2937696-1, Date Reported : Apr 05, 2024 due to revise sample information.
Sampled By : Chanon Booncheun
Remark :
LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by
Saranya Chalerthamrong
Scientist (4)

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21120
P/O : 451051256
Project Name : Environment : EIA
Project Location :
Lot ID: 2429527
Date Received : Mar 29, 2024
Date Reported : Jul 03, 2024
Report Number : 2937696-1 Rev. No.1
Page 3 of 4

Sample Number	2429527-3	Sampled Date	Mar 28, 2024	Sample Description	Air Quality	Location	ห้วยหินขาว (F1)	Date Analysis Commenced	Apr 01, 2024	Condition of Sample	Drawn into one sorbent tube, refrigerated	Barometric Pressure	759 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			10:00 AM - 12:00 PM		mg/m3	-	0.05		<0.05	1		Based on OSHA, ID-174-SG												Bangkok
Sulfuric acid			10:00 AM - 12:00 PM		mg/m3	-	0.05		<0.05	1		Based on OSHA, ID-174-SG												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)
Note : This Analysis test report is reissued to supersede report No.2937696-1, Date Reported : Apr 05, 2024 due to revise sample information.
Sampled By : Chanon Booncheum

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

Approved by
Savanya C.
Saranya Chalermthammong
Scientist (4)

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Analysis / Test Report

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21120
P/O : 451051256
Project Name : Environment : EIA
Project Location :
Lot ID: 2429527
Date Received : Mar 29, 2024
Date Reported : Jul 03, 2024
Report Number : 2937696-1 Rev. No.1
Page 4 of 4

Sample Number	2429527-4	Sampled Date	Mar 28, 2024	Sample Description	Air Quality	Location	ห้วยหินขาว (F2)	Date Analysis Commenced	Apr 01, 2024	Condition of Sample	Drawn into one sorbent tube, refrigerated	Barometric Pressure	759 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			10:00 AM - 12:00 PM		mg/m3	-	0.05		<0.05	1		Based on OSHA, ID-174-SG												Bangkok
Sulfuric acid			10:00 AM - 12:00 PM		mg/m3	-	0.05		<0.05	1		Based on OSHA, ID-174-SG												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)
Note : This Analysis test report is reissued to supersede report No.2937696-1, Date Reported : Apr 05, 2024 due to revise sample information.
Sampled By : Chanon Booncheum

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

Approved by
Savanya C.
Saranya Chalermthammong
Scientist (4)

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Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-Lok-Bankhai, Bangkok, Rayong Thailand
21120
Lot ID: 2468868
Date Received : Jun 21, 2024
Date Reported : Jun 28, 2024
Report Number : 3027406-1
P/O : 4510512526
Project Name : Environment : EIA
Project Location :

Page 1 of 4

Sample Number	2468868-1								
Sampled Date	Jun 21, 2024								
Sample Description	Air Quality								
Location	พื้นที่ด้าน D1								
Date Analysis Commenced	Jun 22, 2024								
Condition of Sample	Drawn into two filter papers placed in plastic cassette								
Barometric Pressure	755 mmHg								
Atmospheric Temperature	32.0 °C								
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Respirable Dust	08:30 AM - 04:30 PM	mg/m3	-	0.15	<0.15	5	Based on NIOSH (1998), OSHA 0600	OSHA	Rayong
Total Dust	08:30 AM - 04:30 PM	mg/m3	-	0.15	0.73	15	Based on NIOSH (1994), OSHA 0500	OSHA	Rayong

Guideline :
OSHA : Occupational Safety and Health Administration
Sampled By : Nattakarn Vonginyoo
Remark :
LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by
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Saranya Chalermbanmong
Scientist (4)

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21120
Lot ID: 2468868
Date Received : Jun 21, 2024
Date Reported : Jun 28, 2024
Report Number : 3027406-1
P/O : 4510512526
Project Name : Environment : EIA
Project Location :

Page 2 of 4

Sample Number	2468868-2									
Sampled Date	Jun 19, 2024									
Sample Description	Air Quality									
Location	Auditorium D2									
Date Analysis Commenced	Jun 22, 2024									
Condition of Sample	Drawn into two filter papers placed in plastic cassette									
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										
Respirable Dust	08:30 AM - 04:30 PM	mg/m3	-	0.15	<0.15	5	Based on NIOSH (1998), OSHA 0600	OSHA	Rayong	
Total Dust	08:30 AM - 04:30 PM	mg/m3	-	0.15	<0.15	15	Based on NIOSH (1994), OSHA 0500	OSHA	Rayong	

Guideline :
OSHA : Occupational Safety and Health Administration
Sampled By : Nattakarn Vonginyoo
Remark :
LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by
Savanya C.
Saranya Chalermbanmong
Scientist (4)

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21120
P/O : 4510512526
Project Name : Environment : EIA
Project Location :
Lot ID: 2468868
Date Received : Jun 21, 2024
Date Reported : Jun 28, 2024
Report Number : 3027406-1

Page 3 of 4

Sample Number	2468868-3							
Sampled Date	Jun 19, 2024							
Sample Description	Air Quality							
Location	ห้วยไคร้ (F1)							
Date Analysis Commenced	Jun 26, 2024							
Condition of Sample	Drawn into one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.4 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline Testing Location
Air Testing								
Phosphoric acid	08:30 AM - 04:30 PM	mg/m3	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL Bangkok
Sulfuric acid	08:30 AM - 04:30 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 : Nattakarn Vongthipoo

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

Swanya C.

Approved by
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Scientist (4)

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21120
P/O : 4510512526
Project Name : Environment : EIA
Project Location :
Lot ID: 2468868
Date Received : Jun 21, 2024
Date Reported : Jun 28, 2024
Report Number : 3027406-1

Page 4 of 4

Sample Number	2468868-4							
Sampled Date	Jun 19, 2024							
Sample Description	Air Quality							
Location	ห้วยไคร้ (F2)							
Date Analysis Commenced	Jun 26, 2024							
Condition of Sample	Drawn into one sorbent tube, refrigerated							
Barometric Pressure	755 mmHg							
Atmospheric Temperature	31.4 °C							
Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Phosphoric acid	08:30 AM - 04:30 PM	mg/m3	-	0.05	<0.05	1	Based on OSHA, ID-174-SG	MOL Bangkok
Sulfuric acid	08:30 AM - 04:30 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 : Nattakarn Vongthipoo

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

Swanya C.

Approved by
Swanya Chaitamthamrong
Scientist (4)

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ภาคผนวก ค-8

ระดับเสียงในสถานที่ทำงาน



Analysis / Test Report

Client : Michelin Siam Co., Ltd.
129 Moo 3, Nong-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2429523
Date Received : Mar 29, 2024
Date Reported : Apr 03, 2024
Report Number: 2952634-1

Page 1 of 1

Sample Number	2429523-1
Parameter	Noise (Leq 8 hrs.)
Location	บริเวณใกล้ทางแยกถนนสุขุมวิท (N1) (Heat treatment & Brass Coating #/RTO)
Measurement Date	Mar 28, 2024
Measurement by	Sawal Tongpho
Time	
09:00 AM - 10:00 AM	81.3
10:00 AM - 11:00 AM	83.5
11:00 AM - 12:00 PM	79.8
12:00 PM - 01:00 PM	81.4
01:00 PM - 02:00 PM	82.5
02:00 PM - 03:00 PM	82.2
03:00 PM - 04:00 PM	81.8
04:00 PM - 05:00 PM	82.3
Leq Average 8 hrs. (dB(A))	81.9
Lmax (dB(A))	100.4
Standard (dB(A))	90
Reference Method : ISO1996-1 and 1996-2	
Standard : กรมควบคุมมลพิษ (ฉบับแก้ไขเพิ่มเติมครั้งที่ 1 พ.ศ. 2556)	
Turn to be used for the purpose of the report only	

Technical Management

Tharitat.

Thantia Kulsumwong
Scientist (4)

Approved by

Supt S.

Supot Salameh
Section Head

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Analysis / Test Report

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129 Moo 3, Nong-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O :
Project Name : Environment : EIA
Project Location :
Lot ID: 2429523
Date Received : Mar 29, 2024
Date Reported : Apr 03, 2024
Report Number: 2952635-1

Page 1 of 1

Sample Number	2429523-2
Parameter	Noise (Leq 8 hrs.)
Location	บริเวณใกล้ทางแยกถนนสุขุมวิท (N2) (Wet Drawing (Cedro)/RCD3)
Measurement Date	Mar 28, 2024
Measurement by	Sawal Tongpho
Time	
09:00 AM - 10:00 AM	81.9
10:00 AM - 11:00 AM	81.9
11:00 AM - 12:00 PM	81.3
12:00 PM - 01:00 PM	82.3
01:00 PM - 02:00 PM	82.9
02:00 PM - 03:00 PM	82.4
03:00 PM - 04:00 PM	86.1
04:00 PM - 05:00 PM	81.7
Leq Average 8 hrs. (dB(A))	82.1
Lmax (dB(A))	90.6
Standard (dB(A))	90
Reference Method : ISO1996-1 and 1996-2	
Standard : กรมควบคุมมลพิษ (ฉบับแก้ไขเพิ่มเติมครั้งที่ 1 พ.ศ. 2556)	
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Technical Management

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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 : 4510512526
Project Name : Environment : EIA
Project Location :
Lot ID: 2468865
Date Received : Jun 21, 2024
Date Reported : Jun 27, 2024
Report Number: 3037400-1

Page 1 of 1

Sample Number	2468865-1
Parameter	Noise (Leq 8 hrs.)
Location	บริเวณใกล้สะพานข้ามแม่น้ำ (N1) (Heat treatment & Brass Coating #/RTO)
Measurement Date	Jun 19, 2024
Measurement by	Nattakarn Vonghyoo
Time	Leq (dB(A)) Lmax (dB(A)) L90 (dB(A))
08:56 AM - 09:56 AM	81.7 84.4 75.5
09:56 AM - 10:56 AM	81.8 91.7 75.8
10:56 AM - 11:56 AM	81.5 84.4 76.0
11:56 AM - 12:56 PM	82.5 85.3 82.2
12:56 PM - 01:56 PM	79.5 87.5 75.7
01:56 PM - 02:56 PM	76.3 82.1 75.8
02:56 PM - 03:56 PM	76.6 77.4 76.5
03:56 PM - 04:56 PM	79.0 86.4 75.2
Leq Average 8 hrs. (dB(A))	80.4
Lmax (dB(A))	91.7
Standard (dB(A))	90
Reference Method : ISO 1996-1 and 1996-2	
Standard : กรมมาตรฐานอุตสาหกรรม (ตามข้อกำหนดการประเมินผลกระทบทางสิ่งแวดล้อม พ.ศ.๒๕๖๑)	

Technical Management

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Thantita Kulsumwong
Scientist (4)

Approved by

Supt S.

Supot Salameh
Section Head

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2272-62/ EMAIL

S.Vijayaratne, Air Noise rpt (11-14MM)



Analysis / Test Report

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129 Moo 3, Nong-La-Lok-Bankhai Road, Nong-La-Lok, Bankhai, Rayong Thailand 21120
P/O : 4510512526
Project Name : Environment : EIA
Project Location :
Lot ID: 2468865
Date Received : Jun 21, 2024
Date Reported : Jun 27, 2024
Report Number: 3037401-1

Page 1 of 1

Sample Number	2468865-2
Parameter	Noise (Leq 8 hrs.)
Location	บริเวณใกล้สะพานข้ามแม่น้ำ (N2) (Wet Drawing (Cadm)/RCOS)
Measurement Date	Jun 19, 2024
Measurement by	Nattakarn Vonghyoo
Time	Leq (dB(A)) Lmax (dB(A)) L90 (dB(A))
09:16 AM - 10:16 AM	83.1 92.3 82.3
10:16 AM - 11:16 AM	84.2 98.3 83.5
11:16 AM - 12:16 PM	83.8 85.3 83.2
12:16 PM - 01:16 PM	83.9 87.1 83.2
01:16 PM - 02:16 PM	83.4 85.9 82.6
02:16 PM - 03:16 PM	84.0 89.7 83.6
03:16 PM - 04:16 PM	83.9 88.1 83.2
04:16 PM - 05:16 PM	83.7 86.8 83.0
Leq Average 8 hrs. (dB(A))	83.8
Lmax (dB(A))	92.3
Standard (dB(A))	90
Reference Method : ISO 1996-1 and 1996-2	
Standard : กรมมาตรฐานอุตสาหกรรม (ตามข้อกำหนดการประเมินผลกระทบทางสิ่งแวดล้อม พ.ศ.๒๕๖๑)	

Technical Management

Tharitat.

Thantita Kulsumwong
Scientist (4)

Approved by

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S.Vijayaratne, Air Noise rpt (11-14MM)

ภาคผนวก ง

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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_FS0527	31-Jan-24	31-Jul-24	6
Stack	Oxides of Nitrogen	Pitot Tube	BKK_FS0531	31-Jan-24	31-Jul-24	6
Stack	Oxides of Nitrogen	Flue gas Analyzer	RYG_FS0563	26-Jan-24	25-Jan-25	12
Stack	Oxides of Nitrogen	Vacuum Gauge	RYG_FS0332	30-Mar-23	30-Sep-24	18
Stack	Oxides of Nitrogen	SPECTROPHOTOMETER	RYG_EN0037	18-Sep-23	18-Mar-25	18
Stack	Phosphoric acid	Console Control Unit	BKK_FS0527	31-Jan-24	31-Jul-24	6
Stack	Phosphoric acid	Pitot Tube	BKK_FS0531	31-Jan-24	31-Jul-24	6
Stack	Phosphoric acid	Flue gas Analyzer	RYG_FS0563	26-Jan-24	25-Jan-25	12
Stack	Phosphoric acid	Dry Gas	BKK_FS0534	9-Jan-24	9-Jul-24	6
Stack	Phosphoric acid	Ion Chromatography	BKK_EN0069	12-Jan-24	12-Jan-25	12
Stack	Sulfuric Acid	Console Control Unit	BKK_FS0527	31-Jan-24	31-Jul-24	6
Stack	Sulfuric Acid	Pitot Tube	BKK_FS0531	31-Jan-24	31-Jul-24	6
Stack	Sulfuric Acid	Flue gas Analyzer	RYG_FS0563	26-Jan-24	25-Jan-25	12
Stack	Total Suspended Particulate	Console Control Unit	BKK_FS0527	31-Jan-24	31-Jul-24	6
Stack	Total Suspended Particulate	Pitot Tube	BKK_FS0531	31-Jan-24	31-Jul-24	6
Stack	Total Suspended Particulate	Flue gas Analyzer	RYG_FS0563	26-Jan-24	25-Jan-25	12
Stack	Total Suspended Particulate	Digital Balance	RYG_EN0003	22-Feb-24	22-Feb-25	12
Ambient	Total Suspended Particulate	High Volume	RYG_FS0181	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0174	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0176	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0664	-	-	On site Calibration
Ambient	Total Suspended Particulate	Digital Balance	RYG_EN0001	22-Feb-24	22-Feb-25	12
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0264	4-Jan-24	4-Jul-24	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0457	4-Jan-24	4-Jul-24	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0461	4-Jan-24	4-Jul-24	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0261	4-Jan-24	4-Jul-24	6
Ambient	Sulfuric Acid	Field Rotameter	RYG_FS0658	1-Apr-24	1-Jul-24	3
Ambient	Sulfuric Acid	Ion Chromatography	BKK_EN0069	12-Jan-24	12-Jan-25	12
Ambient	Phosphoric acid	Field Rotameter	RYG_FS0658	1-Apr-24	1-Jul-24	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_FS0544	21-Jul-23	21-Jan-25	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0414	10-Feb-23	10-Aug-24	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0531	19-Jan-23	19-Jul-24	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0329	18-Aug-23	18-Feb-25	18
Workplace	Total Dust	Field Rotameter	RYG_FS0197	4-Jan-24	4-Apr-24	3
Workplace	Total Dust	Field Rotameter	RYG_FS0659	1-Apr-24	1-Jul-24	3
Workplace	Total Dust	Digital Balance	RYG_EN0004	22-Feb-24	22-Feb-25	12
Workplace	Respirable Dust	Field Rotameter	RYG_FS0197	4-Jan-24	4-Apr-24	3
Workplace	Respirable Dust	Field Rotameter	RYG_FS0659	1-Apr-24	1-Jul-24	3
Workplace	Respirable Dust	Digital Balance	RYG_EN0004	22-Feb-24	22-Feb-25	12
Workplace	Phosphoric Acid	Field Rotameter	RYG_FS0655	4-Jan-24	4-Apr-24	3
Workplace	Phosphoric Acid	Field Rotameter	RYG_FS0658	1-Apr-24	1-Jul-24	3
Workplace	Phosphoric Acid	Ion Chromatography	BKK_EN0069	12-Jan-24	12-Jan-25	12
Workplace	Sulfuric Acid	Field Rotameter	RYG_FS0655	4-Jan-24	4-Apr-24	3
Workplace	Sulfuric Acid	Field Rotameter	RYG_FS0658	1-Apr-24	1-Jul-24	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_FS0030	25-Jan-24	24-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0031	10-Aug-23	10-Aug-24	12
Noise	Leq 8 hrs	Sound Calibrator	RYG_FS0496	26-Jan-24	25-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0494	23-Feb-24	22-Feb-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0495	23-Feb-24	22-Feb-25	12
Noise	Leq 24 hrs	Sound Calibrator	RYG_FS0213	28-Feb-24	27-Feb-25	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0026	25-Jan-24	24-Jan-25	12



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Heat	Heat Stress	Heat Stress Monitor	RYG_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_FS0524	26-Jan-24	25-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0577	15-Jan-24	14-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0578	20-Jul-23	20-Jul-24	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0579	20-Jul-23	20-Jul-24	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0219	15-Feb-24	14-Feb-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0220	11-Jan-24	10-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0221	11-Jan-24	10-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0223	12-Jan-24	11-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0226	16-Feb-24	15-Feb-25	12
Rayong Lab	pH at 25 °C	pH meter	RYG_EN0183	19-Jan-24	19-Jan-25	12
Rayong Lab	BOD	DO meter with Sensor	RYG_EN0032	24-Jul-23	24-Jan-25	18
Rayong Lab	BOD	Incubator	RYG_EN0154	29-May-23	29-Nov-24	18
Rayong Lab	COD	Spectrophotometer	RYG_EN0037	18-Sep-23	18-Mar-25	18
Rayong Lab	Total Suspended Solids	Electronic Balance	RYG_EN0002	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
Rayong Lab	Conductivity	Conductivity meter	RYG_EN0029	4-Sep-23	4-Mar-25	18
Rayong Lab	Temperature	pH meter	RYG_FS0574	1-Apr-24	1-Apr-25	12
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 (Cold 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 (Cold 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 (Cold Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
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 (Cold 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 (Cold 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 (Cold Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18



CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Barometric Pressure (mmHg) 754
Relative Humidity (%) 53.0
Temperature (C°) 27.0

Reference Dry Gas Meter Data

Reference Dry Gas Meter ID BKK_0623
Serial No. 1607009
Correction Factor (V) 1.0000
Next Calibration Date 9-Jun-24

Console Control Meter Data

Calibration No. C-310124-BKK_FS0527
Dry Gas Meter ID BKK_FS0527
Serial No. 1508053
Model No. XC-572-V

ΔH (mm-H ₂ O)	Θ Moles	Reference Dry Gas Meter Calibration					Console Control Drygas Meter					Dry Gas Meter Correction Factor	Orifice Calibration Factor
		V ₁ (Liters)			T ₁ (°C)	V ₂ (Liters)			T ₂ (°C)	To (°C)	Avg. T _m (°C)		
		Final	Initial	Total		Final	Initial	Total					
15	-1.02	150.00	0.00	150.00	31.0	60227.0	60232.0	145.00	30.0	30.0	30.0	1.0239	41.9111
25	9.01	150.00	0.00	150.00	31.0	60238.6	60241.9	145.00	30.0	30.0	30.0	1.0243	41.9987
50	6.38	150.00	0.00	150.00	31.0	60253.0	60254.0	145.00	31.0	31.0	31.0	1.0256	41.9765
69	5.04	150.00	0.00	150.00	31.0	60258.8	60259.0	145.89	31.0	31.0	31.0	1.0260	41.9127
120	4.12	150.00	0.00	150.00	31.0	60261.2	60275.0	145.70	31.0	31.0	31.0	1.0241	42.0117
												Avg	1.0237

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

ΔV_{avg} Official 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 5.3.1.7

Calibrated by

Mr. Sakit Phaisanphut

Approved by

Mr. Natthapol Jengwarewong

(Mr. Sakit Phaisanphut)

RYG Field Services Scientist (4)

(Mr. Natthapol Jengwarewong)

RYG Field Services Specialist (1)

FORM NO. F-65-027 REVISION 2 ISSUE DATE 20-JUL-12



Stopwatch Calibration Test Report

Calibration Date 31 Jan 24
Barometric Pressure (mmHg) 754
Relative Humidity (%) 53.0

Next Cal Date 30 Jul 24
Temperature (C°) 27.0

Reference Stopwatch Data

Stopwatch ID No RYG_FS0540
Model F808
Serial No E18051
Calibration Date 9 Dec 22
Certificate No E-2009018

Console Control Meter Data

Dry Gas Meter No BKK_FS0527
Model XC-572-V
Serial No 1508053

Run No	Time Actual (m:ss.ms)	Time Reading (m:ss)	Diff (ms)	Diff (min)
1	5:00:03	5:00	3	0:00:05
2	5:00:09	5:00	9	0:00:13
3	5:00:09	5:00	9	0:00:15
4	5:00:11	5:00	11	0:00:18
5	5:00:05	5:00	5	0:00:08
6	5:00:05	5:00	5	0:00:10
7	5:00:05	5:00	5	0:00:10
8	5:00:08	5:00	8	0:00:13
9	5:00:09	5:00	9	0:00:15
10	5:00:07	5:00	7	0:00:12
Average				0:00:12
SD				0:00:04

Calibrate by

Mr. Sakit Phaisanphut

Approved by

Mr. Natthapol Jengwarewong

RYG Field Service Scientist (4)

RYG Field Service Specialist (1)



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date	31 Jan 24	Ambient Temperature (°C)	27		
Calibration sheet No.	G-310124-BKK_FS0527	Relative Humidity (%)	53		
Digital Temperature ID	BKK_FS0527	Reference Temperature ID	BKK_FS1144		
Serial No		Serial No	20100000013		
Model	XC-672-V	Model	Digicon-CG-VI-M5		
		Next Calibrate	14 Aug 24		
Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass
	100	100	0	±3	Pass
	150	150	0	±3	Pass
	200	200	0	±3	Pass
Probe	250	250	0	±3	Pass
	300	300	0	±3	Pass
	500	501	1	±3	Pass
	100	101	1	±3	Pass
	120	121	1	±3	Pass
	140	141	1	±3	Pass
Oven	100	101	-	±3	-
	120	121	-	±3	-
	140	142	-	±3	-
Filter	100	102	2	±3	Pass
	120	121	1	±3	Pass
	140	141	1	±3	Pass
Exit	0	1	1	±3	Pass
	10	0	-1	±3	Pass
	20	20	0	±3	Pass
Meter	0	-1	-1	±3	Pass
	25	24	-1	±3	Pass
	50	48	-2	±3	Pass
AUX	0	-1	-1	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass

MPE (Maximum permissible error of measurement) ค่าความคลาดเคลื่อนสูงสุดที่อนุญาต

Calibrated by

Mr. Sakit Phaisanphut

RYG Field Services Scientist (4)

Approved by

Mr. Natthapol Jengwarewong

RYG Field Services Specialist (1)

FORM NO. F-65-027 REVISION NO. 2 ISSUE DATE 16-2-23



PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

Calibration Date	31 Jan 24			Nozzle Set ID	BKK_FS0533
Calibration Sheet No	C-310124-BKK_FS0533			Vernier Caliper ID	BKK_FS1123

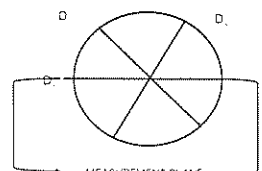
Nozzle ID #	Nozzle Diameter (cm.)			Hi - Lo	ID - D ₁ - D ₂ Δ
	D ₁	D ₂	D ₃	ΔD	D _{1,2}
1	0.316	0.318	0.316	0.002	0.317
2	0.480	0.475	0.474	0.005	0.476
3	0.635	0.635	0.635	0.000	0.635
4	0.791	0.792	0.791	0.001	0.791
5	0.950	0.952	0.951	0.002	0.951
6	1.068	1.080	1.069	0.009	1.066
7	1.270	1.270	1.270	0.000	1.270
8	1.598	1.600	1.598	0.002	1.599

Where

D₁, D₂, D₃ Three different nozzle diameters at 60 degrees to each other, each measured to the nearest 0.005 mm

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

D₃ ID - D₁ - D₂ ΔD₃



Calibrated by

Mr. Sakit Phaisanphut

Field Scientist (4)

Approved by

Mr. Natthapol Jengwarewong

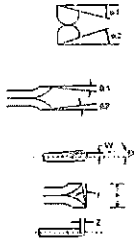
Field Specialist (1)

FORM NO. F-65-027 REVISION NO. 2 ISSUE DATE 16-2-23



Type S Pitot Tube Calibration

Date Calibration 31-Jan-24 Due Date 31-Jul-24
Pitot ID BKK_FS0531 Inclinator ID BKK_FS1131
Pitot SN - Vernier ID RYG_FS0539



Parameter	Value	Allowable Range	Check
α_1	0.6	$-10^\circ < \alpha_1 < +10^\circ$	OK
α_2	1.4	$-10^\circ < \alpha_2 < +10^\circ$	OK
β_1	-2.3	$-5^\circ < \beta_1 < +5^\circ$	OK
β_2	-0.5	$-5^\circ < \beta_2 < +5^\circ$	OK
γ	-1.1	-	-
θ	1.3	-	-
$Z = A \tan \gamma$	-0.017	$Z \leq 0.125"$	OK
$W = A \tan \theta$	0.020	$W \leq 0.031"$	OK
Dt	0.311	$0.188" \leq Dt \leq 0.375"$	OK
A/2Dt	1.415	$1.05 \leq A/2Dt \leq 1.5$	OK
A	0.88	$2.10t \leq A \leq 3Dt$	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.

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

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

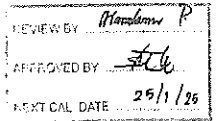
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Calibration Certificate



Certificate No: G 670052
Date of Issue: 26-Jan-24

Instrument description : Flue Gas Analyzer
Instrument model : Testo 350 New
Control unit serial no. : 03580098/1121
Instrument serial no. : 02995047/1121
ID no. or control no. : RYG_FS0563
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 : 2 Pages
Receiving no. : L-240266
Receiving date : 24-Jan-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 : $23 \pm 5^\circ\text{C}$
Humidity : $55 \pm 15\% \text{RH}$
Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsongkhong, Lakki, Bangkok 10210
Calibration procedure no. : This instrument was calibrated by comparison with Standard gas mixture according to calibration Work Instruction no. WI-CL-28-C
The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. This certificate is applied only to item under test Environmental condition.
This Calibration Certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature and seal not valid and The results relate only to the items tested/calibrated.
This calibration certificate documents are traceability to national standards, which realize measurement according to the International System of Units (SI).
Date of calibration : 26-Jan-24



FM-CL-09-C Rev.8

Page 1 of 2

Issued Date 26/01/25

FORM NO.: F06-124 REVISION NO.: 0 ISSUE DATE: 25/12/23

Entech Industrial Solution Co., Ltd.

17/121 Soi Ngamwongwan 47 Yaek 48 Toongsongkhong, Lakki Bangkok 10210 THAILAND Tel: 0 2779-8888 Calibration Center: 0 2779-8888 Fax: 0 2779-8888 Email: info@entech.co.th

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Calibration Certificate



Certificate No.: G 670052



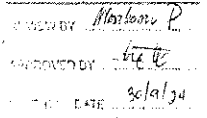
CALIBRATION LABORATORY Co., LTD.
210-11, 14-15 Soi Pracha Manee 20 Yaek 4, Klongmanee Rd., Ladprao, Bangkok 10320
Tel: 02-518-0354 Fax: 02-518-7972 www.calibrationlab.co.th E-mail: info@calibrationlab.co.th



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : VACUUM GAUGE
MANUFACTURER : QUALITYWELL
MODEL / TYPE : N/A
SERIAL NO. : VG01[RYG_FS0332]
CLID. NO. : 212300695
JOB CONTROL NO. : 230329034806



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

DATE OF RECEIVED : 29 March 2023

DATE OF ISSUED : 31 March 2023

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

Calibrated By : Sittipong Pimdee
Calibration Engineer



Approved By : Mongkol Yotsoontom
Authorized Signatory
31 March 2023

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

Certificate No. Q23034806

F3-011-04/01-12

page 1 of 3

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.50 % Vol	2412/23	Unide	27-Aug-27
Oxygen (O ₂) 10.04 % Vol	CG-0153-21	Nimt	10-Nov-26
Oxygen (O ₂) 21.02 % Vol	CG-0041-22	Nimt	10-Feb-27
Carbon monoxide (CO) 80.14 ppm	CG-0010-22	Nimt	14-Feb-27
Carbon monoxide (CO) 302 ppm	1915/23	Unide	16-Jun-25
Carbon monoxide (CO) 1003 ppm	2584/23	Unide	10-Sep-25
Nitrogen Dioxide (NO ₂) 30.34 ppm	2703/23	Unide	22-Aug-24
Nitrogen Dioxide (NO ₂) 80.96 ppm	3240/21	Unide	26-Jun-24
Nitrogen Dioxide (NO ₂) 201.9 ppm	1975/23	Unide	17-Jul-25
Nitric Oxide (NO) 30.01 ppm	CG-0014-23	Nimt	19-Feb-25
Nitric Oxide (NO) 151.5 ppm	0161/23	Unide	22-Jun-25
Nitric Oxide (NO) 322.5 ppm	1974/23	Unide	17-Jul-25
Sulphur Dioxide (SO ₂) 50.36 ppm	2264/23	Unide	17-Jul-25
Sulphur Dioxide (SO ₂) 100.8 ppm	3507/22	Unide	09-Nov-24
Sulphur Dioxide (SO ₂) 600.8 ppm	2003/23	Unide	17-Jul-25

Measured room conditions

Temperature : 23.2 °C Humidity : 60.5 %RH Pressure : 1013.4 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 1.200 ml/min Gas pressure : 1017.1 mbar

Calibration Results (Without adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.50	2.46	0.04	0.15
O ₂ (%Vol)	10.04	9.93	-0.11	0.20
O ₂ (%Vol)	21.02	21.09	0.07	0.30
CO (ppm)	80.14	80	0.14	2.0
CO (ppm)	302	302	0	6.0
CO (ppm)	1003	1005	2	12
NO ₂ (ppm)	30.34	30.1	-0.24	8.0
NO ₂ (ppm)	80.96	81.2	0.24	8.0
NO ₂ (ppm)	201.9	200.8	-1.1	12
NO (ppm)	30.01	31	0.99	8.0
NO (ppm)	151.5	152	0.5	8.0
NO (ppm)	322.5	321	-1.5	12
SO ₂ (ppm)	50.36	52	1.64	6.0
SO ₂ (ppm)	100.8	102	1.2	6.0
SO ₂ (ppm)	600.8	603	2.2	13

Remark : 1 cm³/mol = 1 %vol, 1 µmol/mol = 1 ppm

End of Report

FM-CL-09-C Rev.8

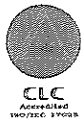
Page 2 of 2

Issued Date 26/01/25

Entech Industrial Solution Co., Ltd.

17/121 Soi Ngamwongwan 47 Yaek 48 Toongsongkhong, Lakki Bangkok 10210 THAILAND Tel: 0 2779-8888 Calibration Center: 0 2779-8888 Fax: 0 2779-8888 Email: info@entech.co.th





REPORT OF CALIBRATION

FOR

NOMENCLATURE : VACUUM GAUGE
MANUFACTURER : QUALITYWELL
MODEL / TYPE : N/A
SERIAL NO. : VG01(RYG_FS0332)
DATE OF CALIBRATION : 30 March 2023

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$ Relative Humidity : $(55 \pm 10) \% \text{RH}$

PROCEDURE USED :

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

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

REFERENCE STANDARD USED :

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

TRACEABILITY :

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

UNCERTAINTY :

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

Certificate No. Q23034806

F3-011-04/01-12

page 2 of 3



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

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

CALIBRATION DATA

CORRECTION OF PRESSURE

DUC Test point (mHg)	STD Reading (mHg)		Correction (mHg)	
	Up	Down	Up	Down
-10.0	-9.75	-9.76	+0.25	+0.24
20.0	-19.90	-19.91	+0.10	+0.09
-26.0	-26.02	-26.03	-0.02	-0.03
-27.0	-27.04	-27.05	0.04	-0.05
-28.0	-28.05	-28.05	-0.05	-0.05

Uncertainty of measurement = 0.66 mHg

Transmitting Fluid : Air

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

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

End of Certificate

Certificate No. Q23034806

F3-011-04/01-12

page 3 of 3



Certificate of Calibration

Equipment: SPECTROPHOTOMETER
Model: DR6000
Serial No. (or ID.): 1627045 (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 $^\circ\text{C}$ \pm 0.2
Humidity 65.3 $\% \text{RH}$ \pm 1.0

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

Calibration By: Mr. Nattapat Rungruang

Calibration Date: 18 September 2023

The Method used: In house method, CAL-WI-24, base on ASTM E 275-08 and ASTM E 387-04

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

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

(Mr. Nattapat Rungruang)

Person in charge

(Mr. Nitin Sriharan)

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
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2533 Sukhumvit Road, Bangkok, Thailand
Phone: +66 2026 7000 Email: info.cali@dksh.com Website: www.dksh.com/en/thailand

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CAL-FM-C06-15: 12 Sep 2022

Certificate No. C06230441 Page 2 of 3

Calibration Results:

Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of filter at 2 nm and UUC at 2 nm

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
410.61	410.3	0.31	0.13
536.66	536.6	0.06	0.13
637.88	638.3	-0.32	0.13
748.48	748.7	-0.22	0.13
807.03	807.4	-0.37	0.13

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.2930	0.289	0.0040	0.0045
	0.5168	0.518	-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
	0.2516	0.250	0.0016	0.0045
	0.4595	0.462	-0.0025	0.0045
	0.9334	0.933	0.0004	0.0045
540.1 nm	0.0000	0.000	0.0000	0.0045
	0.2481	0.245	0.0011	0.0045
	0.4652	0.468	-0.0038	0.0045
	0.8465	0.846	0.0009	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.2504	0.259	-0.0084	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
	0.2576	0.257	0.0009	0.0045
	0.4971	0.497	0.0001	0.0045
	0.9720	0.971	0.0010	0.0045

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CAL-FM-C06-15: 12 Sep 2022

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: WO-00005382

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
	0.2684	0.280	-0.0036	0.0080
350 nm	0.0000	0.000	0.0000	0.0080
	0.6374	0.637	0.0004	0.0080
Stray light *				
Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%T)	Absorbance (A)	
260.62 +/- 0.11 nm	260.6	1.3	1.885	
391.44 +/- 0.11 nm	391.4	1.3	1.885	
Spectral Resolution *				
Nominal Concentration 0.02 % w/v	Peak	Trough	Ratio	SDW
Standard Wavelength (nm)	268.68	265.69	1.38	2.00
UUC: Wavelength (nm)	266.2	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

DKSH Technology (Thailand) Co., Ltd.
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CAL-FM-C05-15: 12 Sep 2022

ชนิดเครื่องมือ: SPECTROPHOTOMETER

รุ่น: DR6000

หมายเลขเครื่อง: 1627845

ตรวจสอบ (รับ)		ตรวจสอบ (ส่ง)		หมายเหตุ
18 Sep 2023		18 Sep 2023		
ปกติ	ไม่ปกติ	ปกติ	ไม่ปกติ	
General				
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. กิ๊พซ์ ปิด - เปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	
Spectrophotometer				
<input type="checkbox"/>	<input type="checkbox"/>	6. แบตเตอรี่ไฟฟ้้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวควบคุมความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input checked="" type="checkbox"/>	9.2 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input checked="" type="checkbox"/>	741.5 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. ช่องใส่หลอดตัวอย่าง (Carousel Module)	<input checked="" type="checkbox"/>	
pH Meter and Conductivity Meter				
<input type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl)	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาตั้งอิเล็กโทรด (Stand)	<input type="checkbox"/>	
Turbidimeter				
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่องสว่างของแสง (>= 2.5 ไม่น้อย 3.0)	<input type="checkbox"/>	
Automatic Titrator				
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาวะ Piston Burettes	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	

เส้นเส้นฐานเดิม: *656.1nm=656.1nm

*486.0nm=485.5nm

Mr. Natthapol Rungreang
Service Engineer

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CAL-FM-R31-03: 20 Jul 2022



DRY GAS METER CALIBRATION TEST REPORT

Calibration Date	9-Jan-24	Barometric Pressure (mm Hg)	754.7
Next Calibration Date	9-Jul-24	Relative Humidity (%)	55.0
		Temperature (°C)	27.2
Dry Gas Meter Data		Reference Dry Gas Meter Data	
Calibration sheet No.	C-090124-BKK_FS0534	Reference Dry Gas Meter ID	BKK_FS1122
Dry Gas Meter ID	BKK_FS0534	Serial No.	A2003240
Serial No.	1509020	Correction Factor (Y)	0.9824
Model No.	XC-60-CV	Next Calibration Date	7-Nov-24

Reference Dry Gas Meter Calibration			Dry Gas Meter							Dry Gas Meter
Vr (Liters)			Tr (° C)	Vm (Liters)			Ti (° C)	Te (° C)	Avg Tm (° C)	Correction Factor (Y)
Final	Initial	Total		Final	Initial	Total				
30.00	0.00	30.00	28.0	30.42	0.00	30.42	29.0	29.0	29.0	0.9720
30.00	0.00	30.00	28.0	30.43	0.00	30.43	29.0	29.0	29.0	0.9719
60.00	0.00	60.00	29.0	61.00	0.00	61.00	30.0	30.0	30.0	0.9655
60.00	0.00	60.00	29.0	61.01	0.00	61.01	30.0	30.0	30.0	0.9694
90.00	0.00	90.00	29.0	92.27	0.00	92.27	30.0	30.0	30.0	0.9614
90.00	0.00	90.00	29.0	92.28	0.00	92.28	31.0	31.0	31.0	0.9645
									Avg	0.9681

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

Calibrate by

Approved by

Mr. ()
RYG Field Service Scientist (2)Mr. ()
RYG Field Service Specialist (1)

Stopwatch Calibration Test Report

Calibration Date	9 Jan 24	Next Cal. Date	9 Jul 24
Barometric Pressure (mmHg)	754.7	Temperature (°C)	27.2
Relative Humidity (%)	55.0		
Reference Stopwatch Data		Console Control Meter Data	
Stopwatch ID No.	E18051	Dry Gas Meter No.	BKK_FS0534
Model	F808	Model	XC-60-CV
Serial No.	-	Serial No.	1509020
Calibration Date	8 Sep 20		
Certificate No.	E-2009018		

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	5:00:09	5:00	8	0.00013
3	5:00:09	5:00	9	0.00015
4	5:00:11	5:00	11	0.00018
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	5:00:08	5:00	8	0.00013
9	5:00:09	5:00	9	0.00015
10	5:00:07	5:00	7	0.00012
Average				0.00012
SD				0.00004

Calibrate by

Approved by

Mr. Sakat Phaisanphut

Mr. Natthapol Jengwareewong

RYG Field Service Scientist (4)

RYG Field Service Specialist (1)



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date	9 Jan 24	Ambient Temperature (°C)	27.2
Calibration sheet No.	C-000124-BKK-FS0534	Relative Humidity (%)	55
Digital Temperature ID	BKK_FS0534	Reference Temperature ID	RYG_FS0581
Serial No.	1569020	Serial No.	201900014916
Model	XC-60-CV	Model	Digison-CV-VT-MS
		Next Calibrate	13 Nov 24

Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stick	0	0	0	±0.5	Pass
	25	25	0	±0.5	Pass
	50	50	0	±0.5	Pass
	100	100	0	±0.5	Pass
	150	150	0	±0.5	Pass
	200	200	0	±0.5	Pass
	250	251	1	±0.5	Pass
	300	301	1	±0.5	Pass
	500	501	1	±0.5	Pass
	100	100	0	±0.5	Pass
Probe	120	121	1	±0.5	Pass
	140	141	1	±0.5	Pass
	100	100	0	±0.5	Pass
	120	120	0	±0.5	Pass
Oven	140	140	0	±0.5	Pass
	100	100	0	±0.5	Pass
	120	120	0	±0.5	Pass
Fiber	140	140	0	±0.5	Pass
	100	100	0	±0.5	Pass
	120	121	1	±0.5	Pass
Exit	140	141	1	±0.5	Pass
	0	0	0	±0.5	Pass
	10	10	0	±0.5	Pass
Meter	20	21	1	±0.5	Pass
	0	0	0	±0.5	Pass
	25	25	0	±0.5	Pass
AUX	50	50	0	±0.5	Pass
	0	0	0	±0.5	Pass
	25	25	0	±0.5	Pass
	50	50	0	±0.5	Pass

MPE (Maximum permissible error of measurement) ค่าความคลาดเคลื่อนสูงสุดที่ยอมรับได้

Calibrated by

Jittakorn

(Mr Jittakorn Siwaza)
RYG Field Service Scientist (2)

Approved by

Nattapon Jangwansawang

(Mr Nattapon Jangwansawang)
RYG Field Service Specialist (1)

FORM NO F-00-027 REVISION NO 2 ISSUE DATE 16/2/23



REVIEW BY: *Audchorawan S.*
APPROVED BY: *Tanyaporn M.*
NEXT CAL DATE: 12 Jan 2025

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

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2843 8361-6, e-mail: service.thailand@sartorius.com



SARTORIUS

REVIEW BY: *Thawit*
APPROVED BY: *P.*
NEXT CAL. DATE: 12/02/2025

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.: 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 Intihana
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
Ambient Conditions:
Temperature: 23.7 °C ± 5.0 °C
Humidity: 62.0 % RH ± 10.0 % RH
Pressure: ±

Reasons for calibration
☐ New Installation ☐ Service / Repair ☒ Recalibration/ Maintenance ☐ Equipment Condition: ☒ Good Operate ☐ Fail

Measurement Method UKAS Publication Ref: Lab 14

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

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YC011-622-00	Sartorius weight set 1mg - 5000g E2 YC011-622-00	TCS	M2309197G	23-Aug-2025
MHB-382SD	Humidity/Balance/Temp. Lutron MHB-382SD	DKSH	C19231845	23-Aug-2024

This certificate relate and apply this equipment only.

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

Mr. Chonchai Intihana

Mr. Chonchai Intihana (Technical Manager)



SOP FM 33 03 February 2022

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2843 8361-6 Fax: +66 2843-8367, e-mail: service.thailand@sartorius.com

SARTORIUS

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)
The repeatability is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement range is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.	The off-center loading error is yielded by the difference between the reading of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R110).
Nominal Value : (Low Load) 20 g Tolerance 0.0001 g	Nominal value : 100 g Tolerance 0.0004 g
Nominal Value : (High Load) 200 g Tolerance 0.0001 g	
Standard Deviation 0.00005 0.00005	

Linearity

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

Tolerance		0.0002 g		
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
0.01	0.0100	0.0100	0.0000	0.00013
0.1	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) : 757

Calibrate Location : สำนักงานเขตหลักสี่ (A1) Temperature (°C) : 31

Calibrate Date : 5-Apr-24 High Volume ID : RYG-FS0181

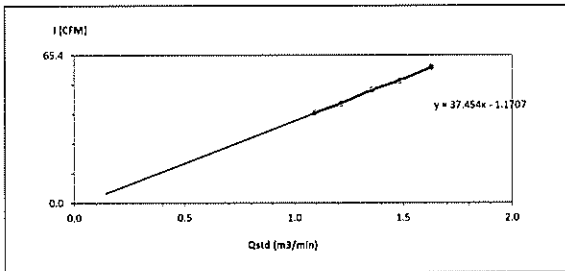
CalibrationSheet No.: C-050424-RYG-FS0181 High Volume Model : TE-5170D

Calibrator ID : RYG-FS0206 High Volume S/N : 5334

Calibrator Model : TE-5028A Calibrator Slope : 1.47433

Calibrator S/N : 1543 Calibrator Intercept : -0.01503

Test No.	Delta H ₂ O (Inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.6	1.0957	40	Slope : 37.4545 Intercept : -1.1707 Correlation Coefficient : 0.9991
2	3.2	1.2139	44	
3	4.0	1.3555	50	
4	4.8	1.4834	54	
5	5.8	1.6291	60	



Calibrated by : Mr. Anurak Tongkhajonsakda
Field Scientist(1)

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

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



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 757

Calibrate Location : บ้านนาโพธิ์ (A2) Temperature (°C) : 31

Calibrate Date : 5-Apr-24 High Volume ID : RYG-FS0174

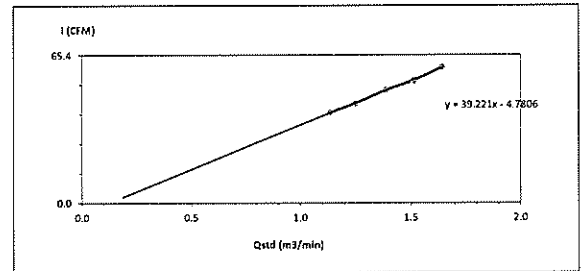
CalibrationSheet No.: C-050424-RYG-FS0174 High Volume Model : TE-5170D

Calibrator ID : RYG-FS0206 High Volume S/N : 4800

Calibrator Model : TE-5028A Calibrator Slope : 1.47433

Calibrator S/N : 1543 Calibrator Intercept : -0.01503

Test No.	Delta H ₂ O (Inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.8	1.1365	40	Slope : 39.2210 Intercept : -4.7806 Correlation Coefficient : 0.9986
2	3.4	1.2508	44	
3	4.2	1.3886	50	
4	5.0	1.5137	54	
5	5.9	1.6430	60	



Calibrated by : Mr. Anurak Tongkhajonsakda
Field Scientist(1)

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

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



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 757

Calibrate Location : บ้านนาโพธิ์ (A3) Temperature (°C) : 31

Calibrate Date : 5-Apr-24 High Volume ID : RYG-FS0176

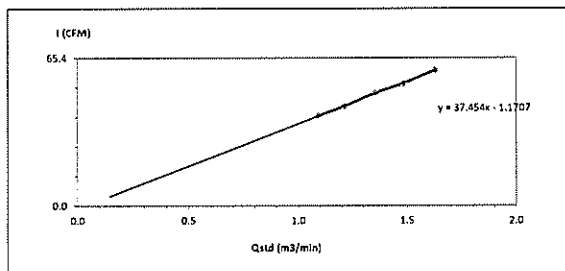
CalibrationSheet No.: C-050424-RYG-FS0176 High Volume Model : TE-5170D

Calibrator ID : RYG-FS0206 High Volume S/N : 4802

Calibrator Model : TE-5028A Calibrator Slope : 1.47433

Calibrator S/N : 1543 Calibrator Intercept : -0.01503

Test No.	Delta H ₂ O (Inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.6	1.0957	40	Slope : 37.4545 Intercept : -1.1707 Correlation Coefficient : 0.9991
2	3.2	1.2139	44	
3	4.0	1.3555	50	
4	4.8	1.4834	54	
5	5.8	1.6291	60	



Calibrated by : Mr. Anurak Tongkhajonsakda
Field Scientist(1)

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

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



High Volume Air Sampler Calibration Worksheet

Project Site : Michelin Siam Co., Ltd. Barometric Pressure (mm Hg) : 757

Calibrate Location : บ้านนาโพธิ์ (A4) Temperature (°C) : 31

Calibrate Date : 5-Apr-24 High Volume ID : RYG-FS0664

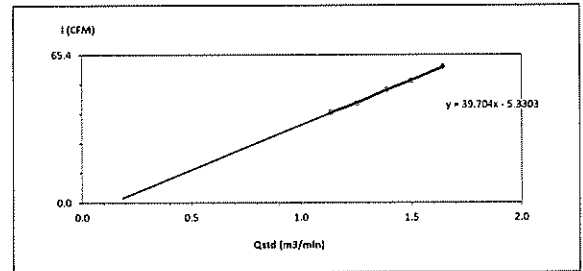
CalibrationSheet No.: C-050424-RYG-FS0664 High Volume Model : TE-5009K

Calibrator ID : RYG-FS0206 High Volume S/N : 6261

Calibrator Model : TE-5028A Calibrator Slope : 1.47433

Calibrator S/N : 1543 Calibrator Intercept : -0.01503

Test No.	Delta H ₂ O (Inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.8	1.1365	40	Slope : 39.7037 Intercept : -5.3303 Correlation Coefficient : 0.9995
2	3.4	1.2508	44	
3	4.2	1.3886	50	
4	4.9	1.4986	54	
5	5.9	1.6430	60	



Calibrated by : Mr. Anurak Tongkhajonsakda
Field Scientist(1)

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

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



SARTORIUS

Certificate of Calibration

Model Number: LA130S-F
Description: Analytical Balance
Serial Number: 25409664
ID No.: RYG_EN0001
Manufacturer: Sartorius
Certificate No.: 24BCI0068
Issued Date: Friday, February 23, 2024
Reference No.: 229196
Page No.: 1 of 1

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

Calibrated By: Mr.Chonchai Inthana
Calibration Date: Thursday, February 22, 2024
Calibration Procedure No.: This calibration was conducted by
Using in-house calibration procedure number (WI-002)
Based on UKAS LAB 14 : 2019

Metrological data:
Capacity: 150 g Readability: 0.0001 g
Reasons for calibration
☐ New Installation ☐ Service / Repair ☒ Recalibration/ Maintenance
Ambient Conditions:
Temperature: 23.6 °C ± 5.0 °C
Humidity: 54.0 % RH ± 10.0 % RH
Pressure: ±
Equipment Condition: ☒ Good Operate ☐ Fix

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	C19231845	23-Aug-2024

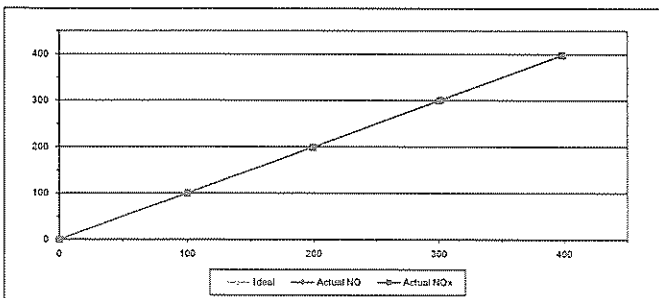
This certificate relates and apply this equipment only.
This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division
Sartorius (Thailand) Co., Ltd.
SOP FM 33 03 February 2022
Mr.Chonchai Inthana(Technical Manager)



MULTIPOINT CALIBRATION REPORT

Calibration Date: 4-Jan-24
Manufacturer: HORIBA
Serial No.: 8G314J3K
Calibrator Manufacturer: Teledyne API
Serial No.: 947
Std. Gas Concentration (PPM): 55.88
Cylinder Pressure (psi): 1800
Certified Date: 9-Feb-22
Equipment Name: NOx Analyzer
Model: APNA-370
Equipment ID: RYG_F80284
Model: 700
Cylinder No.: GN0027222
Certified By: Airgas Inc.
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	99.20	-0.80	-0.80	100.10	0.10	0.10
2	200.00	199.50	-0.50	-0.25	199.30	-0.70	-0.35
3	300.00	298.60	-1.40	-0.47	301.50	1.50	0.50
4	400.00	398.20	-1.80	-0.45	398.00	-2.00	-0.50
AVERAGE (%)				-0.48			-0.03



Calibrated By: (Mr.Jirawat Sakam)
Field Environmental Scientist (3)
Approved By: (Mr.Saranyth Jitranont)
Assistant General Manager

SARTORIUS

Certificate of Calibration

Model Number: LA130S-F
Description: Analytical Balance
Serial Number: 25409664
ID No.: RYG_EN0001
Manufacturer: Sartorius
Certificate No.: 24BCI0058
Issued Date: Friday, February 23, 2024
Reference No.: 229196
Page No.: 2 of 2

Calibration Results : Without Adjustment

Repeatability		Eccentricity (Off-center loading error)	
The 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.		The off-center loading error is yielded by the difference between the readings 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 GUM, R10).	
Nominal Value : (Low Load)	10.0000 99.9999	Nominal value:	50 9
10 g	10.0000 100.0000	Tolerance	0.0004 9
Tolerance	0.0001 g		
Nominal Value : (High Load)	10.0000 100.0000		
100 g	10.0000 100.0000		
Tolerance	0.0001 g		
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	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
0.01	0.0100	0.0100	0.0000	0.00020
0.05	0.0500	0.0500	0.0000	0.00021
0.1	0.1000	0.1000	0.0000	0.00021
0.5	0.5000	0.5000	0.0000	0.00021
1	1.0000	1.0000	0.0000	0.00021
2	2.0000	2.0000	0.0000	0.00021
5	5.0000	5.0000	0.0000	0.00021
10	10.0000	10.0001	0.0001	0.00024
20	20.0000	20.0001	0.0001	0.00021
100	100.0000	99.9999	-0.0001	0.00024
End of Report.				

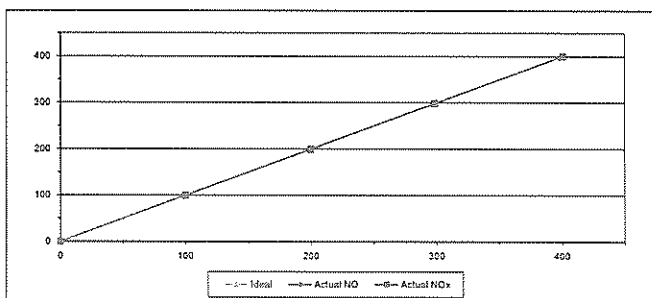
SOP FM 33 03 February 2022



MULTIPOINT CALIBRATION REPORT

Calibration Date: 4-Jan-24
Manufacturer: HORIBA
Serial No.: TZTBYRL1
Calibrator Manufacturer: Teledyne API
Serial No.: 947
Std. Gas Concentration (PPM): 55.88
Cylinder Pressure (psi): 1800
Certified Date: 9-Feb-22
Equipment Name: NOx Analyzer
Model: APNA-370
Equipment ID: RYG_F80457
Model: 700
Cylinder No.: GN0027222
Certified By: Airgas Inc.
Expired Date: 9-Feb-30

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	98.30	-1.70	-1.70	100.20	0.20	0.20
2	200.00	198.40	-1.60	-0.80	199.80	-0.20	-0.10
3	300.00	297.90	-2.10	-0.70	298.50	-1.50	-0.50
4	400.00	398.60	-1.40	-0.35	400.80	0.80	0.20
AVERAGE (%)				-0.69			-0.02



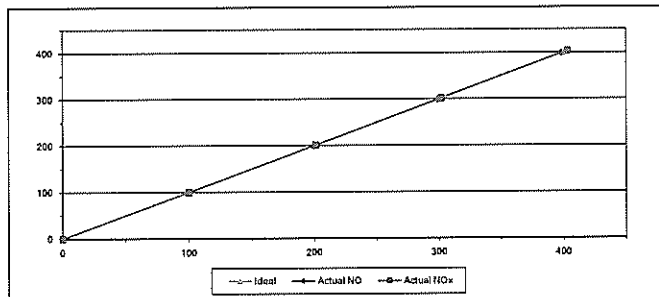
Calibrated By: (Mr.Jirawat Sakam)
Field Environmental Scientist (3)
Approved By: (Mr.Saranyth Jitranont)
Assistant General Manager



MULTIPOINT CALIBRATION REPORT

Calibration Date	4-Jan-24	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	T85HWM41	Equipment ID	RYG_FS0461
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	100.10	0.10	0.10
2	200.00	201.00	1.00	0.50	201.10	1.10	0.55
3	300.00	298.70	-1.30	-0.43	302.10	2.10	0.70
4	400.00	398.40	-1.60	-0.40	403.50	3.50	0.88
AVERAGE (%)				-0.31			0.47



Calibrated By

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

Approved By

(Mr. Sarayuth Jitranont)
Assistant General Manager

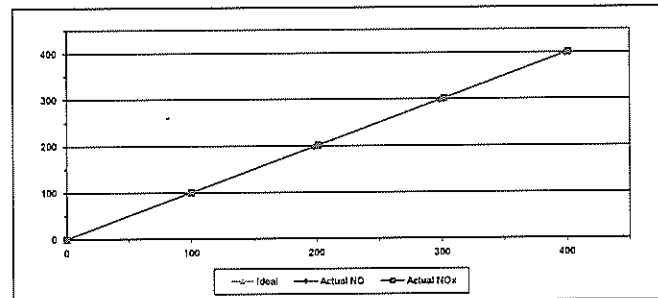
ALS Laboratory Group
FORM NO. F 06-056 REVISION NO. - ISSUE DATE 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	4-Jan-24	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	8EEAW53E	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	201.50	1.50	0.75
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			0.41



Calibrated By

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

Approved By

(Mr. Sarayuth Jitranont)
Assistant General Manager

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



ROTA METER CALIBRATION RESULT APRIL 2024

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0585	23 Apr 24	Y = 1.0322x + 2.25	0.9997
BKK_FS0587	23 Apr 24	Y = 1.0111x + 16.357	0.9994
BKK_FS0592	23 Apr 24	Y = 1.001x + 14.551	1.0000
BKK_FS0594	23 Apr 24	Y = 1.0049x + 4.9762	1.0000
BKK_FS1004	01 Apr 24	Y = 0.9826x + 12.32	0.9998
BKK_FS1005	01 Apr 24	Y = 1.0183x + 0.0633	0.9998
BKK_FS1006	01 Apr 24	Y = 1.1534x - 3.3241	0.9989
BKK_FS1007	23 Apr 24	Y = 1.1084x + 2.9017	0.9994
BKK_FS1008	06 May 24	Y = 1.1347x + 2.1015	0.9996
BKK_FS1012	07 May 24	Y = 1.0488x - 26.533	0.9998
BKK_FS1013	07 May 24	Y = 1.0255x - 57.741	1.0000
BKK_FS1017	04 Apr 24	Y = 1.0213x + 0.1156	1.0000
BKK_FS1018	04 Apr 24	Y = 1.0007x + 1.3933	0.9999
BKK_FS1019	04 Apr 24	Y = 1.0039x - 1.3381	1.0000
BKK_FS1020	04 Apr 24	Y = 1.003x + 5.7656	1.0000
BKK_FS1021	04 Apr 24	Y = 1.0066x - 25.605	0.9926
BKK_FS1022	04 Apr 24	Y = 1.0037x - 103.66	0.9980
BKK_FS1023	07 May 24	Y = 1.1613x - 2.675	1.0000
BKK_FS1024	07 May 24	Y = 1.0157x - 4.3362	1.0000
BKK_FS1025	07 May 24	Y = 1.0018x - 4.6236	0.9999
BKK_FS1039	01 Apr 24	Y = 0.9909x + 11.357	0.9991
BKK_FS1040	01 Apr 24	Y = 1.0121x - 19.203	0.9996
BKK_FS1041	01 Apr 24	Y = 1.0176x + 1.4813	0.9996
BKK_FS1042	01 Apr 24	Y = 0.9927x + 10.76	0.9905
BKK_FS1043	01 Apr 24	Y = 0.9965x + 13.696	1.0000
BKK_FS1044	01 Apr 24	Y = 1.1159x - 0.9354	0.9978
PHK_FS0027	06 May 24	Y = 1.1281x + 0.4049	0.9997
PHK_FS0028	06 May 24	Y = 1.0332x - 1.8233	0.9990
PHK_FS0029	06 May 24	Y = 1.001x + 10.848	1.0000
RYG_FS0197	01 Apr 24	Y = 1.0045x + 10.275	1.0000
RYG_FS0198	01 Apr 24	Y = 1.0061x + 0.715	0.9999
RYG_FS0199	01 Apr 24	Y = 0.976x + 3.1497	0.9998
RYG_FS0654	01 Apr 24	Y = 1.0354x + 0.3361	0.9995
RYG_FS0655	01 Apr 24	Y = 0.978x + 13.603	0.9991
RYG_FS0656	01 Apr 24	Y = 1.0035x + 6.879	0.9999
RYG_FS0657	01 Apr 24	Y = 1.0233x + 0.8908	0.9982
RYG_FS0658	01 Apr 24	Y = 0.9905x + 0.8867	0.9996
RYG_FS0659	01 Apr 24	Y = 0.9994x + 13.924	1.0000
SGK_FS0135	23 Apr 24	Y = 1.0117x + 4.8833	1.0000



ROTA METER CALIBRATION RESULT APRIL 2024

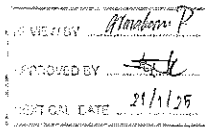
Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
SGK_FS0136	23 Apr 24	Y = 1.0134x + 3.6467	1.0000
SGK_FS0138	04 Apr 24	Y = 1.0449x - 0.3684	0.9988
SGK_FS0139	04 Apr 24	Y = 1.0086x + 3.1267	0.9988
SGK_FS0140	04 Apr 24	Y = 1.0029x + 7.5181	1.0000
SGK_FS0141	23 Apr 24	Y = 1.1129x - 0.0619	0.9997
SGK_FS0142	23 Apr 24	Y = 1.0136x + 2.4267	0.9999
SGK_FS0143	23 Apr 24	Y = 1.0036x + 8.3162	1.0000

Review By :

(Mr. Wichan Choonharat)
Enviro Field Services Manager

Approved By :

(Mr. Sarayuth Jitranont)
Assistant General Manager



Certificate Number
CWS-001-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM	Cup anemometer
MANUFACTURER	Novalynx
MODEL/TYPE	Sensor: WS-02F Data logger: Q10 WS-25DL-D
SERIAL NUMBER	Sensor: WSD-A5662 Data logger: AS662
ID NUMBER	RWG_F52544
CONDITION AS-RECEIVED	Used item
CUSTOMER	ALS laboratory group (Thailand) Co., Ltd. 104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Soan Luang, Khet Soan Luang, Bangkok 10250 Thailand
RECEIVED DATE	11 Jul 2023
MEASUREMENT DATE	21 Jul 2023
ISSUE DATE	21 Jul 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature	23.0 ± 3.0 °C
Relative Humidity	55.0 ± 15.0 %RH
Atmospheric Pressure	1010 ± 10 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITIONS

Wind tunnel cross section area	500 cm ²
Wind direction frontal area	100 cm ²
Diameter of mounting pipe	mm
Blockage ratio of test object	0.111 [-]

Preconditioning: 24 hours at ambient conditions.

Measurement Condition: The average values during measurement are (24.0) °C, (61.7) %RH and (1009.1) hPa

TABULATION OF RESULTS:

The table on next page give the measured values

Calibrated by:
1. Mr. Soravit Thaisakul
2. Miss Intraratt Jantachompol



Approved signatory:

Mr. Parinya Banchachien
Calibration Department Manager

Remarks:
* Possible cross section area of the wind tunnel
* Possible cross section area of the tested object include mounting pipe
* Diameter of mounting pipe
* Ratio "a" to "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
CWD-001-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM	Wind Direction Sensor
MANUFACTURER	Novalynx
MODEL/TYPE	Sensor: WS-02F Data logger: Q10 WS-25DL-D
SERIAL NUMBER	Sensor: WSD-A5662 Data logger: AS662
ID NUMBER	RWG_F52544
CONDITION AS-RECEIVED	Used item
CUSTOMER	ALS laboratory group (Thailand) Co., Ltd. 104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Soan Luang, Khet Soan Luang, Bangkok 10250 Thailand
RECEIVED DATE	11 Jul 2023
MEASUREMENT DATE	21 Jul 2023
ISSUE DATE	21 Jul 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature	23.0 ± 3.0 °C
Relative Humidity	55.0 ± 15.0 %RH
Atmospheric Pressure	1010 ± 10 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITION

Wind tunnel cross section area	500 cm ²
Wind direction frontal area	129 cm ²
Diameter of mounting pipe	mm
Blockage ratio of test object	0.143 [-]

Preconditioning: 24 hours at ambient conditions.

Measurement Condition: The average values during measurement are (23.8) °C, (63.0) %RH and (1011.6) hPa

TABULATION OF RESULTS:

The table on next page give the measured values

Calibrated by:
1. Mr. Soravit Thaisakul
2. Miss Intraratt Jantachompol



Approved signatory:

Mr. Parinya Banchachien
Calibration Department Manager

Remarks:
* Possible cross section area of the wind tunnel
* Possible cross section area of the tested object include mounting pipe
* Diameter of mounting pipe
* Ratio "a" to "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-001-66

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

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

V _{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V _{unc} (m/s)	Error (m/s)	U (k=2) (m/s)
1.024	23.64	23.55	0.8	0.2	0.31
2.079	24.05	23.55	1.8	-0.3	0.31
3.019	24.04	23.55	2.8	0.2	0.31
4.150	24.12	23.55	3.9	-0.3	0.31
5.00	23.72	23.55	4.8	0.2	0.31
5.99	23.68	23.55	5.8	-0.2	0.31
7.04	23.58	23.55	6.9	-0.2	0.31
8.15	23.64	23.55	7.9	-0.2	0.31
9.09	23.30	23.55	9.0	-0.1	0.31
10.06	23.40	23.55	9.9	-0.3	0.31
11.13	23.48	23.55	11.0	-0.2	0.31
12.11	23.40	23.55	12.0	-0.1	0.31
13.16	23.50	23.55	13.0	-0.1	0.31
14.22	23.40	23.55	14.0	-0.2	0.31
15.22	23.50	23.55	15.0	-0.2	0.31
16.27	23.44	23.55	16.1	-0.2	0.31

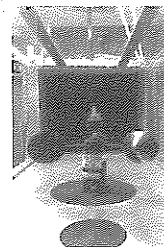
Remark:

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

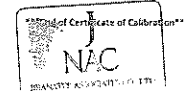
² Velocity of standard

³ Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration set up of the cup anemometer calibration in the wind tunnel of Janatee 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 lacking geometry



Certificate Number

CWD-001-66

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

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

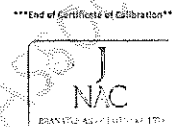
Air speed m/s	D _{unc} Degree (°)	D _{unc} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
	45.000	41	-4	1.0
	90.000	87	3	1.0
	135.000	132	-3	1.0
	180.000	180	0	1.0
	225.000	228	3	1.0
	270.000	273	-3	1.0
	315.000	318	3	1.0
	360.000	359	-1	1.0

Remark:

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

² Direction of standard

³ Direction of Unit Under Calibration





63/14-15,67/35-36, Soi Petchkasem 7/71, Petchkasem Rd,
Wathphra, Bangkokhyai, Bangkok 10600 Thailand.
Tel: (66) 02-8680812#13 Fax: (66) 02-8680860 www.jiranatee.com



63/14 15,67/35-36, Soi Petchkasem 7/71, Petchkasem Rd,
Wathphra, Bangkokhyai, Bangkok 10600 Thailand.
Tel: (66) 02-8680812#13 Fax: (66) 02-8680860 www.jiranatee.com



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-037 66
Page 1 of 2

Equipment Name: Data Logger with Temperature sensor
Manufacturer: Novalyx
Model: 110-WS-25DL D
Serial No.: A5662
ID No.: RYG_FS0544

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

Received date: 11 Jul 2023
Calibration date: 21 Jul 2023
Issue date: 21 Jul 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS 100 A500,
Serial No.: 667682-09, Due date: 28 Mar 2024
2. Digital Temperature Indicator Model: DTI 1000-A MK
II Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (55±15)%

Calibration Procedure
The temperature calibration was done by in-house
calibration method as WICL 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-0092-
22

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

Calibrated by
☐ Mr. Sorawit Thachulad
☒ Miss Jitraporn Lerdsomphot
☐ Miss Ruangsripanit Phoommit



Approved Signatory:
Mr. Pannya Booncharoen
Calibration Department Manager

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment
Calibration Range: 20 - 40 °C

Function

This equipment was connected with temperature sensor Model: HMP60 S/N: T3230591.

Dimension : Diameter 12 mm, Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.060	19.6	-0.5	0.099
70	25.054	24.6	-0.5	0.099
70	30.050	29.7	-0.3	0.14
70	35.043	34.5	-0.5	0.099
70	40.036	39.5	-0.5	0.14

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

★ End of Certificate ★



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BEEN OBTAINED IN WRITING FROM THE LABORATORY



63/14-15,67/35-36, Soi Petchkasem 7/71, Petchkasem Rd,
Wathphra, Bangkokhyai, Bangkok 10600 Thailand.
Tel: (66) 02-8680812#13 Fax: (66) 02-8680860 www.jiranatee.com

CERTIFICATE OF CALIBRATION

Calibration No. : RH-01072023
Page 1 of 1 Pages

Measurement Item : Relative humidity with data logger
Manufacturer : Novalyx
Model/Type : 110-WS-25DL D
Serial Number : A5662
ID No : RYG_FS0544
Customer : ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Environmental Condition
The measurement was carried out in an ambient temperature of (26±3)°C, and relative humidity of (50±15)%

Measurement Method
Unit Under Calibration (UUC) was calibrated by comparison method with standard chilled mirror hygrometer model: 1800
3 in the humidity generator chamber to determine the errors.

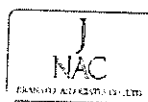
Traceability
This instrument was calibrated using standard equipment whose accuracy is traceability through National Institute of
Standards and Technology to the international system of units (SI) via MCS Calibration, Inc. Certificate number: 20926-
601 Due date Sep 26, 2024.

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

Measurement Results
This equipment was connected with indoor air quality probe and Displayed (URI) on display Model: HMP60, Serial num
ber: T3230591
Calibration was performed in the range of 20%RH to 80%RH
The results of calibration are reported in table below.

Determined (%RH)	Standard (average) (%RH)	UUC (reading) (%RH)	Error (%RH)	Uncertainty ±(%RH)
20	20.07	16.3	-3.8	0.61
50	50.23	46.0	-4.2	0.61
80	80.23	73.5	-6.7	0.61

Performed by
☒ Mr. Sorawit Thachulad
☒ Miss Jitraporn Lerdsomphot
☐ Miss Ruangsripanit Phoommit



Approved Signatory:
Mr. Pannya Booncharoen
Calibration Department Manager

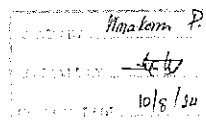
THIS CALIBRATION REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS
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1. Jiranatee Associates Co., Ltd.
63/14-15 67/35-36
Petchkasem 7/71, Rd Wathphra, Bangkokhyai
Bangkok 10600 Thailand
Tel: +66(0)28680812
Mobile: +66(0)28680813
Email: nac Calibration@jiranatee.com
Web site: www.jiranatee.com

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

Air speed measurement laboratory
Calibration services department



Certificate Number
CL 021 66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM : Cup anemometer
MANUFACTURER : Novalyx
MODEL/TYPE : Sensor WS-037
Data logger: 200-WS-25DL
SERIAL NUMBER : Sensor
Data logger: A5176
ID NUMBER : RYG_FS0414
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 : 27 Jan 2023
MEASUREMENT DATE : 10 Feb 2023
ISSUE DATE : 10 Feb 2023

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

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

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

Preconditioning : 24 hours at ambient conditions.
Measurement Condition : The average values during measurement are (24.1) °C, (47.6) %RH and (1014.7) hPa.

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

Calibrated by:
☒ Mr. Sorawit Thachulad
☒ Miss Jitraporn Lerdsomphot



Approved signatory:
Mr. Pannya Booncharoen
Calibration Department Manager

Remarks:
¹ Inside probe protection 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"

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IN WRITING FROM THE LABORATORY

MEASUREMENT RESULTS ⁵

The cup anemometer, Unit Under Calibration (UUC) was exercise at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 10 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 300 mm respectively away from wind tunnel nozzle. UUC was installed at centre of the test section. The calibration was carried out under both riding and telling 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.

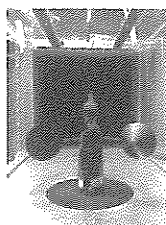
V_{ref} [m/s]	Temp. wind tunnel [°C]	Temp. room [°C]	v_{wall} [m/s]	Error [m/s]	$\frac{D}{(v_{ref}-v_{wall})}$ [s]
0.585	24.10	24.10	0.8	-0.2	0.35
2.033	24.10	24.10	1.9	-0.1	0.18
3.040	23.94	24.10	3.0	-0.1	0.23
4.134	24.10	24.10	4.0	-0.1	0.20
4.69	23.92	24.10	4.9	-0.1	0.44
5.08	24.10	24.10	6.0	0.0	0.18
7.05	23.90	24.10	7.9	-0.1	0.36
8.19	24.06	24.10	8.2	0.0	0.26
9.09	23.84	24.10	9.1	0.0	0.24
10.09	23.92	24.10	10.1	0.0	0.28
11.15	23.80	24.10	11.1	0.0	0.45
12.14	23.80	24.10	12.2	0.0	0.31
13.80	23.80	24.10	13.2	0.0	0.47
14.26	23.74	24.10	14.2	0.0	0.42
15.29	23.78	24.10	15.1	-0.1	0.66
16.28	23.70	24.10	16.3	0.0	0.56

Remark:

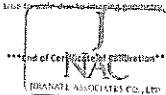
^a Calibration results only count for the tested circumstances and environmental conditions during which calibration took place.² Velocity of standard

Validity of Δt_{21} under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration set up of the exp anemometer calibration in the wind tunnel of Brunner Associates Co., Ltd. The exp anemometer shown may differ from the calibrated one. Remark: The proportion of the test does not have to be done in a large quantity.



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	D ₁₀₀	D ₅₀	Error	U (%)
m/s	Degree (°)	Degree (°)	Degree (°)	Degree (°)
4.99	0.000	0	0	0.58
	45.000	41	-4	0.58
	90.000	87	-3	0.58
	135.001	132	3	0.68
	180.000	179	1	0.74
	225.000	227	-2	0.91
	270.002	273	3	0.58
	315.000	318	3	0.74

Remarks

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

* Duration of study

Definition of Visual Acuity Calibration



End of Certificate of Calibration

CERTIFICATE OF CALIBRATION

Calibration procedure:
The wind direction sensor was calibrated against Standard Rotary Encoder model AX20915-DM04 P1 5.0A in a close fit section of open-type wind tunnel with 900 cm² cross test section area. The W-LL-008 based on IEC 61400-12-2. Wind energy generation systems - Part 12-1. Power performance measurements of electricity producing wind turbines. March 2017 was used as a calibration guideline.

Feasibility:
This certificate provides a traceability of the mass movement to recognized national standards, and to realization of the International System of Units (SI) through the NMAT (National Metrology Institute of Thailand) via Certificate Number: 04-0043-22

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

Received 10 May 1993

RECEIVED DATE	16 Jan 2023
MEASUREMENT DATE	19 Jan 2023
ISSUE DATE	20 Jan 2023

ENVIRONMENTAL CONDITIONS:
Ambient condition in the laboratory
Temperature
Relative Humidity
Atmospheric Pressure

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

CALIBRATION CONDITION			
Wind tunnel cross-section area ¹	900	cm ²	
Win direction frontal area ²	120	cm ²	
Diameter of mounting pipe ³		mm	
Blockage ratio of test object ⁴	0.143	1/7	

Preconditioning	24 hours at ambient conditions
Measurement Condition	The average values during measurement are (23.01 °C, (46.6) %RH and (1034.9) hPa

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

Calibrated by:
 Dr. Susan Thompson
 1700 University Ave. NW
 Atlanta, GA 30303

Approved:

Mr. Farisya Bismillah
 Calibration Department Manager

Remarks:

- 1) Nozzle root section area of the wind tunnel
- 2) Projected cross section area of the tested object include mounting pipe
- 3) Diameter of mounting pipe
- 4) Ratio $\frac{A_1}{A_2}$

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

Certificate Number
CL-013-65

Certificate Number
CL-013-65

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

Cup anemometer

Manufacturer

Model/Type

Serial Number

ID Number

Condition as received

Customer

Calibration procedure:

The cup anemometer was calibrated against Standard air velocity transducer model: 3455/02 and pitot tube with precision differential pressure meter model: DP41550 in an air flow test facility of 1000 mm diameter, with 500 mm cross section area. The test facility was used in accordance with ISO 91:2001. The test facility was used in accordance with ISO 91:2001. The test facility was used in accordance with ISO 91:2001.

Traceability

This certificate provides a traceability of the measurement to the recognized national standard, and to realization of the international system of units (SI) through the NIMT (National Institute of Metrology Thailand) via Certificate Number: NIMT-0052-21 and NIMT-0066-22

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

RECEIVED DATE

16 Jan 2023

MEASUREMENT DATE

18 Jan 2023

ISSUE DATE

20 Jan 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature: 23.0 ± 3.0 °C

Relative Humidity: 55.0 ± 15.0 %RH

Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITIONS

Wind tunnel cross-section area: 900 cm²

Wind direction frontal area: 100 cm²

Diameter of mounting pipe: 6 mm

Blockage ratio of test object: 0.111 [-]

Preconditioning

24 hours at ambient conditions

Measurement Condition

The average values during measurement are (23.7) °C, (44.5) %RH and (1018.3) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

Mr. Sorawit Thachalad

Ms. Jitraporn Lertsomphol

Approved Signatory:

Mr. Panying Booncharoen

Calibration Department Manager

Remarks:

- 1. Measured cross-section area of the wind tunnel
- 2. Projected cross-section area of the tested object include mounting pipe
- 3. Diameter of mounting pipe
- 4. Ratio $\frac{A_o}{A_t}$

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

CERTIFICATE OF CALIBRATION

Certificate No.: CL-006-60
Page 1 of 2

Equipment Name: Data Logger with Temperature

Sensor

Manufacturer: Novalynx

Model: 110-WS-25DL-D

Serial No.: A5769

ID No.: RYG_FS0531

Received date: 16 Jan 2023

Calibration date: 18 Jan 2023

Issue date: 20 Jan 2023

Customer:
Name: ALS laboratory group (Thailand) Co., Ltd.
Address: 104 Phatthanaikan 40, Phatthanaikan Rd.,
Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Reference Used During Calibration

1. Standard Temperature Probe Model: STS-100 A500, Serial No.: 667682 09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition

Temperature: (23±3) °C
Relative Humidity: (55±15)%

Calibration Procedure

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

Traceability

The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT) Certificate number: TT-0034-22, Certificate number: ER-0092-22

Calibrated by:

- Mr. Sorawit Thachalad
- Ms. Jitraporn Lertsomphol

Approved Signatory:

Mr. Panying Booncharoen
Calibration Department Manager

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 _{ref} Degree (°)	D _{meas} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
0.000	0	0	0	0.58
45.000	43	43	-2	0.74
90.000	88	88	-2	0.74
135.000	133	133	2	0.74
180.000	179	179	-1	0.74
225.000	227	227	-1	0.74
270.000	272	272	2	0.74
315.000	317	317	2	0.74

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

Certificate Number
CL-013-64

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The cup anemometer, Unit Under Calibration (UUC) was exercised at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 10 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 350 mm respectively away from wind tunnel nozzle. UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below

V _{ref} [m/s]	Temp. wind tunnel [°C]	Temp. room [°C]	V _{meas} [m/s]	Error [m/s]	U (k=2) [m/s]
0.583	23.60	23.70	0.7	-0.3	0.18
2.024	23.74	23.70	1.7	-0.3	0.16
3.044	23.50	23.70	2.9	-0.2	0.18
4.119	23.82	23.70	3.9	-0.2	0.19
5.02	23.50	23.70	4.9	-0.2	0.18
5.99	23.68	23.70	5.8	-0.2	0.18
7.08	23.50	23.70	6.9	-0.1	0.20
8.18	23.58	23.70	8.0	-0.2	0.18
9.11	23.50	23.70	9.0	-0.3	0.19
10.08	23.66	23.70	10.0	-0.1	0.25
11.15	23.37	23.70	11.0	-0.2	0.21
12.14	23.66	23.70	12.0	-0.2	0.20
13.20	23.32	23.70	13.2	0.0	0.25
14.25	23.50	23.70	14.3	-0.1	0.27
15.23	23.30	23.70	15.3	-0.2	0.27
16.29	23.40	23.70	16.2	0.1	0.23

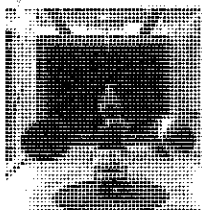
Remark:

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

² Velocity of standard

³ Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration set-up of the cup anemometer calibration in the wind tunnel of 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.

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.

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 - 40 °C

Function:

This equipment was connected with temperature sensor Model: HMP60 S/N: T0210901.

Dimension : Diameter 12 mm. Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.067	19.8	-0.3	0.099
60	25.058	24.6	-0.5	0.099
60	30.052	29.5	-0.6	0.099
60	35.047	34.5	-0.5	0.099
60	40.038	39.3	-0.7	0.099

UUC*: Unit Under Calibration

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

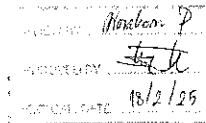
★ End of Certificate ★



J
NAC
63/14-15, 67/35-36, Soi Petchkasem 7/71, Petchkasem Rd,
Wathapra, Bangkok, Bangkok 10600 Thailand.
Tel: (66) 02-8680812#13 Fax: (66) 02-8680860 www.jiranatee.com

Accredited calibration laboratory
ISO/IEC 17025:2017
KSC 1501B 17025
CALIBRATION 0363

Air speed measurement laboratory
Calibration services department.



Certificate Number

CWS-003-65

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

Cup anemometer

MANUFACTURER

Navalyn

MODEL/TYPE

Sensor WS-02F

SERIAL NUMBER

Data logger 200 WS 2540

DATE

Sensor WS-AS150

DATE

Data logger AS150

ID NUMBER

RYG_F53329

CONDITION AS RECEIVED

Used item

CUSTOMER

ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

Calibration procedure:

The cup anemometer was calibrated against standard air velocity transducer model: 0455-42 and pitot tube with precision differential pressure meter model: DPM1500 in an open test section of Eiffel type wind tunnel with 900 cm² cross test section area. The WS-CL-007 board with ITC 61400-12-1, Wind entry generation system - Flat 12-1 Power performance measurements of electricity producing wind turbines, March 2017 was used as a calibration guideline.

Traceability:

This certificate provides a traceability of the measurement to recognized national standards, and to realization of the international system of units (SI) through the NIMT National Metrology Institute of Thailand's Calibration Certificate number: NMW-0002-21 and NMW-0006-22.

Uncertainty of Measurement:

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

RECEIVED DATE

11 Aug 2023

MEASUREMENT DATE

18 Aug 2023

ISSUE DATE

21 Aug 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow

Temperature

23.0 ± 1.0 °C

Relative Humidity

55.0 ± 15.0 %RH

Atmospheric Pressure

1010 ± 10 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITIONS

Wind tunnel cross section area*

900 cm²

Win direction frontal area*

100 cm²

Diameter of mounting pipe*

mm

Biological rate of test object*

0.111 [1]

Preconditioning

24 hours at ambient conditions

Measurement Condition

The average values during measurement are 23.31 °C, 14.31 %RH and 1005.55 hPa

TASULATION OF RESULTS:

The table on next page give the measured values

Calibrated by:

Mr. Satewit Thachetad

Miss Jitraporn Lertrachiphol



Approved Signatory

Mr. Parinya Booncharoen
Calibration Department Manager

Remarks:

*Winding end section area of the wind tunnel

*Projected cross section area of the tested object include mounting pipe

*Diameter of mounting pipe

*Ratio $\frac{A}{A_0}$

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

CERTIFICATE OF CALIBRATION

Calibration No.: RH 04012023
Page 1 of 1 Pages

Measurement Item

Relative humidity with data logger

Manufacturer

Navalyn

Model/Type

110 WS 25DL D

Serial Number

A5789

ID No.

RYG-FS0631

Customer

ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

Environmental Condition:

The measurement was carried out in an ambient temperature of (26±3)°C, and relative humidity of (60±10)%.

Measurement Method:

Unit Under Calibration (UUC) was calibrated by comparison method with standard thermo hygrometer in the humidity generator chamber to determine the errors.

Traceability:

This instrument was calibrated using standard equipment whose accuracy is traceability through National Institute of Standards and Technology to the international system of units (SI) via MCS Calibration, Inc. Certificate number: 20314-101 Due date: Mar 14, 2023.

Measurement Date: Jan 18, 2023

Issued Date: Jan 20, 2023

Measurement Results:

This equipment was connected with indoor air quality probe and Displayed (UUC) on display. Model HMP60, Serial number: T0210901.

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

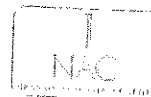
The results of calibration are reported in table below

Determined (%RH)	Standard (%RH)	UUC (%RH)	Error (%RH)	Uncertainty ±(%RH)
20	20.03	16.0	-2.0	0.61
50	50.24	47.5	-2.4	0.61
80	80.19	77.3	-2.9	0.61

Performed by

☐ Mr. Satewit Thachetad

☒ Miss Jitraporn Lertrachiphol



Approved Signatory

Mr. Parinya Booncharoen
Calibration Department Manager

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

Page 2 of 2 Pages

MEASUREMENT RESULTS⁵

The cup anemometer, Unit Under Calibration (UUC) was exercise at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 300 mm respectively away from wind tunnel nozzle. UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 3 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)
1.032	24.10	24.30	0.9	-0.1	0.31
2.095	24.14	24.30	1.9	-0.2	0.31
3.006	24.08	24.30	2.8	-0.1	0.31
4.220	24.04	24.30	4.0	0.2	0.31
5.00	23.78	24.30	4.9	-0.1	0.31
5.97	23.82	24.30	5.9	-0.1	0.31
7.01	23.78	24.30	6.9	-0.1	0.31
8.13	24.00	24.30	8.0	-0.1	0.31
9.07	23.82	24.30	9.0	-0.1	0.31
10.07	23.50	24.30	9.9	-0.1	0.31
11.13	23.84	24.30	11.1	0.0	0.31
12.13	23.60	24.30	12.0	-0.1	0.31
13.15	23.82	24.30	13.2	0.0	0.31
14.24	23.74	24.30	14.1	-0.1	0.31
15.20	23.50	24.30	15.2	0.0	0.31
16.26	23.74	24.30	16.1	0.2	0.31

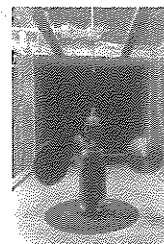
Remark:

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

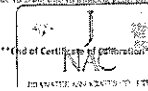
*Velocity of standard

*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 calibration one. Remark: The proportion of the set-up is not true to scale due to image compression.



CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM MANUFACTURER MODEL/TYPE

Wind Direction Sensor
: hovalys
: Sensor WS-02F

SERIAL NUMBER

Data logger: 200-WS-25LB
Sensor: WS-02F-AS190

ID NUMBER

Data logger: AS190
RYG_FS0329

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 Aug 2023

MEASUREMENT DATE

18 Aug 2023

ISSUE DATE

23 Aug 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature: 23.0 ± 3.0 °C
Relative Humidity: 55.0 ± 15.0 %RH
Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION

Elife-type wind tunnel of Jirantee Associates Co., Ltd.

CALIBRATION CONDITION

Wind tunnel cross section area¹: 900 cm²
Win direction frontal area²: 129 cm²
Diameter of mounting plate³: 129 mm
Blockage ratio of test object⁴: 0.143 [-]

Preconditioning

24 hours at ambient conditions.

Measurement Condition

The average values during measurement are (23.9) °C, (44.8) %RH and (1009.2) hPa.

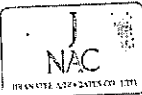
TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

1) Mr. Sarawit Thairatad

2) Miss Jiraporn Jiratanont



Approved signature:

[Signature]

Mr. Panyaporn Boonchaisan
Calibration Department Manager

Remarks:

¹ Net cross-section area of the wind tunnel

² Projected cross-section area of the tested object including mounting plate

³ Diameter of mounting plate

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 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 ₁ Degree (°)	D ₂ Degree (°)	Error Degree (°)	U (k=2) Degree (°)
5.00	45.000	41	-4	1.0
	90.000	87	-3	1.0
	135.000	132	-3	1.0
	180.000	178	-2	1.0
	225.000	225	1	1.0
	270.000	272	2	1.0
	315.000	319	4	1.0
	360.000	359	-1	1.0

Remarks:

¹ Calibrations 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



ROTA METER CALIBRATION RESULT JANUARY 2024

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0585	10 Jan 24	Y = 1.0351x + 2.3733	0.9998
BKK_FS0587	10 Jan 24	Y = 1.0168x + 15.05	0.9997
BKK_FS0592	10 Jan 24	Y = 1.0013x + 12.556	1.0000
BKK_FS0594	10 Jan 24	Y = 1.0048x + 4.0762	1.0000
BKK_FS1004	04 Jan 24	Y = 0.9973x + 13.47	0.9993
BKK_FS1005	04 Jan 24	Y = 1.0187x + 1.25	0.9998
BKK_FS1006	04 Jan 24	Y = 1.1580x - 3.6605	0.9981
BKK_FS1007	10 Jan 24	Y = 1.1347x + 1.6007	0.9980
BKK_FS1008	10 Jan 24	Y = 1.127x + 4.3827	0.9996
BKK_FS1017	04 Jan 24	Y = 1.0632x - 0.0701	0.9998
BKK_FS1018	04 Jan 24	Y = 1.0115x + 1.2867	0.9996
BKK_FS1019	04 Jan 24	Y = 1.0019x + 8.4867	1.0000
BKK_FS1026	10 Jan 24	Y = 0.9618x + 1.0626	0.9999
BKK_FS1027	10 Jan 24	Y = 1.0065x - 4.3786	1.0000
BKK_FS1028	10 Jan 24	Y = 1.0184x - 37.308	0.9997
BKK_FS1029	10 Jan 24	Y = 0.9809x + 2.7925	0.9977
BKK_FS1030	10 Jan 24	Y = 0.998x - 1.3266	1.0000
BKK_FS1031	10 Jan 24	Y = 1.015x - 27.236	0.9997
BKK_FS1039	04 Jan 24	Y = 1.0047x + 8.0267	0.9997
BKK_FS1040	04 Jan 24	Y = 1.0059x + 3.6652	1.0000
BKK_FS1041	04 Jan 24	Y = 1.0677x - 0.0486	0.9995
BKK_FS1042	04 Jan 24	Y = 1.0021x + 11.273	0.9995
BKK_FS1043	04 Jan 24	Y = 1.0023x + 8.3905	1.0000
BKK_FS1044	04 Jan 24	Y = 1.0738x + 1.2527	0.9997
PHK_FS0027	10 Jan 24	Y = 1.1096x + 0.3565	1.0000
PHK_FS0028	10 Jan 24	Y = 1.034x - 2.52	1.0000
PHK_FS0029	10 Jan 24	Y = 1.0017x + 8.0124	1.0000
RYG_FS0197	04 Jan 24	Y = 1.0045x + 10.275	1.0000
RYG_FS0198	04 Jan 24	Y = 1.0024x + 10.1	1.0000
RYG_FS0199	04 Jan 24	Y = 1.0343x - 0.3954	0.9999
RYG_FS0654	04 Jan 24	Y = 1.0520x + 0.1565	0.9996
RYG_FS0655	04 Jan 24	Y = 0.992x + 8.9667	0.9992
RYG_FS0656	04 Jan 24	Y = 1.0068x - 2.8420	1.0000
RYG_FS0657	04 Jan 24	Y = 1.0472x + 1.9228	0.9999
RYG_FS0658	04 Jan 24	Y = 0.9675x + 20.263	0.9996
RYG_FS0659	04 Jan 24	Y = 1.0028x + 10.275	1.0000
SGK_FS0135	17 Jan 24	Y = 1.0145x + 2.8273	1.0000
SGK_FS0136	17 Jan 24	Y = 1.0113x + 1.75	0.9999
SGK_FS0138	04 Jan 24	Y = 1.0632x - 1.0034	0.9999



ROTA METER CALIBRATION RESULT JANUARY 2024

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
SGK_FS0139	04 Jan 24	Y = 1.0047x + 1.8667	0.9999
SGK_FS0140	04 Jan 24	Y = 1.0001x + 14.149	1.0000
SGK_FS0141	04 Jan 24	Y = 1.111x - 1.1337	0.9994
SGK_FS0142	04 Jan 24	Y = 1.0179x + 0.3833	0.9999
SGK_FS0143	04 Jan 24	Y = 1.054x + 2.2352	1.0000

Review By :

[Signature]

(Mr. Wichan Choonharat)

Enviro Field Services Manager

Approved By :

[Signature]

(Mr. Sarayuth Jitranont)

Assistant General Manager

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

REVIEW BY *Thawit*
APPROVED BY *D. Inthana*
NEXT CAL DATE 01/03/24

Certificate of Calibration

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

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

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

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

Metrological data: Capacity 120 g Readability 0.00001 g
Reasons for calibration: ☒ New Installation ☐ Service / Repair ☒ Re-calibration / Maintenance
Ambients Conditions: Temperature 24.0 °C ± 5.0 °C
Humidity 63.0 % 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	SPC-RT	C02212665	14-Sep-2023
MHB-382SD	Humidity/Barmeter/Temp. Lutron MHB-382SD	OKSH	C19220444	6-Sep-2023

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

Chonchai Inthana

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

Calibration Results : Without Adjustment

Repeatability		Eccentricity (Off-center loading error)	
The reproducibility is the ability of a weighing instrument to display nearly identical results 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.		The off-center loading error is yielded by the difference between the residual 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 R113).	
Nominal Value (Low Load)	0.00002 g	Nominal value	50 g
5 g	0.00002 g		9 g
Tolerance	0.000015 g	Tolerance	0.00015 g
Nominal Value (High Load)	50 g		
50 g	0.00002 g		
Tolerance	0.000015 g		
Standard Deviation	0.000007 g		

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	Conventional Mass Value
(g)	(g)
0.01	0.01000
0.1	0.10000
1	1.00000
2	2.00002
5	5.00002
10	10.00002
20	20.00002
30	30.00002
40	40.00003
50	50.00002

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

Calibration Results : Without Adjustment

Repeatability		Eccentricity (Off-center loading error)	
The reproducibility is the ability of a weighing instrument to display nearly identical results 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.		The off-center loading error is yielded by the difference between the residual 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 R113).	
Nominal Value (Low Load)	100.0000 g	Nominal value	50 g
100 g	100.0000 g		9 g
Tolerance	0.000015 g	Tolerance	0.00015 g
Nominal Value (High Load)	100 g		
100 g	100.0000 g		
Tolerance	0.000015 g		
Standard Deviation	0.00003 g		

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	Conventional Mass Value
(g)	(g)
65	65.0000
70	70.0000
75	75.0000
80	80.0000
85	85.0000
90	90.0000
95	95.0000
100	100.0000
110	110.0000
120	120.0000

Err of Report

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 MSE125P-100-DU Certificate No. 24BCI0071
Description: Semi-micro Balance Issued Date Friday, February 23, 2024
Serial Number 0033108993 Reference No. 220186
ID No. RYG_EN0004
Manufacturer Sartorius Page No. 1 of 3

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

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

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

Metrological data: Capacity 60.1/120 g Readability 0.00001/0.0001 g
Reasons for calibration: ☒ New Installation ☐ Service / Repair ☒ Re-calibration / Maintenance
Ambients Conditions: Temperature 24.0 °C ± 5.0 °C
Humidity 60.0 % 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-2026
MHB-382SD	Humidity/Barmeter/Temp. Lutron MHB-382SD	OKSH	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.

Chonchai Inthana

Mr Chonchai Inthana (Technical Manager)

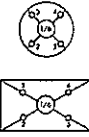
SOP FM 33 03 February 2022



Certificate of Calibration

Model Number: MSE125P-100-DU Certificate No.: 24BCI0071
Description: Semi-micro Balance Issued Date: Friday, February 23, 2024
Serial Number: 0033108993 Reference No.: 229196
ID No.: RYG_EN0004
Manufacturer: Sartorius Page No.: 2 of 3

Calibration Results : Without Adjustment

Repeatability			Eccentricity (Off-center loading error)		
The 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.			The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R110).		
Nominal Value : (Low Load)	5.00003	50.00003	Nominal value :	50	g
5 g	5.00001	50.00003	Tolerance	0.00015	g
Tolerance	5.00003	50.00002			
0.000015 g	5.00002	50.00003			
	5.00001	50.00003			
Nominal Value : (High Load)	5.00002	50.00003			
50 g	5.00001	50.00003			
Tolerance	5.00001	50.00002			
0.000015 g	5.00002	50.00003			
	5.00002	50.00002			
Standard Deviation	0.000008	0.000005			

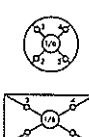
Linearity				
The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.				
Tolerance	0.00004	g		
Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
0.01	0.01000	0.01000	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

Certificate of Calibration

Model Number: MSE125P-100-DU Certificate No.: 24BCI0071
Description: Semi-micro Balance Issued Date: Friday, February 23, 2024
Serial Number: 0033108993 Reference No.: 229196
ID No.: RYG_EN0004
Manufacturer: Sartorius Page No.: 3 of 3

Calibration Results : Without Adjustment

Repeatability			Eccentricity (Off-center loading error)		
The 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.			The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R110).		
Nominal Value : (Low Load)	100.0000	100.0000	Nominal value :	50	g
100 g	100.0000	100.0000	Tolerance	0.00015	g
Tolerance	0.000015 g	100.0000			
	100.0000	100.0000			
Nominal Value : (High Load)	100.0000	100.0000			
100 g	100.0000	100.0000			
Tolerance	0.000015 g	100.0000			
	100.0000	100.0000			
Standard Deviation	0.00003	100.0000			

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

SOP FM 33 03 February 2022

SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

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

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_FS0496

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHEI 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 : Nathakorn Pisutpaisan

Approved by :

T. Petchum
(Thanakul Petchum)

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SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

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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	33511R	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL-HP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL-HP 30/0267	13-FEB-24
Digital Multimeter	33461A	MY60024273	EEL-HP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KA1	34560495	AA-3002-23	14-FEB-24
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 2423 8331 Email: calibration@sith-pharm.com



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. Petchur

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

451-451/1 Srinthorn Road, Bangbunru, Bangkok, 10700 Thailand
Tel: +66 2423 8331 Email: calibration@sith-pharm.com



Cert. No. : ACL24093
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-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).

T. Petchur

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Tel: +66 2423 8331 Email: calibration@sith-pharm.com



Cert. No. : ACL24093
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RUON
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00734225 / 145272 / 34370
ID No.: RYG FS0030

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. Petchur
(Thanakul Petchurai)

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SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

451-451/1 Srinthorn Road, Bangbunru, Bangkok, 10700 Thailand
Tel: +66 2423 8331 Email: calibration@sith-pharm.com



Cert. No. : ACL24093
Job No. : VC67AC0058
Pages : 3 of 8

Summary of Measurement Result :

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

T. Petchur

Cert. No. : ACL24093
Job No. : VC67AC0058
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)
21.4

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

Frequency Weighting	Measured value (dB)
A - weight	11.6
C - weight	17.9
Flat	23.6

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	-1.1	-0.9	-0.9	±5.0

T. Petch

Cert. No. : ACL24093
Job No. : VC67AC0058
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	53.9	-0.1	± 1.1
49.0	49.0	0.0	± 1.1
44.0	43.9	-0.1	± 1.1
39.0	38.9	-0.1	± 1.1
34.0	33.9	-0.1	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	28.0	0.0	± 1.1
27.0	27.0	0.0	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.0	0.0	± 1.1

T. Petch

Cert. No. : ACL24093
Job No. : VC67AC0058
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

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

T. Petch

Cert. No. : ACL24093
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	94.0	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, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	136.2	-0.2	±3.0

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

T. Petch

Cert. No. : ACL24093
Job No. : VC67AC0058
Pages : 8 of 8Cert. No. : ACL23249
Pages : 1 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.8	0.2	±1.5

12. High level stability

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

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

End of Calibration Certificate

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00734218 / 146937 / 34368
ID No. : RYG_F80031

Condition As Found : GOOD

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

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

Received Date : 13 JULY 2023
Calibration Date : 10 AUGUST 2023
Date of Issue : 11 AUGUST 2023

Calibrated by : Nathakorn Pisutparisan

Approved by :

T. Petchurai
(Thanakul Petchurai)

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QI-TS12-04-04-020604

Continuation of Calibration Certificate

Cert. No. : ACL23249
Job No. : VC66AC0085
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1 Reference Standard Instruments

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EI-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	IF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL-BP-30-0266	12-FEB-24
Digital Multimeter	33461A	MY53220076	FEL-BP-28-0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL-BP-31-0266	14-FEB-24
Programmable Attenuator	MAT-1070	62109114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAJ	34560495	AA-3002-23	14-FEB-24

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

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

3.1 National Institute of Metrology (Thailand).

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

Continuation of Calibration Certificate

Cert. No. : ACL23249
Job No. : VC66AC0085
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	0.3
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. : ACL23249
Job No. : VC66AC0085
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)
23.3

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

Frequency Weighting	Measured value (dB)
A - weight	14.8
C - weight	19.7
Flat	25.7

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	0.7	0.8	0.8	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	0.2	0.3	0.3	±5.0

QT-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL23249
Job No. : VC66AC0085
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	53.9	-0.1	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	38.9	-0.1	± 1.1
34.0	34.0	0.0	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.0	0.0	± 1.1
27.0	27.0	0.0	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.0	0.0	± 1.1

QT-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL23249
Job No. : VC66AC0085
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	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

QT-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL23249
Job No. : VC66AC0085
Pages : 7 of 8

8. Level linearity including the level range control

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

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	135.3	-1.1	±3.0

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

QT-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL23249
Job No. : VC66AC0085
Pages : 8 of 8

11. Overload Indication

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

12. High level stability

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

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

End of Calibration Certificate

Q1-TS12-64-01-02064



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL. BP. 178/0167

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

Calibration Procedure

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

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

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

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

Date of Calibration 23 Feb 2024 - 1 Mar 2024

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TISTR/MTA 002 Rev. 4



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL. BP. 178/0167

CALIBRATION CERTIFICATE

Submitted by ALS Laboratory Group (Thailand) Co., Ltd.
Address 104 Phatthanakan 40, Phatthanakan Rd., Kwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250
Calibrated at Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A Muang, Samutprakan 10260.

Instrument Calibrated :
Description Sound Level Meter
Manufacturer Ruon
Model NL-42
Serial No. 00900073 (ID-RYG_FS0494)
Microphone UC-52 No 188466
Preamplifier NH-24 No 01735

Ambient Environment
Temperature $(23 \pm 3) ^\circ\text{C}$
Relative Humidity $(50 \pm 15) \%$
Ambient Pressure $(101.325 \pm 1.5) \text{ kPa}$

Standards used :

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

Date of Receipt 24 Jan 2024

Date of Calibration 23 Feb 2024 - 1 Mar 2024

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TISTR/MTA 002 Rev. 4



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL. BP. 178/0167

1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)		Deviation value (dB)	Acceptance limit Class 2 (dB)	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
	Before adjust	After adjust				
113.91	114.1	113.9	0.0	1.0	0.30	N/A

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 124.6 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
17.8	0.10	N/A

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

Frequency Weighting	Measured value (dB)	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
A-Weight	12.9	0.10	N/A
C-Weight	18.5	0.10	N/A
Flat	24.2	0.10	N/A

Date of Calibration 23 Feb 2024 - 1 Mar 2024

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TISTR/MTA 002 Rev. 4



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL BP. 178/0167

3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
125	0.1	0.2	0.2	1.5	0.45	0.6
1 000	-0.1	-0.1	-0.1	1.0	0.45	0.6
8 000	-0.7	-0.7	-0.7	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

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

Date of Calibration : 23 Feb 2024-1 Mar 2024

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This result is valid only if the laboratory is accredited to ISO 17025.

Adjustment of the report is not allowed. If the report is used for legal purposes, the user must obtain the original report from the laboratory.

FMBLMTC.002 Rev.4

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL BP. 178/0167

7. Level linearity on the reference level range

Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
136	136.0	0.0	1.1	0.30	0.3
135	135.0	0.0	1.1	0.30	0.3
134	134.0	0.0	1.1	0.30	0.3
133	133.0	0.0	1.1	0.30	0.3
132	132.0	0.0	1.1	0.30	0.3
131	131.0	0.0	1.1	0.30	0.3
130	130.0	0.0	1.1	0.30	0.3
129	129.0	0.0	1.1	0.30	0.3
124	124.0	0.0	1.1	0.30	0.3
119	119.0	0.0	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.0	0.0	1.1	0.30	0.3
79	79.0	0.0	1.1	0.30	0.3
74	74.0	0.0	1.1	0.30	0.3
69	69.9	-0.1	1.1	0.30	0.3

Date of Calibration : 23 Feb 2024-1 Mar 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL BP. 178/0167

5. Long-term stability

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

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

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

6.2 Time weightings at 1 kHz

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

Date of Calibration : 23 Feb 2024-1 Mar 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No. EEL BP. 178/0167

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

Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
64	63.9	-0.1	1.1	0.30	0.3
59	58.9	-0.1	1.1	0.30	0.3
54	53.9	-0.1	1.1	0.30	0.3
49	49.0	0.0	1.1	0.30	0.3
44	44.0	0.0	1.1	0.30	0.3
39	38.9	-0.1	1.1	0.30	0.3
34	33.9	-0.1	1.1	0.30	0.3
29	28.9	-0.1	1.1	0.30	0.3
28	27.9	-0.1	1.1	0.30	0.3
27	26.9	-0.1	1.1	0.30	0.3
26	25.9	-0.1	1.1	0.30	0.3
25	24.9	-0.1	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

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

Date of Calibration : 23 Feb 2024-1 Mar 2024

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FMBLMTC.002 Rev.4

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THAILAND INSTITUTE OF SCIENCE AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67 0232

MITC No. EE1 BP 179/0167

1. Absolute Sensitivity

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

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

2. Self-generated noise

2.1 Normal test

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

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

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

Date of Calibration 23 Feb 2024-1 Mar 2024

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FM/SL MITC 002 Rev.4

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THAILAND INSTITUTE OF SCIENCE AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67 0232

MITC No. EE1 BP 179/0167

5. Long-term stability

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

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

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

6.2 Time weightings at 1 kHz

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

Date of Calibration 23 Feb 2024-1 Mar 2024

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FM/SL MITC 002 Rev.4

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THAILAND INSTITUTE OF SCIENCE AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67 0232

MITC No. EE1 BP 179/0167

3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (dB)	Uncertainty (dB)	Maximum permitted uncertainty of measurement (dB)
	A-weight	C-weight	Flat			
125	0.2	0.3	0.3	1.5	0.45	0.6
1000	-0.2	-0.2	-0.2	1.0	0.45	0.6
8000	-0.7	-0.8	-0.8	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 2 (dB)	Uncertainty (dB)	Maximum permitted uncertainty of measurement (dB)
	A-weight	C-weight	Flat			
63	-0.1	-0.1	0.0	2.0	0.20	0.6
125	-0.1	0.0	0.0	1.5	0.20	0.6
250	-0.1	0.0	0.0	1.5	0.20	0.6
500	0.0	0.0	0.0	1.5	0.20	0.6
1000	0.0	0.0	0.0	1.0	0.20	0.6
2000	-0.1	-0.1	0.0	2.0	0.20	0.6
4000	-0.1	-0.1	0.0	3.0	0.20	0.6
8000	0.0	0.0	0.0	5.0	0.20	0.7

Date of Calibration 23 Feb 2024-1 Mar 2024

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FM/SL MITC 002 Rev.4

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THAILAND INSTITUTE OF SCIENCE AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67 0232

MITC No. EE1 BP 179/0167

7. Level linearity on the reference level range

Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (dB)	Uncertainty (dB)	Maximum permitted uncertainty of measurement (dB)
136	136.0	0.0	1.1	0.30	0.3
135	135.0	0.0	1.1	0.30	0.3
134	134.0	0.0	1.1	0.30	0.3
133	133.0	0.0	1.1	0.30	0.3
132	132.0	0.0	1.1	0.30	0.3
131	131.0	0.0	1.1	0.30	0.3
130	130.0	0.0	1.1	0.30	0.3
129	129.0	0.0	1.1	0.30	0.3
124	124.0	0.0	1.1	0.30	0.3
119	119.0	0.0	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.0	0.0	1.1	0.30	0.3
79	79.0	0.0	1.1	0.30	0.3
74	74.0	0.0	1.1	0.30	0.3
69	68.9	-0.1	1.1	0.20	0.3

Date of Calibration 23 Feb 2024-1 Mar 2024

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FM/SL MITC 002 Rev.4

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232

MTC No. EEL BP 179-0167

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

Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (dB)	Uncertainty (dB)	Maximum permitted uncertainty of measurement (dB)
64	63.9	-0.1	1.1	0.30	0.3
59	58.9	-0.1	1.1	0.30	0.3
54	53.9	-0.1	1.1	0.30	0.3
49	48.9	-0.1	1.1	0.30	0.3
44	43.9	-0.1	1.1	0.30	0.3
39	38.9	-0.1	1.1	0.30	0.3
34	33.9	-0.1	1.1	0.30	0.3
29	28.9	-0.1	1.1	0.30	0.3
24	23.9	-0.1	1.1	0.30	0.3
19	18.9	-0.1	1.1	0.30	0.3
14	13.9	-0.1	1.1	0.30	0.3
9	8.9	-0.1	1.1	0.30	0.3
4	3.9	-0.1	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

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

Date of Calibration 23 Feb 2024 - 1 Mar 2024

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FM/ELC 002 Rev. 6



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232

MTC No. EEL BP 179-0167

10. Peak C sound level

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

11. Overload indication

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

12. High-level stability

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

Calibrated by

Approved by

(Mr. Jantarat Jantarat)

Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration 23 Feb 2024 - 1 Mar 2024

Date of Issue 1 Mar 2024

Ref: 29-126-101200-447000

End of Certificate

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232

MTC No. EEL BP 179-0167

8. Level linearity including the level range control

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

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

9. Tone burst response

Time Weighting	Toneburst Duration 1s (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (dB)	Uncertainty (dB)	Maximum permitted uncertainty of measurement (dB)
Fast	200	126.0	0.0	1.0	0.20	0.3
	2	108.9	0.1	1.0, 2.5	0.20	0.3
	0.25	99.9	-0.1	1.5, 5.0	0.20	0.3
Slow	200	119.6	0.0	1.0	0.20	0.3
	2	100.0	0.0	1.0, 5.0	0.20	0.3
	0.25	90.8	0.2	1.5, 5.0	0.20	0.3
SEI	200	120.0	0.0	1.0	0.20	0.3
	2	100.0	0.0	1.0, 2.5	0.20	0.3
	0.25	90.8	0.2	1.5, 5.0	0.20	0.3

Date of Calibration 23 Feb 2024 - 1 Mar 2024

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FM/ELC 002 Rev. 6



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0292

MTC No. EEL BP 830-0267

CALIBRATION CERTIFICATE

Submitted by ALS Laboratory Group (Thailand) Co., Ltd.

Address 104 Phatthanasirak Rd., Phatthanasirak Rd., Khwaeng Phatthanasirak, Khet Suan Luang, Bangkok, 10250

Calibrated at Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated:

Ambient Environment

Description Sound Calibrator

Temperature (23 ± 3) °C

Manufacturer Rion

Relative Humidity (50 ± 15) %

Model NC-74

Ambient Pressure (101.325 ± 1.500) kPa

Serial No

34178121 (ID: RYG JS0213)

Standards used:

1. Digital Function Synthesizer NF Electronic DI 195A S/N 122037
2. Measuring Amplifier Brüel&Kjaer 2636 S/N 1537484
3. Programmable Attenuator Tamagawa TPA-303A S/N 0214
4. Digital Multimeter Agilent 34401A S/N MY44005560
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001
6. Audio Analyzer Keithley 2015-P S/N 14106495
7. Condenser Microphone B&K 4180 S/N 2859871

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

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

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

Date of Receipt 19 Feb 2024

Date of Calibration 26 Feb 2024

Handwritten signature and date: 29/2/25

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FM/ELC 002 Rev. 6

Request No. 21-67/0292 MTC No. EEL-DP. 83/0267

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

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

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

1. Sound Pressure Level

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

2. Frequency

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

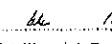
3. Total Distortion


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

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

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

Calibrated by : 
(Mr. Weerachai Deechaiyae)

Approved by : 
(Mr. Praveen Khuyya)
Director
Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre
Ref : 2011267021900719001

Date of Calibration : 28 Feb. 2024

Date of Issue : 29 Feb. 2024

End of Certificate

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The results relate only to the items tested and do not extend to other items.

Authorizing the Report/Certificate and calibration of the results is subject to full compliance with the written permission obtained from the Governor of TISTR.

FM/BLMTC.002 Rev.4

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SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

451-45/1 Srinthorn Road, Bangburu, Bangkok 10700 Thailand
Tel : +66 2433 0331 Email : calibration@sithiporn.com



Cert. No. : ACL24092
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	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

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

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Cert. No. : ACL24092

Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NH-24
Serial No. : 00734220 / 145286 / 34371
ID No. : RYG_FS0026


Condition As Found : GOOD

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

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

Received Date : 19 JANUARY 2024
Calibration Date : 25-26 JANUARY 2024
Date of Issue : 29 JANUARY 2024

Calibrated by : Nathakorn Pisutpaisan

Approved by : 
(Thanakul Petchurai)

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

SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

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Cert. No. : ACL24092
Job No. : VC67AC0058
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. : ACL24092
Job No. : VC67AC0058
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)
16.3

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

Frequency Weighting	Measured value (dB)
A-weight	13.4
C-weight	19.5
Flat	25.4

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	±1.5
1000	0.1	0.1	0.1	±1.0
8000	2.3	2.3	2.3	±5.0

T. Petch...

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Cert. No. : ACL24092
Job No. : VC67AC0058
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	29.9	-0.1	±1.1
29.0	29.0	0.0	±1.1
28.0	28.0	0.0	±1.1
27.0	27.1	0.1	±1.1
26.0	26.1	0.1	±1.1
25.0	25.1	0.1	±1.1

T. Petch...

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Cert. No. : ACL24092
Job No. : VC67AC0058
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long-term stability

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

T. Petch...

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Cert. No. : ACL24092
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	94.0	0.0	±1.1

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lpeak (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	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

T. Petch...

Cert. No. : ACL24092
Job No. : VC67AC0058
Pages : 8 of 8J NAC
J NAC ASSOCIATES CO., LTD.
459/459/1 Srinthorn Road, Bangbunma, Bangkok, 10700 Thailand
Tel: +66 2433 8331
Fax: +66 2433 8332
Email: calibration@sithiporn.com
Website: www.sithiporn.comAccredited calibration laboratory
ISO/IEC 17025:2017
NSC-TIS-TIS 17025
CALIBRATION 0367Temperature measurement laboratory
Calibration services departmentNSC-TIS-TIS 17025
CALIBRATION 0367

11. Overload indication

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

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

Certificate No. : CDT-030-67

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 20032243
ID NUMBER : RVG_F50523
CONDITION AS-RECEIVED : Used Item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phanthanank 40, Phanthanank 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

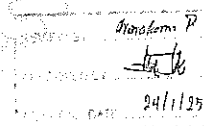
ENVIRONMENTAL CONDITIONS:

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. 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



Continuation of Certificate of Calibration Number CDT-030-67

Page 2 of 2 Pages

Result of Calibration: [X] Without Adjustment [] With Adjustment

Calibration Range: 20 - 40 °C

Excerpt:

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	40.022	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.

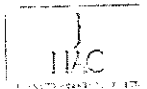
Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.055	20.0	0.1	0.099
110	25.051	25.1	0.0	0.099
110	30.040	30.1	0.1	0.099
110	35.032	35.1	0.1	0.099
110	40.023	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 21001795.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.055	20.1	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: Unit Under Calibration

End of Certificate of Calibration

J NAC
J NAC ASSOCIATES CO., LTD.
459/459/1 Srinthorn Road, Bangbunma, Bangkok, 10700 Thailand
Tel: +66 2433 8331
Fax: +66 2433 8332
Email: calibration@sithiporn.com
Website: www.sithiporn.comAccredited calibration laboratory
ISO/IEC 17025:2017
NSC-TIS-TIS 17025
CALIBRATION 0367Temperature measurement laboratory
Calibration services departmentNSC-TIS-TIS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

Certificate No. : CDT-031-67

MEASUREMENT ITEM : Heat Stress Monitor
MANUFACTURER : Delta OHM
MODEL/TYPE : HD32.2
SERIAL NUMBER : 20032243
ID NUMBER : RVG_F50523
CONDITION AS-RECEIVED : Used Item
CUSTOMER : ALS laboratory group (thailand) Co., Ltd.
104 Phanthanank 40, Phanthanank 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

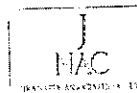
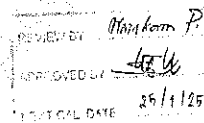
ENVIRONMENTAL CONDITIONS:

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. 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: 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 295 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

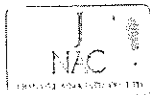
Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 21001786.
Dimension: Diameter 14 mm. Length 150 mm

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=2.71 providing a level of confidence of approximately 95%

End of Certificate of Calibration



43/34 15 47/33 30
Rachaburi 211, P.O. Box 100, Bangkok 10110
Bangkok 10110 (Thailand)
Tel: +662 055 0012
Mobile: +662 055 00453
E-mail: info@janitre.com
Web site: www.janitre.com

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

Temperature measurement laboratory
Calibration services department

MSC - TIS - TIS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No.: CDT-032-67

Page 1 of 2 Pages

MEASUREMENT ITEM

Heat Stress Monitor

MANUFACTURER

Delta OHM

MODEL/TYPE

HD32.2

SERIAL NUMBER

29032249

ID NUMBER

RYG_FS0524

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

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

Calibration procedure:

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

Traceability:

The measurement results are traceable to the international system of units (SI) through National Institute of Metrology, Thailand (NIMT). Certificate number: TT-0038 23, Certificate number: ER-0101 23

Reference Used During Calibration:

1. Standard Temperature Probe

Model: S15 100 AS00, Serial No: 667087 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

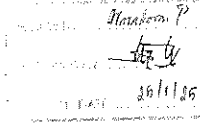
Uncertainty of Measurement

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.

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

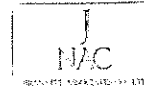
TABULATION OF RESULTS:

The table on next page give the measured values



Calibrated by:

Mr. Sorawit Thachad
Miss Rittiraporn Lertsompol
Miss Rungnirumpai Phasomma



Approved signatory

Mr. Pinyia 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: 21001215.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.035	20.1	0.1	0.099
80	25.051	25.2	0.1	0.099
80	30.044	30.2	0.2	0.099
80	35.036	35.2	0.2	0.099
80	40.031	40.2	0.2	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 21001244.
Dimension: Diameter 3.3 mm. Length 265 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.035	20.0	0.0	0.099
110	25.051	25.0	0.1	0.099
110	30.044	29.9	-0.1	0.099
110	35.035	35.0	0.0	0.099
110	40.031	40.0	0.0	0.099

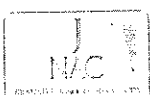
Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 21001790.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.035	20.1	0.1	0.099
75	25.051	25.0	0.1	0.099
75	30.044	29.9	-0.1	0.099
75	35.035	34.8	-0.1	0.099
75	40.031	39.7	-0.3	0.21

UUC*: Unit Under Calibration

Remark: The reported uncertainty of measurement is 0.16, based on standard uncertainty multiplied by a coverage factor k=2.71 providing a level of confidence of approximately 95%

End of Certificate of Calibration



43/34 15 47/33 30
Rachaburi 211, P.O. Box 100, Bangkok 10110
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Mobile: +662 055 00453
E-mail: info@janitre.com
Web site: www.janitre.com

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

Temperature measurement laboratory
Calibration services department

MSC - TIS - TIS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No.: CDT-033-67

Page 1 of 2 Pages

MEASUREMENT ITEM

Heat Stress Monitor

MANUFACTURER

Delta OHM

MODEL/TYPE

HD32.2

SERIAL NUMBER

22016307

ID NUMBER

RYG_FS0577

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 Jun 2024

MEASUREMENT DATE

15 Jan 2024

ISSUE DATE

17 Jun 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature: 23.0 ± 3.0 °C

Relative Humidity: 55.0 ± 15.0 %RH

Calibration procedure:

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

Traceability:

The measurement results are traceable to the international system of units (SI) through National Institute of Metrology, Thailand (NIMT). Certificate number: TT-0038 23, Certificate number: ER-0101 23

Reference Used During Calibration

1. Standard Temperature Probe

Model: S15 100 AS00, Serial No: 667087 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

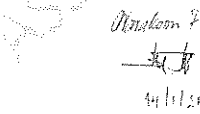
Uncertainty of Measurement

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.

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

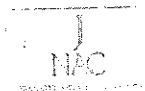
TABULATION OF RESULTS:

The table on next page give the measured values



Calibrated by:

Mr. Sorawit Thachad
Miss Rittiraporn Lertsompol
Miss Rungnirumpai Phasomma



Approved signatory

Mr. Pinyia 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: 22025572.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.060	19.9	-0.2	0.099
80	25.051	24.9	-0.2	0.099
80	30.042	29.9	-0.1	0.099
80	35.035	34.9	-0.1	0.099
80	40.025	39.9	-0.1	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 21001243.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.050	20.0	-0.1	0.099
110	25.051	25.0	-0.1	0.099
110	30.042	30.0	0.0	0.099
110	35.035	35.0	0.0	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: 22025042.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.060	20.0	-0.1	0.099
75	25.051	24.9	0.2	0.099
75	30.042	29.8	-0.2	0.099
75	35.035	34.7	-0.3	0.099
75	40.025	39.7	-0.3	0.099

UUC* Unit Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. CDT-033-66
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: H032.2
Serial No: 22016389
ID No: RYG_FS0576

Customer
Name: ALS laboratory group (Thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwang Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand

Received date: 11 Jul 2023
Calibration date: 20 Jul 2023
Issue date: 20 Jul 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS 100 A500,
Serial No. 667682-09, Due date: 28 Mar 2024
2. Digital Temperature Indicator Model: DTI-1000-A MK
II Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (55±15)%

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-0038-23, Certificate number ER 0092
22

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

Calibrated by
☐ Mr. Soravit Thachalad
☒ Miss Jitraporn Lertsomphol
☐ Miss Ruengrumpa Phonmit



Approved Signatory:
Mr. Panya 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: 22015694
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.034	19.9	0.1	0.099
80	25.052	24.9	0.2	0.099
80	30.043	29.9	0.1	0.099
80	35.036	34.9	-0.1	0.099
80	40.035	39.8	-0.2	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 22023956
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.034	20.1	0.1	0.099
110	25.051	25.1	0.0	0.099
110	30.043	30.1	0.1	0.099
110	35.036	35.1	0.1	0.099
110	40.035	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 22025031.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.034	20.1	0.1	0.099
75	25.051	25.0	-0.1	0.099
75	30.043	29.9	-0.1	0.099
75	35.037	34.8	-0.2	0.099
75	40.035	39.7	-0.3	0.099

UUC* Unit Under Calibration

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

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No. CDT-034-66
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: H032.2
Serial No: 22016389
ID No: RYG_FS0579

Customer
Name: ALS laboratory group (Thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwang Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand

Received date: 11 Jul 2023
Calibration date: 20 Jul 2023
Issue date: 20 Jul 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS 100 A500,
Serial No. 667682-09, Due date: 28 Mar 2024
2. Digital Temperature Indicator Model: DTI-1000-A MK
II Serial No.: 671407-00591 Due date: 22 July 2023

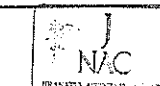
Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (55±15)%

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-0038-23, Certificate number ER 0092
22

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

Calibrated by
☐ Mr. Soravit Thachalad
☒ Miss Jitraporn Lertsomphol
☐ Miss Ruengrumpa Phonmit



Approved Signatory:
Mr. Panya Booncharoen
Calibration Department Manager

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63/14-16.67/35-36, Soi Petchkasem 7/1, Petchkasem Rd,
Walthapa, Bangkok, Bangkok 10600 Thailand.
Tel: (66) 02-8680812413 Fax: (66) 02-8680860 www.jiranatee.com



Certificate No. : COT-034-66
Page 2 of 2



JIRANATEE ASSOCIATES CO., LTD.

Jiranatee Associates Co., Ltd.
63/14-16.67/35-36
Petchkasem 7/1, Rd Walthapa, Bangkok
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E-mail: jiranatee@jiranatee.com
Web site: www.jiranatee.com

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

Temperature measurement laboratory
Calibration services department



NAC - TIS - TIS 17025
CALIBRATION 0367

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: 22015701.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.053	20.0	-0.1	0.099
60	25.051	25.0	-0.1	0.099
60	30.043	30.0	-0.0	0.099
60	35.038	34.9	-0.1	0.099
60	40.032	39.9	-0.1	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 22023034
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	25.051	25.1	0.0	0.099
110	30.043	30.1	0.1	0.099
110	35.038	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: 22025053
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.054	20.1	0.0	0.099
75	25.051	25.0	-0.1	0.099
75	30.043	29.9	-0.1	0.099
75	35.038	34.9	-0.1	0.099
75	40.032	39.8	-0.2	0.099

UUC* Unit Under Calibration

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

End of Certificate



CERTIFICATE OF CALIBRATION

Certificate No. : COT-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
CUSTOMER: AIS 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.

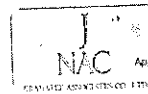
Calibration procedure:
The temperature calibration was done by In-House calibration method using Wt-Ci 001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale use was based on ITS-90.

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 A500, Serial No: 657682-09, Due date: 28 Mar 2024
2. Digital Temperature Indicator Model: DTI 1000 A MEH, 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. Sorawat Thachalee
☐ Miss Jitraporn Lerttongphol
☒ Miss Ruangsang Poommit



Approved signatory

Mr. Parinya Booncharoen
Calibration Department Manager

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Continuation of Certificate of Calibration Number COT-055-67

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: 22033263
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.053	20.4	0.3	0.099
60	25.054	25.4	0.3	0.099
60	30.040	30.4	0.4	0.099
60	35.026	35.4	0.4	0.099
60	40.018	40.4	0.4	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 17023317
Dimension: Diameter 3.3 mm. Length 205 mm.

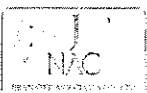
Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.054	20.3	-0.2	0.099
110	25.054	25.3	-0.2	0.099
110	30.040	30.3	0.3	0.099
110	35.027	35.3	0.3	0.099
110	40.018	40.3	0.3	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015491
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.054	20.5	0.4	0.099
75	25.054	25.4	0.3	0.099
75	30.041	30.4	0.4	0.099
75	35.026	35.3	0.3	0.099
75	40.018	40.2	0.2	0.099

UUC* Unit Under Calibration

End of Certificate of Calibration



Jiranatee Associates Co., Ltd.
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Tel: +6628680812
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E-mail: jiranatee@jiranatee.com
Web site: www.jiranatee.com

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

Temperature measurement laboratory
Calibration services department



NAC - TIS - TIS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No. : COT-015-67

Page 1 of 2 Pages

MEASUREMENT ITEM: Heat Stress Monitor
MANUFACTURER: Delta OHM
MODEL/TYPE: HD32.2
SERIAL NUMBER: 15006715
ID NUMBER: RYG_F50220
CONDITION AS-RECEIVED
CUSTOMER: AIS 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: 11 Jan 2024
ISSUE DATE: 17 Jan 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature: 23.0 ± 3.0 °C
Relative Humidity: 55.0 ± 15.0 %RH

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

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

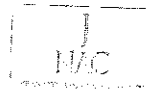
Calibration procedure:
The temperature calibration was done by In-House calibration method using Wt-Ci 001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale use was based on ITS-90.

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 A500, Serial No: 657682-09, Due date: 28 Mar 2024
2. Digital Temperature Indicator Model: DTI 1000 A MEH, 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. Sorawat Thachalee
☐ Miss Jitraporn Lerttongphol
☒ Miss Ruangsang Poommit



Approved signatory

Mr. Parinya Booncharoen
Calibration Department Manager

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Continuation of Certificate of Calibration Number CDT-015-67

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: 17023563.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.050	20.0	0.0	0.099
80	25.042	25.0	0.0	0.099
80	30.040	30.0	0.0	0.099
80	35.034	35.0	0.0	0.099
80	40.026	40.0	0.0	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 20015632.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.050	20.0	0.0	0.099
110	25.042	25.0	0.0	0.099
110	30.040	30.1	0.1	0.099
110	35.034	35.1	0.1	0.099
110	40.026	40.0	0.0	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015507.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.050	20.2	0.2	0.099
75	25.042	25.0	0.0	0.099
75	30.040	30.0	0.0	0.099
75	35.034	35.0	0.0	0.099
75	40.026	39.9	-0.1	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-016-67

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER : Heat Stress Monitor
MODEL/TYPE : Delta DHM
SERIAL NUMBER : HD32.2
ID NUMBER : 15006716
CONDITION AS-RECEIVED : RYG_150223
CUSTOMER : Used item

Heat Stress Monitor

Delta DHM

HD32.2

15006716

RYG_150223

Used item

ALS laboratory group (thailand) Co., Ltd.
104 Phatthanasak 40, Phatthanasak Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE

11 Jan 2024

MEASUREMENT DATE

11 Jan 2024

ISSUE DATE

17 Jan 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature : 23.0 ± 3.0 °C

Relative Humidity : 55.0 ± 15.0 %RH

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

TABULATION OF RESULTS:

The table on next page give the measured values.

Harom P
10/1/25

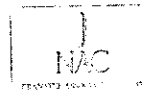
Calibration procedure:
The temperature calibration was done by In-House calibration method as follows according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale use was based on ITS-90.

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: TR-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 ASQ, Serial No. 667682-09, Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTI-1000 A KKH, Serial No. 671407, 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 Thacholad
☒ Miss Jitkarn Lertsanphol
☒ Miss Ruangsarn Phoommit



Approved signatory: Mr. Parinya Booncharoen
Calibration Department Manager

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Continuation of Certificate of Calibration Number CDT-016-67

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: 18009587.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.050	20.1	0.1	0.099
80	25.042	25.1	0.1	0.099
80	30.040	30.0	0.0	0.099
80	35.035	35.0	0.0	0.099
80	40.026	40.0	0.0	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15015607.
Dimension: Diameter 3.3 mm. Length 205 mm.

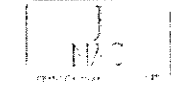
Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.049	20.0	0.0	0.099
110	25.042	25.0	0.0	0.099
110	30.040	30.0	0.0	0.099
110	35.034	35.0	0.0	0.099
110	40.026	40.0	0.0	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015492.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.049	20.2	0.2	0.099
75	25.042	25.1	0.1	0.099
75	30.040	30.0	0.0	0.099
75	35.034	34.9	-0.1	0.099
75	40.026	39.9	-0.1	0.099

UUC*: Unit Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-017-67

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER : Heat Stress Monitor
MODEL/TYPE : Delta DHM
SERIAL NUMBER : HD32.2
ID NUMBER : 15006718
CONDITION AS-RECEIVED : RYG_150223
CUSTOMER : Used item

Heat Stress Monitor

Delta DHM

HD32.2

15006718

RYG_150223

Used item

ALS laboratory group (thailand) Co., Ltd.
104 Phatthanasak 40, Phatthanasak Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE

11 Jan 2024

MEASUREMENT DATE

12 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.

Harom P
11/1/25

Calibration procedure:
The temperature calibration was done by In-House calibration method as follows 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: TR-0101-23

Reference Used During Calibration:
1. Standard Temperature Probe
Model: STS-100 ASQ, Serial No. 667682-09, Due date: 28 Mar 2024
2. Digital Temperature Indicator
Model: DTI-1000 A KKH, Serial No. 671407, 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 Thacholad
☒ Miss Jitkarn Lertsanphol
☒ Miss Ruangsarn 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: 10009588.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.053	20.1	0.0	0.099
80	25.045	25.1	0.1	0.099
80	30.040	30.1	0.1	0.099
80	35.039	35.1	0.1	0.099
80	40.032	40.0	0.0	0.099

Table 2. This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 20019638.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.053	20.1	0.1	0.14
110	25.045	25.2	0.2	0.099
110	30.040	30.3	0.3	0.099
110	35.039	35.3	0.3	0.099
110	40.030	40.3	0.3	0.099

Table 3. This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015496.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.053	20.2	0.1	0.099
75	25.045	25.1	0.1	0.099
75	30.040	30.0	0.0	0.099
75	35.039	34.9	-0.1	0.099
75	40.030	39.8	-0.2	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=2.14 providing a level of confidence of approximately 95%.

End of Certificate of Calibration



Thammasat University Co., Ltd.
67/14 Tt. 67/10, 65
Klongkum 10110, Bangkok, Thailand
Tel: +662-0500112
Mobile: +662-0500113
Email: jnac@jananitte.com
Website: www.jananitte.com

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

Temperature measurement laboratory
Calibration services department

CERTIFICATE OF CALIBRATION

Certificate No.: CDT-057-02

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS-RECEIVED
CUSTOMER

Heat Stress Monitor

Delta OHM

HD32.3

15005726

RYG_F50226

Used Item

ALS Laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

12 Feb 2024
16 Feb 2024
20 Feb 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature 23.0 ± 3.0 °C
Relative Humidity 55.0 ± 15.0 %RH

Calibration procedure:

The temperature calibration was done by In-House calibration method using Wt-CI-601 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-0037-23, Certificate number: EA 0101 23

Reference Used During Calibration:

1. Standard Temperature Probe Model: S15-100 ASD, Serial No: 607693-09, Due date: 28 Mar 2024
2. Digital Temperature Indicator Model: DTI-1000-A-Me-H, 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.

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

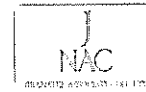
TABULATION OF RESULTS:

The table on next page give the measured values.

Handwritten signature and date: 16/2/26

Calibrated by:

☒ Mr. Serawit Thachathad
☐ Miss Jitraporn Lertsomphol
☐ Miss Ruangrumpai Phoommit



Approved signatory:

Handwritten signature of Mr. Parinya Booncharoen
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	-0.1	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.

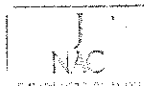
Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.054	20.0	-0.1	0.099
110	25.055	25.1	0.0	0.099
110	30.041	30.1	0.1	0.099
110	35.032	35.1	0.1	0.099
110	40.018	40.1	0.1	0.099

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



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
43/1 PATTANAKARNRONGSOI 15 SUKHUMVIT 10, SUKHUMVIT 10, BANGKOK 10110
TEL: 0-2717-9007 FAX: 0-2719-3244



Cert.No.: 24CH56
Page.: 1 of 3

Certificate of Calibration

Equipment :

pH Meter

Manufacturer :

Mettler Toledo

Model :

SevenCompact S220

Serial No. :

C104059460

ID No. :

RYG_EN0183

Condition As-Received:

Used Item

Received Date :

18 January 2024

Reference Date :

19 January 2024

Reference :

2401-0578DSC-2

Submitted by :

ALS Laboratory Group (Thailand) Co. Ltd. (Rayong Branch)
616/10 Moo 5, T. Moenam Khu,
A. Phukdaeng, Rayong 21140, Thailand

Ambient Temperature :

(25 ± 2.5) °C

Relative Humidity :

(50 ± 15) %

Calibration Procedure :

In-house method :
- CP-CH5 by direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM)
- CP-CH8 by comparison with temperature standard

Calibrated by :

Warakorn Lermagrabkul

Approved by :

Handwritten signature of Warakorn Lermagrabkul
Approved Signatory

(√) Sathap Meangmai
() Warakorn Lermagrabkul
() Pongpan Palpim

Issue Date :

24 January 2024

The Uncertainties are for a confidence probability of approximately 95%

* Certificate issued for the purpose of calibration only. It is not valid for other purposes.
** For the purpose of Calibration Services, Equipment Calibration and Testing Services.



Cert.No.: 24CH96
Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030048	130RC116	23E2802	27 Aug 2024
2) Ref. Standard Thermometer	4982054	110RC044	23I908	26 July 2024

This certification is traceable to the International System of Unit maintained through:-

- Technology Promotion Association (Thailand-Japan)

2. Certified Reference Materials

The measurement results are traceable to SI through CPA chem Ltd.
ANSI-ASQ National Accreditation Board. Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	940102	27 Nov 2025
pH 6.986	CPA chem	940104	02 Nov 2024
pH 9.997	CPA chem	940106	02 Nov 2024

3. This certificate is valid only to the item calibrated on date and place of calibration

Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input		Actual Reading		Uncertainty of Measurement (\pm mV)	Coverage factor k
	pH	mV	mV	mV	pH		
pH Meter S/N.: C104059460	4.000	177.48	177.4	4.000	0.058	2.00	
	7.000	0.00	0.0	7.000	0.058	2.00	
	10.000	-177.48	-177.5	10.000	0.058	2.00	



Cert.No.: 24CH96
Page.: 3 of 3

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4.01,7.00,10.01)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (\pm)	Coverage factor k
pH Electrode S/N.: 3225367	4.008	4.013	176.0	0.0054	2.07
	6.986	6.983	2.2	0.0084	2.00
	9.997	9.996	-174.1	0.0065	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLab®Expert Pro-ISM

- Serial No. : 3225367

Dimension of probe

- Length : 120 mm.

- Diameter : 12 mm.

- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (\pm °C)	Coverage factor k
25.0	25.001	25.2	0.199	0.13	2.00

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %

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Santhip

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Santhip

1198288



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
51/1 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK, 10250
TEL. 0-2717-3000-21 FAX. 0-2719-9181



Certificate of Calibration

Certificate No.: 24E289
Page: 1 of 2

Equipment:	pH Meter	This certificate may not be reproduced other than in full except with the prior written approval of the head of Corporate Services 3 Equipment Calibration and Testing Services
Manufacturer:	Mettler Toledo	
Model:	SevenCompact S220	
Serial No.:	C104059460	
ID No.:	RYG_EN0183	
Condition As-Received:	Used Item	
Received Date:	16 January 2024	
Calibration Date:	23 January 2024	
Reference:	2401-0578DSC	Submitted by: ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
Ambient Temperature:	(23 ± 2) °C	615/10 Moo 5, T Maenam Kru, A.Pluakdaeng, Rayong 21140, Thailand
Relative Humidity:	(50 ± 10) %	

Procedure used: Calibration were conducted using calibration procedure No. CP-E17 According to EURAMET cg-15.

Condition of this result of calibration

1. Reference standards Instruments

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Multi-Product Calibrator	5500A	6315011	E2U2300035	29 May 2024

2. This result of calibration was made on requested at the point specified by customer.

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

4. This Certification is traceable to the International System of Unit maintained through:-

-NA Caltechnologies Co.,Ltd. ANAB Accredited No. Calibration AC-2658

Calibrated by: Wichareeporn Wongchutikrangs Approved Signatory: _____
Issue Date: 24 January 2024
[] Phitsakorn Prabpapha
[] Nuntawat Khamchai
[] Pongsaporn Boonyaporn

1198286



Cert. No.: 24E289
Page.: 2 of 2

Result of calibration:- (*) Without adjustment () After adjustment

Function:	DC voltage measurement	Range:	2000 mV	
	Standard Value	UUC* Reading	Error	Uncertainty
	(mV)	(mV)	(mV)	(\pm μ V)
	-200.0000	-200.0	0.0	68
	-150.0000	-150.0	0.0	65
	-100.0000	-100.0	0.0	63
	-50.0000	-50.0	0.0	61
	0.0000	0.0	0.0	58
	50.0000	50.0	0.0	61
	100.0000	99.9	-0.1	63
	150.0000	149.9	-0.1	65
	200.0000	199.9	-0.1	68

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 %

UUC* = Unit Under Calibration.


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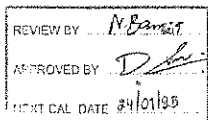
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Cert.No.: 23TW168
Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102795
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. Phakdaeng,
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 : Watalek Sinithean
Approved by : 
Approved Signatory
() Malee Butkruea
(✓) Sathip Meangmal
() Warakorn Lerngagtrakul
Issue Date : 26 July 2023



Condition of this result of calibration

1. Reference Standard Instruments :
This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).
- | Instruments | Serial No. | ID No. | Certificate No. | Due Date |
|-------------|------------|----------|-----------------|-------------|
| 1) Burette | - | 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. Phakdaeng,
Rayong 21140 Thailand
Location : TPA On Site Calibration Laboratory
Received Order : 25 July 2023
Calibrated Date : 27 July 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Preecha Hahib
Approved by : 
Approved Signatory
() Pornthippa Tamayakul
() Malee Butkruea
(✓) Suwit Imjai
Issue Date : 31 July 2023



Equipment : DO Meter with Sensor
Condition As-Received : Used from
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 | 2189080 | 2211285 | TPA | 21 Oct 2023 |
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.
Remark : TPA : Technology Promotion Association (Thailand - Japan)
Result of Calibration :- (*) Without Adjustment
Function : Temperature measurement

This instrument was connected with temperature sensor, S/N.: 1226475367

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
20.00	100	20.011	19.91	-0.101	0.15	2.00

UUC* : Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95 %

-oOo-

The Uncertainties are for a confidence probability of approximately 95 %

This certificate is valid only for the equipment and conditions stated herein. It is not valid for other equipment or conditions. The certificate is void if the equipment is used for other than the stated purpose. The certificate is void if the equipment is used for other than the stated purpose.

A 0003616

a 1159515





Cert. No.: 23TM962
Page : 1 of 3

Certificate of Calibration

Equipment : Low Temp. Incubator
Manufacturer : Memmert
Model : IPP750
Serial No. : V818.0084
ID No. : RYG_EN0154
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
(Rayong Branch)
616/10 Moo 5 T. Maenam Khu,
A. Pluakdaeng, Rayong 21140 Thailand
Location : BOD Room
Received Order : 29 May 2023
Calibration Date : 29 May 2023
Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$
Calibrated by : Men Paltanapongpaiboon
Approved by :
() Pornthipha Tamoyakul
() Malae Buikrua
() Suwil Imjai

Issue Date : 7 June 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced without the prior written
Approval of the head of Corporate Services & Equipment Calibration and Testing Services

A 0054967



Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2305-0898OC-2
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).
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard Instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY57013711	22LM93	02 Jul 2023

2. This certificate is valid only to the item calibrated on date and place of calibration.

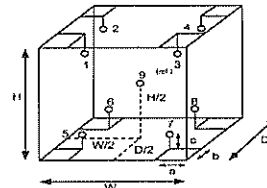
3. This certification is traceable to the International System of Unit.

Result of Calibration : (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	23	23
REL Humid. (%)	54	56
AC Supply (Volt)	223	222



Probe Installation Details :

Dimension	Value
a = 10 cm	D = 0.60 m
b = 10 cm	W = 1.0 m
c = 10 cm	H = 1.2 m
	Capacity = 0.75 m ³

Position :	Ref. Std. ID No.:
1	18-18RTD-01
2	18-18RTD-02
3	18-18RTD-03
4	18-18RTD-04
5	18-18RTD-05
6	18-18RTD-10
7	18-18RTD-07
8	22-18RTD-08
9 (ref.)	18-18RTD-09

a 1165130



Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2305-0898OC-2
Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 23TM962
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
20.0	20.0	20.0	0.019	0.72	1.0	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	19.547	19.780	19.487	19.529	19.408	20.139	20.112	20.406	20.116	0.30

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location, which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

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Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaywang, Huaywang, Bangkok 10210
Tel: +66 2643 8381-8, e-mail: service.thailand@sartorius.com



SARTORIUS

Certificate of Calibration

REVIEW BY :
APPROVED BY :
NEXT CAL. DATE : 02/02/2025

Model Number : MSE224S-100-OU

Certificate No. : 24B010089

Description : Analytical Balance

Issued Date : Friday, February 23, 2024

Serial Number : 0026207039

Reference No. : 22B198

ID No. : RYG_EN0002

Page No. : 1 of 2

Manufacturer : Sartorius

Customer Name : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)

616/10 Moo 5 T. Maenam Khu, A. Pluakdaeng, 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 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

Ambient 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

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	M2308167S	23-Aug-2025
MHB-38280	Humidity/Balometer/Temp. Lithon MHB-38280	DKSH	C1923184S	23-Aug-2024

This certificate relate and apply life 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)



a 1165129

SOP FM 33 03 February 2022

Certificate of Calibration

Model Number : MSE224S-100-DU Certificate No. : 24BCI0059
Description : Analytical Balance Issued Date : Friday, February 23, 2024
Serial Number : 0026207038 Reference No. : 229186
ID No. : RYG_EN0002
Manufacturer : Sartorius Page No. : 2 of 2

Calibration Results : Without Adjustment

Repeatability	Eccentricity (Off-center loading error)	
The repeatability is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.	The off-center loading error is yielded by the difference between the reading 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 R111).	
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

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. : GS11-1572
ID No. : RYG_EN0010
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5 T. Maenam Khu,
A. Pluekdaeng,
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 Pattanapongpalboon
Approved by :
() Pormthippa 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 : 2403-05630C-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.

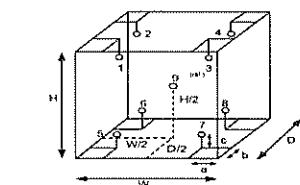
3. This certification is traceable to the International System of Unit.

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 = 0.40 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 : 2403-05630C-1
Cert. No.: 24TM632
Page : 3 of 3

Result of Calibration :-

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	0.69	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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Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2403-0563DC-3
Procedure Used :-

Cert. No.: 24TM634
Page : 2 of 3

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 :
Approved Signatory

() Ponthipha Tameyakul
() Unnopphol Harachai
(x) Suwit Imjai

Issue Date : 23 March 2024

REVIEW BY:

APPROVED BY:

NEXT CAL DATE: 21/03/25

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:-

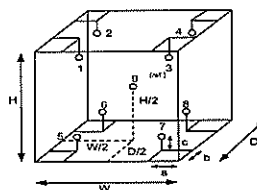
Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

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* : 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. (%)	59	59
AC Supply (Volt)	224	223

Ref. Std. ID No.: @ Calibration Point		
Position :	(180) °C	(164) °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%

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 : 2403-0563DC-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	103.505	103.898	103.712	103.772	103.730	104.289	103.805	103.798	0.42
180.0	180.701	179.239	179.935	179.989	180.127	180.136	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 %.

-000-



Certificate of Calibration

Cert. No.: 24TM635
Page : 1 of 3

Equipment : Water Bath
Manufacturer : Memmert
Model : WN822
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 :
Approved Signatory

() Ponthipha 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%

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 : Water Bath
Condition As-Received : Used Item
Reference : 2403-0563OC-4
Procedure Used :-

Cert. No.: 24TM635
Page : 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT04 Based on ASTM E716 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

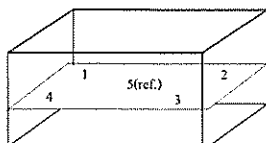
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	
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 as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
551 PATTANAKARNY ROAD SA-16 SHANTI AND NIMMANOMBO RD. BANGKOK, THAILAND
TEL: 0-2351-8900-29 FAX: 0-2351-2858



Cert. No.: 23CH1088
Page: 1 of 2

Certificate of Calibration

Equipment : Conductivity Meter
Manufacturer : Mettler Toledo
Model : S230
Serial No. : 0241407147
ID No. : RYG_EN0029
Condition As-Received : Used Item
Received Date : 01 September 2023
Calibration Date : 04 September 2023
Reference : 2309-0010DSC-7
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. Rayong Branch
616/10 Moo 5, T Maenam Khu,
A Pluakdaeng, Rayong 21140, Thailand

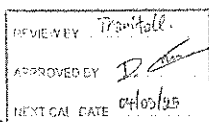
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In-house method
- CP-CH6 : based on direct measurement by using certified reference material (CRM)

Calibrated by : Warakorn Lemgagrakul

Approved by :
Approved Signatory

(✓) Sathip Meangmai
() Warakorn Lemgagrakul
() Ponpan Paipim

Issue Date : 7 September 2023



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	23I435	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	913595	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 %.

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The Uncertainties are for a confidence probability of approximately 95%

For further details, please refer to the TPA Calibration and Testing Services Manual.

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Certificate of Calibration

Cert.No.: 24CH383
Page.: 1 of 2

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : Seven2GoTM pH/mV S2
Serial No. : C202355605
ID No. : RYG_FS0574
Condition As-Received : Used Item
Received Date : 28 March 2024
Calibration Date : 01 April 2024
Reference : 2403-1017DSC-9
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch
616/10 Moo 5, T.Maenam Khu,
A.Pluakdaeng, Rayong 21140, Thailand

Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In-house method :
- CP-CH5 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)

Calibrated by : Warakorn Lemgagrakul

Approved by :
Approved Signatory

() Ponpan Palpim
() Unnopphol Harachai
(✓) Saithip Meangmai

Issue Date : 02 April 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.

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-1635

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	940102	27 Nov 2025
pH 6.866	CPA chem	940104	02 Nov 2024
pH 9.997	CPA chem	940106	02 Nov 2024

3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration Results

Function : mV Measurement

Performing standard curve by Document Process Calibrator at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (± mV)	Coverage factor k
	pH	mV	mV	pH		
pH Meter S/N : C202355606	4.008	177.48	177	4.00	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	10.00	-177.48	-178	10.00	0.58	2.00

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor k
pH Electrode S/N : 2015870	4.008	4.01	167	0.0071	2.00
	6.866	6.99	-10	0.010	2.00
	9.997	10.00	-178	0.0092	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 %.

-00-



Certificate of Calibration

Cert. No.: 24LM61
Page.: 1 of 2

Equipment : pH Meter with Sensor
Manufacturer : Mettler Toledo
Model : Seven2GoTM pH/mV S2
Serial No. : C202355606
ID No. : RYG_FS0574
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
Rayong Branch
616/10 Moo 5, T.Maenam Khu,
A.Pluakdaeng, Rayong 21140, Thailand
Location : TPA On Site Calibration Laboratory

Received Order : 29 March 2024
Calibrated Date : 02 April 2024
Ambient Temperature : (26 ± 1.0) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V

Calibrated by : Warakorn Lemgagrakul

Approved by :
Approved Signatory

() Pornthippa Tamayakul
(✓) Ponpan Palpim
() Suwit Imjai

Issue Date : 7 April 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 : 2403-1017DSC-10

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.

The temperature scale used was based on ITS-90

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Digital Thermometer	A52847	23I1222	TPA	10 Oct 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 : Temperature measurement.

This instrument was connected with temperature sensor, S/N : 2015780

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
25.0	100	25.002	25.0	-0.002	0.16	2.00
40.0	100	40.003	40.1	0.097	0.16	2.00
60.0	100	60.004	60.1	0.096	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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Agilent Technologies

Agilent Technologies (Thailand) Limited
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Bangkok 10500 Thailand

Tel: +662 637 4353
Fax: +662 637 4394
Email: ccc-emi@agilent.com
Website: www.agilent.com/thai

Service Confirmation Number: 6905338201

Service Confirmation Date: 12.12.2023

Customer Contact:

ALS Laboratory Group (Thailand) Co., Ltd.
Head Office
104 Phatthanakan 40 Phatthanakan Rd.
Phraek Phatthanakan Phraek Suat
TAX ID: 0155540564859
Chanatagarn.kmchom@alsglobal.com
27005068

Invoice To:

ALS Laboratory Group (Thailand) Co., Ltd.
Head Office
104 Phatthanakan 40 Phatthanakan Rd.
Phraek Phatthanakan Phraek Suat

Customer Purchase Order Number:	Customer Number:
Service Request:	Service Request Date:
Service Order:	Service Confirmation:

REVIEW BY	Sujjan N.
APPROVED BY	Sujjan N.
NEXT CAL DATE	13/01/2025

Delivery Site:

ALS Laboratory Group (Thailand) Co., Ltd.
Head Office
104 Phatthanakan 40 Phatthanakan Rd.
Phraek Phatthanakan Phraek Suat

Location:

Room
Bldg
Lab
Dept

Direct Inquiries to:

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Contact E-mail: ccc-emi@agilent.com
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Sub-branch: Western Branch Bangkok 10110 Thailand
Attn: No. 012-4832-4329
TMS Khong Thai Bank PCL
Siam Square Bldg 416/1-2 Rama 1 Rd. Pathumwan, BKK 10333
Thailand

Page 1 of 3

Service Instrument:

Model Number	Model Description	Serial Number	System Handle	Parent Asset
SYS-IM-7703-E	ICP-MS 7700 System Enhanced		ICP-MS 7700 (HPLC)	
G1316A	1260 Thermostatted Column Compartment	DEACN1236D	ICP-MS 7700 (HPLC)	SYS-IM-7700-E
G1329B	1260 Standard Autosampler	DEAAC1108B	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	JP12091612	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	6185-6850	ICP-MS Checkout Solutions	1.00	Agreement Entitlement 100 % covered		

Additional Information:

Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhon, Saraburi 18110

Telephone: +66 2 586 5792-4 Fax: +66 2 586 5109

Website: www.scieco.co.th E-Mail: calibrate@scg.co.th

Service Confirmation Number: 6905338201
Service Confirmation Date: 12.12.2023

Service Information:

Problem Description: WU-DG-IM/HPLC-7700-5001143313		
Service Provided: Perform DG Hardware control test CSD logon, Autosample, ISIS, Auto tune, BG and Stability. After done the instrument BKK_EL0026 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 Kerasathain	Customer Field Service Representative Signature: 	Date: 12 Dec 2023
Customer Name: Supakwan Mak	Customer Signature: 	Date: 12 Dec 2023
Additional Comments:		

Page 3 of 3

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 : / Sujjan Nakhakred (Site Calibration Manager)

Date of Issue : 26 SEP 2023

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme, which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced either in whole or in part except with the prior written approval of the Metrological Center.



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhohi, Saraburi 18110

Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T231676

Page 2 of 6

Calibration Report

Equipment : HEATING BLOCK
Date of Calibration : 22 September 2023
Environment : Temperature : 21.8-23.1 °C
Line Voltage : 221.6-226.3 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert 20 standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20

All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument .

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN21-TN30	T230014	17 January 2024
TC	TYPE T	TN31-TN40	T230014	17 January 2024
DATA LOGGER	34970A	TIS1	T230014	17 January 2024

3. This certificate is traceable to .

National Institute of Metrology (Thailand) through Metrological Center (NSC-TIS1-TIS 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

Equipment Description :

Time Constant 2 Hour 20 Minute At 95 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

() without adjustment (X) after adjustment

Approved By

FM-L13 108 30-05-57



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhohi, Saraburi 18110

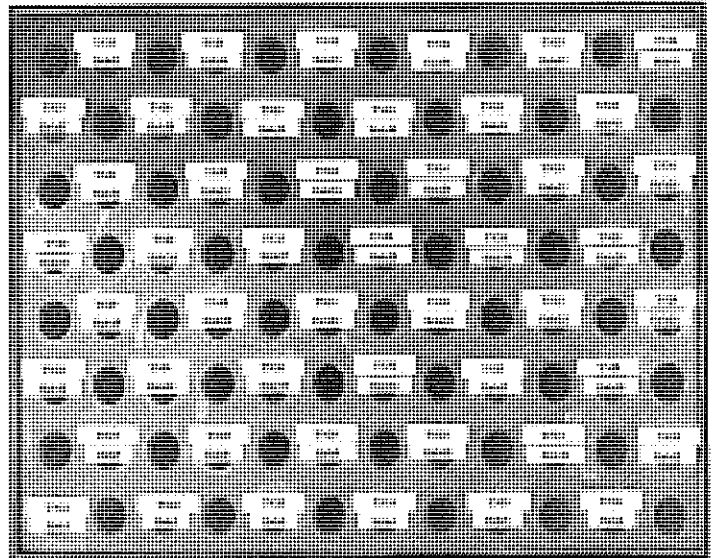
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Certificate No. T231676

Page 3 of 6

Calibration Report



FRONT CONTROL

Approved By

FM-L13 108 30-05-57



Metrological Center

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Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

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	95.36 95.43 95.19 95.16 95.35 94.97
Min	94.94 94.95 94.72 94.71 94.90 94.57
Average	95.15 95.19 94.96 94.94 95.13 94.77
R3 Hole13-Hole18	TN33 TN34 TN35 TN36 TN37 TN38
Max	95.37 95.50 95.22 95.21 95.33 95.31
Min	94.99 95.09 94.78 94.82 94.88 94.96
Average	95.18 95.30 95.00 95.02 95.11 95.13
R4 Hole19-Hole24	TN39 TN40 TN21 TN22 TN23 TN24
Max	95.59 94.42 94.52 94.24 94.63 94.67
Min	95.21 94.06 94.13 93.88 94.28 94.27
Average	95.40 94.24 94.33 94.06 94.45 94.47
R5 Hole25-Hole30	TN25 TN26 TN27 TN28 TN29 TN30
Max	95.19 95.38 92.93 95.30 95.14 95.03
Min	94.83 95.03 92.56 94.95 94.79 94.70
Average	95.01 95.20 92.75 95.12 94.96 94.67
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 93.95 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 93.45 94.30 94.60
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 95.42 94.97
Min	95.57 95.15 94.82 94.84 94.99 94.48
Average	95.78 95.39 95.05 95.07 95.22 94.68

Approved By

FM-L13 108 30-05-57



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhohi, Saraburi 18110

Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No T231676

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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 105.23 104.32 105.43 105.25 104.44 105.27
105	Min 104.94 103.95 105.15 105.04 104.11 104.96
Average	105.09 104.13 105.29 105.15 104.28 105.12
R2 Hole7-Hole12	TN27 TN28 TN29 TN30 TN31 TN32
Max	105.36 105.12 105.18 105.22 105.12 105.16
Min	105.11 104.92 104.96 105.00 104.92 104.97
Average	105.20 105.02 105.07 105.11 105.02 105.06
R3 Hole13-Hole18	TN33 TN34 TN35 TN36 TN37 TN38
Max	105.37 105.63 105.82 104.80 104.69 105.19
Min	105.17 105.37 104.75 104.59 104.50 105.00
Average	105.27 105.50 104.88 104.69 104.60 105.09
R4 Hole19-Hole24	TN39 TN40 TN21 TN22 TN23 TN24
Max	105.31 104.43 106.41 104.71 105.63 105.82
Min	105.08 104.22 106.15 104.41 105.37 105.56
Average	105.19 104.33 106.28 104.56 105.50 105.69
R5 Hole25-Hole30	TN25 TN26 TN27 TN28 TN29 TN30
Max	104.95 106.26 103.34 105.78 105.59 105.87
Min	104.67 105.96 103.08 105.56 105.36 105.68
Average	104.81 106.11 103.21 105.67 105.48 105.77
R6 Hole31-Hole36	TN31 TN32 TN33 TN34 TN35 TN36
Max	104.75 104.86 104.80 105.20 104.50 104.39
Min	104.54 104.63 104.59 105.00 104.32 104.18
Average	104.65 104.75 104.69 105.10 104.41 104.28
R7 Hole37-Hole42	TN37 TN38 TN39 TN40 TN21 TN22
Max	104.30 104.90 104.85 104.63 104.88 104.85
Min	104.09 104.72 104.66 104.49 104.63 104.52
Average	104.19 104.81 104.75 104.57 104.76 104.68
R8 Hole43-Hole48	TN23 TN24 TN25 TN26 TN27 TN28
Max	105.71 105.85 105.39 105.61 105.42 105.19
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

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Calibration Report

Measurement Results:

HEATING BLOCK			Temperature Distribution	
Setting (°C)	Reading (°C)		Stability (±°C)	Uncertainty (±°C)
	Min, Max	Average		
109.0	109.3, 109.5	109.4	0.26	0.81
107.0	107.0, 107.1	107.1	0.19	0.76

* 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

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-TISI-TIS 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

Equipment Description :

Time Constant ☐ 1 Hour ☐ 30 Minute At ☐ 3 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

(X) without adjustment () after adjustment

Approved By: _____

FM-L15 118/18-08-66

Certificate of Calibration

Equipment : Chamber (Cooling Room)

Manufacturer : KOLDTECH

Model : KM 320

Serial No. : TBN-1012061/05

Customer Code : BKK_EN0167

ID No. : T2463A3

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phathanakan 40, Phathanakan Rd., Khwaeng Phathanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : Laboratory

Date of Receipt : 29 November 2023

Calibrated By : Atiphong Rongrat (Technician)

Approved By : _____ / Boonchai Suriyawong (Site Calibration Manager)

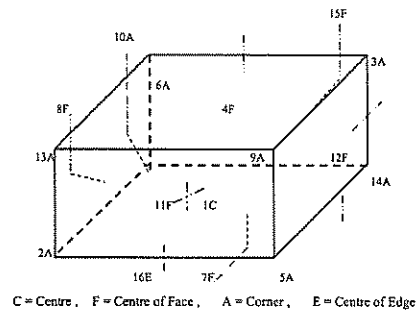
Date of Issue : 09 JAN 2024

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrology.

FM-L14 119/18-08-66

Calibration Report



1C = TN161	12F = TN172
2A = TN162	13A = TN173
3A = TN163	14A = TN174
4F = TN164	15F = TN175
5A = TN165	16E = TN176
6A = TN166	
7F = TN167	
8F = TN168	
9A = TN169	
10A = TN170	
11F = TN171	

Approved By: _____

FM-L15 118/18-08-66



Certificate No. T232160

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Calibration Report

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)											
	TN161	TN162	TN163	TN164	TN165	TN166	TN167	TN168	TN169	TN170	TN171	TN172
3.0	2.83	3.34	2.95	3.46	3.45	3.76	3.25	3.46	3.39	3.50	3.58	3.42
	TN173	TN174	TN175	TN176								
	3.33	3.39	3.15	3.43								

Chamber (Cooling Room)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (± °C)	Coverage Factor k
	Min ,	Max					
3.0	2.8	4.1	3.36	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:

Agilent CrossLab Start Up Services

Agilent 5100 5110 ICP-OES Preventive Maintenance

REVIEW BY	Thirina E
APPROVED BY	Sau E
NEXT CAL DATE	21/03/2025

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

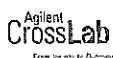
Revised: A-E2 issued 21 January 2022
Document Number: G8914-60075
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Agilent 5100, 5110 Preventive Maintenance Checklist



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

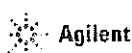
Agilent 5100, 5110 Preventive Maintenance Checklist



From Insight to Outcome

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/agilent/resources>. 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	G3010A / HP11610005
Instrument System Site and Location	RLS Laboratory Group (London) Co., LTD

List System Component Product Numbers	List the Serial Numbers of each Component
1 G3010A	RV 10010005
2 8.612A	AD1544074
3 G2102 - 80201	1004 - 00159
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> Other 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-Dismountable Fully Dismountable Other
Injector Diameter	<u>2.4mm</u> 1.6mm 1.4mm 0.8mm Other
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 insure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☒ Replace high capacity air inlet dust filter element if installed.
- ☒ Remove and clean instrument water inlet filter.

Agilent Water Recirculator

- ☒ **Service not applicable**
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir.
- ☒ Remove, clean and reinstall water inlet metal mesh filter if present.
- ☒ Re-fill with Agilent Cool Clear cooling fluid.
- ☒ Clean the cycling 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 as 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 re-install 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 213.807 nm SBR	1581.2	3444.3	1520.0	3421.8
Mn 257.610 nm SBR	1351.1	1255.2	1329.3	1245.3
Al 396.152 nm SBR	1.1	16.0	5.4	10.5
K 766.491 nm SBR	5.3	62.0	5.4	12.3

* Axial result is not applicable for G0616AA, G0612AA 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	PPSS
Air Flow	PPSS
Water Flow	PPSS
Gas Flows	PPSS
RF Generator	PPSS
Camera Test	PPSS
Optics Test	PPSS
Nebulizer Test	PPSS

ICP-OES Status Results Table

Note: These measurements do not form part of any specification and are for reference only.

Measurement	Standby Mode	Plasma On
Mass Voltage	215.31 V	VAC
Mass Current	0.04 A	A
Instrument Temperature	25.5 °C	25.5 °C
RF Ar Flow (sensor speed)	15.0 Hz	15.0 Hz
Plasma Exhaust Temperature	No measurement	50.1 °C
Water Flow Catalysts	No measurement	1.20 L/min
Water Flow Detector	1.4 L/min	1.07 L/min
Water Inlet Temperature	22.8 °C	22.6 °C
Polychromator Temperature	34.5 °C	35.0 °C
CCD Temperature	-40.1 °C	-40.0 °C
Thermal Stability	2.1 s	2.4 s
Argon Supply Pressure	1.14 MPa	0.61 MPa
Purge Gas Supply Pressure*1	0.10 MPa	0.14 MPa
Oxygen Gas Supply Pressure*1	— MPa	— MPa
Nebulizer Flow	No measurement	0.70 L/min
Nebulizer Back Pressure	No measurement	275.0 kPa
Plasma Gas Flow	No measurement	1.08 L/min
Auxiliary Gas Flow	No measurement	1.00 L/min
RF Power	No measurement	1169 W
RF Supply Current	No measurement	9.66 A
RF Supply Voltage	No measurement	134 V

*1 If option installed

Consumed PM Parts

Part Description	Part Number	Product or Model# where used	Quantity consumed
Axial Pre-Optic Window	G6010-66014	G6010A, G6011A, G6014A/G6015A	1
Radial Pre-Optic Window	G6010-66015	AE	1
Agilent Cool Clear Calcium Fluid	9799-6037	Agilent Water Resirculator	1
Purge Gas Filter	G6310-65735	AE	1
Ar Inlet Filter	G6350-66002	AE	1
High Capacity Ar Filter	G6310-65739	Optional	—
Filter seat for 6 port valve for AVSC-2	G8474-65002	G8464A/G8475	—
Filter seat for 4 port valve for AVSC4	G8493-65002	G8473A	—
Surge solenoid to rise detector 2.5mm id x 1m	G8410-65023	SFS 4	1
Bare connector 2.5mm x 5mm id	G8410-65024	SFS 4	1
PVC waste tubing 5mm id x 5mm id 2m	G8410-65022	SFS 4	1
Additional Parts may be required from engineer's stock:			
X-axis drive belt	5410047030	SFS 3	—
Z-axis drive belt	5410047430	SFS 3	—
Fenestor c pump tubing, PVC, SolvalFlex 3 bridge	5710045006	SFS 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.

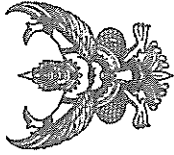
Service Verification

Service Request Number: G0344-90075-0014
Name of Engineer: Name
Title: Training Engineer
Service Engineer Signature: Signature
Total number of pages in this document: 14

Date Service Completed: Feb 21, 2024
Customer Name: Customer Name
Customer Signature: Customer Signature

ภาคผนวก จ

สำเนาหนังสือใบอนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน



ที่ อก ๐๓๑๐(๑)/ ๑ ๖ ๑ ๖ ๘

กรมโรงงานอุตสาหกรรม

ถนนพหลโยธินที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒ ๐ พฤศจิกายน ๒๕๖๖

เรื่อง ต่อยานุแห่งลือรับทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอทะเบียนตอานุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน

ลงวันที่ ๔ สิงหาคม ๒๕๖๖

- สิ่งที่ส่งมด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ ฉบับ
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ ฉบับ
๓. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๑ ฉบับ

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุนหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ขอขยพัฒนาการ ๔๐
ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมที่จารณแล้ว ให้บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด
ต่ออายุนหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

- ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย ตามสิ่งที่ส่งมด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ ๑๔๘ ราย ตามสิ่งที่ส่งมด้วย ๒
ค. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนไว้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูล
หรือวัสดุที่ไม่ได้แล้ว และดิน ตามสิ่งที่ส่งมด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กันยายน ๒๕๖๙ หากประสงค์จะต่ออายุนหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุนพร้อมเอกสารประกอบการขอต่อ
กรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันล่นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ทันทีผ่านเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายธีระ จันทน์กุล)
นักวิทยาศาสตร์เชี่ยวชาญ วิทยาการเกษตร
ผู้อำนวยการกองวิจัยและพัฒนายุทธศาสตร์
ปฏิบัติการการเกษตรและสิ่งแวดล้อมกรม
โรงงานอุตสาหกรรม

กองวิจัยและพัฒนายุทธศาสตร์

กลุ่มมาตรฐานวิชาการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๖ ถึง ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๖ ถึง ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ sarakabandiw@mail.go.th



“อุตสาหกรรมก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”

เอกสารแนบท้ายหนังสือรับตอบข้อชี้แนะทะเบียนห้องปฏิบัติการวิเคราะห์ทาง

บริษัท เอแอลเอส แลเบอร์ทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๒๐๔
ที่ กก ๐๓๑๐(๑)/ ๑ ๖ ๑ ๖ ๘ ลงวันที่ ๒๐ พฤศจิกายน ๒๕๖๖

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๔๑ ราย

- ๑) นายภาณุพล ชัด คิตติคุณาณชัย ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๑
- ๒) นายภัทรพล สว่างเจริญ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๒
- ๓) นายบรรณิธิ เทือกชัยคำ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๓
- ๔) นายศิริโชค พงษ์ประสม ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๔
- ๕) นายณัฐวุฒิ ดึงแพง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๕
- ๖) นางสาวจินดา ไชยธรรม ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๖
- ๗) นางสาวลาวัณย์ น้อยเสียม ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๗
- ๘) นางสาวชนัญญาอุณณ์ อิมขม ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๘
- ๙) นางสาวบริพัตร สายเล้ง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๐๙
- ๑๐) นางสาวนันท์ สมบูรณ์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๑๐
- ๑๑) นางสาวศรียา เอลิมฮารังค์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๑๑
- ๑๒) นางสาวณัฐธรร มงคลจิรวุฒิ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๑๒
- ๑๓) นางสาวศิริลักษณ์ บุญนาค ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๑๓
- ๑๔) นายบพพงศ์ จันทร์พันธุ์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๑๔
- ๑๕) นายบรรณเศรษฐ์ โภมาลัย ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๑๕
- ๑๖) นายธินา จิรายา ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๑๖
- ๑๗) นางสาวเกศรินทร์ แก้วมัน ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๑๗
- ๑๘) นางสาวสุมิณ ชัยเรืองวุฒิ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๑๘
- ๑๙) นางสาวสุชาดา ธรรมถาวร ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๑๙
- ๒๐) นางสาวเมธิกา ชัยเดชสกุล ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๒๐
- ๒๑) นางสาวศศิธร หนูสวัสดิ์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๒๑
- ๒๒) นางสาวเสาวลักษณ์ ภูนาอาหาร ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๒๒
- ๒๓) นายอภิสิทธิ์ สิงหา ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๒๓
- ๒๔) นายศักดิ์สิทธิ์ โพธิ์สาลีพิสุทธิ์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๒๔
- ๒๕) ว่าที่ร้อยตรีหญิง พรหมนิภา ชำเจริญ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๒๕
- ๒๖) นางจิตตา คำแก้ว ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๒๖
- ๒๗) นางสาวอรารณ รักยง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๒๗
- ๒๘) นางสาวนพรัตน์ แยมกราบดี ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๒๘
- ๒๙) นายจุลเดช วาริพร ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๒๙
- ๓๐) นางสาวตยารัตน์ ร้องคำ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๓๐
- ๓๑) นายพรมณ์ ศรีโปเตนตร ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๓๑
- ๓๒) นายอุทิศ อุณิคม ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๓๒
- ๓๓) ว่าที่ร้อยตรี เอลิมเกียรติ อมศรีเสริม ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๓๓
- ๓๔) นางสาววริษา สว่างมา ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๓๔
- ๓๕) นายอนุพงศ์ รัตนศรีประเสริฐ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๓๕

วิทย์

๓๖) นางสาวจุฑารัตน์...

- ๓๖) นางสาวจุฑารัตน์ โอนสันเพียร ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๓๖
- ๓๗) นางสาวจตุรรม หิมพัชกริตติยา ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๓๗
- ๓๘) นางสาวปรางค์ทิพย์ กัลไพศาลศักดิ์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๓๘
- ๓๙) นางสาวเตือนใจ ทางกลาง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๓๙
- ๔๐) นางสาวจิราพร ศิริราช ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๔๐
- ๔๑) นายวรากร ภูกรักษ์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๔๑
- ๔๒) นายทพง วีระมลพิกิจ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๔๒
- ๔๓) นายณิชา เจนจบ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๔๓
- ๔๔) นายคณิศร จำพร ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๔๔
- ๔๕) นายภูวิช พรหมสะอาด ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๔๕
- ๔๖) นายอมเดช โภคาพิพัฒน์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๔๖
- ๔๗) นายชวฤทธิ์ วงษ์จันทร์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๔๗
- ๔๘) นายอาทิตย์ ศรีเสนา ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๔๘
- ๔๙) นายเจษฎาจันทร์ คงศักดิ์ไทย ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๔๙
- ๕๐) นายจรัส บุญยิ่ง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๕๐
- ๕๑) นายธนาธิ เอ็มก ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๕๑
- ๕๒) นายอภิรัตน์ ทุมหนู ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๕๒
- ๕๓) นางสาวสุภาขวัญ มาก ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๕๓
- ๕๔) นางสาวพัทธพร ขวาลสมบุญ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๕๔
- ๕๕) นางสาวธิดา บุญแข็ง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๕๕
- ๕๖) นางสาวภาณุมาศ นามวัฒน์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๕๖
- ๕๗) นางสาวอุไรรัตน์ ทิสรังแก่น ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๕๗
- ๕๘) นายธีรวัฒน์ ปงสุข ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๕๘
- ๕๙) นายอิทธิพล ยะโส ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๕๙
- ๖๐) นายประพจน์ วรรณชัย ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๖๐
- ๖๑) นายชยธร พวงทิพย์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๖๑
- ๖๒) นางสาวกนกวรรณ จำนบาล ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๖๒
- ๖๓) นายสิทธิโชค งามเงิน ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๖๓
- ๖๔) นางศิวารมณ ใจบุญ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๖๔
- ๖๕) นางสาวพรหมธิดา พุ่มคง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๖๕
- ๖๖) นายนวภัทร ศรีวิริยะ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๖๖
- ๖๗) นายสุวิชา ทองอ่อน ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๖๗
- ๖๘) นายวิญญู บุญชัย ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๖๘
- ๖๙) นายสมบุญ จันทร์จันทร์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๖๙
- ๗๐) นายวิรัตน์ ไชยชนะรา ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๗๐
- ๗๑) นายอนุพันธ์ เพิ่มพูน ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๗๑
- ๗๒) นายจิณัฐ ขาวละออ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๗๒
- ๗๓) นายอัสร์ นามบุรี ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๗๓
- ๗๔) นายอัครศร จือสาว ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๐๗๔

วิทย์

๗๕) นายประเสริฐ...

๓๕) นายประเสริฐ สุระพันธ์
๓๖) นายบุญลือ จันทน์นิยม
๓๗) นายพิรพงษ์ ทองอุดมรู้ดา
๓๘) นายอนุพล ทองสุข
๓๙) นายอนุวัฒน์ ม่วงพร
๔๐) นายเจตตราวุฒิ ปัดมะมะ
๔๑) นายฤกษ์ณะ สายวรรณ
๔๒) นายพิชัย บุญเกตุ
๔๓) นายภาณุพงศ์ โขมางค์
๔๔) นายสาธิตกร กุ่มเงื
๔๕) นายสัณชัย โกศรีนาม
๔๖) นายณัฐวุฒิ ศรีประเสริฐ
๔๗) นายจักร์ชัย นาคพนม
๔๘) นายพศธร จัยทิพย์
๔๙) นายสิทธิโชค ทาสีดา
๕๐) นายอนนทกร อินสุดา
๕๑) นางสาววรณิชากร ขาดีวันชัย
๕๒) นางสาวทิพย์ตะวัน มีนากุล
๕๓) นางสาวพาหุรัดปรี สิงห์สมบุญ
๕๔) นางสาวกาญจนาบิน พรหมจันทร์
๕๕) นายศิริดี ทวีราช
๕๖) นายจักริน หมั่นวิชา
๕๗) นายธิดารัย สุขเปีย
๕๘) นายณมนนท์ สีทองคำ
๕๙) นายศุภยพล สมบอก
๖๐) นายทักษ์กนัย อุบลศรี
๖๐๑) นายอนันตกร นามะกุดณา
๖๐๒) นายธิดิพงศ์ บัวแดง
๖๐๓) นายณนทชัย อุปัทม์
๖๐๔) นายวิรุฬห จุลสุทธิ
๖๐๕) นายณัฏฐ์ นาม สานิม
๖๐๖) นายปิยะนัฐ พลมะศรี
๖๐๗) นายพงษ์สิริ โขมเขียว
๖๐๘) นายพัชรพัฒน์ กำคำ
๖๐๙) นายภาณุพงศ์ มานิตย์
๖๑๐) นายมงคล ผลาทิพย์
๖๑๑) นายธีรวัฒน์ ทองอิน
๖๑๒) นายเอกเชา ทับสมัย
๖๑๓) นายอดิศักดิ์ ฝัเม

๖๑๔) นายอนันตชัย วิสุม
๖๑๕) นายวราวุธ ดิบั
๖๑๖) นายแสงตะวัน บะตะลัก
๖๑๗) นายสุทธิพงศ์ รัตนะ
๖๑๘) นายชัชวาลย์ ไชยชนะ
๖๑๙) นายวิศรุต ศรีธรรมมา
๖๒๐) นายมนทกร เนื้อผ่อง
๖๒๑) นายกำชัย สุทธะ
๖๒๒) นางสาวณัฐกรณีย์ บุญชนะ
๖๒๓) นางสาวพัชรินทร์ แสนสร้อย
๖๒๔) นายไพรัชย์ เปี่ยมพิมาย
๖๒๕) นางสาวศุภมาศ ทองมาก
๖๒๖) นางสาวลลิตา จิตรสว่าง
๖๒๗) นางสาวนันทพร เลิกภูเขียว
๖๒๘) นางสาวกฤติมาพร คำแก้ว
๖๒๙) นางสาวสุกฤษ์ณี ภาคภูมิ
๖๓๐) นางสาวไพรินทร์ ศรีวั
๖๓๑) นางสาวหิมนตร ฝุญปัญญา
๖๓๒) นางสาวลลิตา ปานทอง
๖๓๓) นางสาวจริยา ทองนวล
๖๓๔) นางสาวอรยา คำคล่อง
๖๓๕) นางสาวจุฑามารณ์ สุนทรสนาม
๖๓๖) นางสาวณัฐพล คำจันทร์
๖๓๗) นายบุญฤทธิ์ เอี่ยมเทศ
๖๓๘) นายสุภากรดา บัณยรา
๖๓๙) นางสาวพาติ คุณนาน
๖๔๐) นางสาวจิราเจด พ้องดา
๖๔๑) นางสาวอารยา มีชัย
๖๔๒) นางสาววิชุดา ภาคผลญ
๖๔๓) นางสาวนันทิยา จันทะรุณ
๖๔๔) นายกิตติพงศ์ แซ่ลี
๖๔๕) นายอนุวัติ ภูภิล
๖๔๖) นายธีรพล แสงทอง
๖๔๗) นายศักดิ์พัฒน์ บุญมัน
๖๔๘) นายฐิติศักดิ์ เอมไธ
๖๔๙) นายชัยณรงค์ ศรีจันทร์
๖๕๐) นางสาวอัจฉราวรรณ สวมสนง
๖๕๑) นางสาวณัฐภาพร สิงหา
๖๕๒) นายภิรมเรศ แหม่มโต

- ๕ -

- ๑๕๓) นางสาวอุบล เสกศิริ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๕๓
 ๑๕๔) นางสาวไมรัตน์ ทองบุตร ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๕๔
 ๑๕๕) นายภาคภูมิ แพนไทย ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๕๕
 ๑๕๖) นางสาวภาณุ เน้พวง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๕๖
 ๑๕๗) นางสาวพรทิศา สาตาพนม ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๕๗
 ๑๕๘) นายเอกวิทย์ วัชระนา ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๕๘
 ๑๕๙) นายไตรภพ ทิพย์ธรรม ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๕๙
 ๑๖๐) นายจิรเมธ ประเสริฐสิงห์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๖๐
 ๑๖๑) นายจิราวุธ เกษมสุข ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๖๑
 ๑๖๒) นายธีรศักดิ์ ศรีชัย ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๖๒
 ๑๖๓) นายณัฐฤกษ์ สะพานแก้ว ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๖๓
 ๑๖๔) นายปิ่นวิชัย เสมอทรัพย์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๖๔
 ๑๖๕) นายพิเชษฐพงษ์ ไชยา ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๖๕
 ๑๖๖) นายภัทรพงษ์ มณฑาทอง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๖๖
 ๑๖๗) นายสันต์ ตรีภักดิ์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๖๗
 ๑๖๘) นายภาณุเดช เพชรอุด ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๖๘
 ๑๖๙) นายอนุช วัลเลแสง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๖๙
 ๑๗๐) นายภัทรพงษ์ มีสุข ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๗๐
 ๑๗๑) นางสาวนุชรี ลิ้มทิพย์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๗๑
 ๑๗๒) นางสาวสุภาวดี โกศลนาม ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๗๒
 ๑๗๓) นางสาวอรณิชา เทียนคำ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๗๓
 ๑๗๔) นางสาวพรเพ็ญ ขอบสอน ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๗๔
 ๑๗๕) นางสาววันวิสา ขอบพิกุล ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๗๕
 ๑๗๖) นางสาวอรารณ เภาทอง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๗๖
 ๑๗๗) นางสาวอัยลิณ มอริวัฒน์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๗๗
 ๑๗๘) นางสาววิสร่า สุขครอง ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๗๘
 ๑๗๙) นายวุฒิกร ศิริธรรม ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๗๙
 ๑๘๐) นางสาวจตุรกรม กระจำพันธุ์ ทะเบียนเลขที่ ๖-๒๐๔-๖-๐๑๘๐

สมช

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
 บริษัท เอนเอเอส แล็บราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๒๐๔
 ที่อก ๐๓๑๑(๑)/ ๓ ๖ ๑ ๖ ๘ ลงวันที่ ๒ ๐ พฤศจิกายน ๒๕๖๓
 ค. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๙๔ รายการ
 น้าเสีย จำนวน 60 รายการ

ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Aldicarb	High-Performance Liquid Chromatographic Method ^(a)
2	Aldicarb Sulfone	High-Performance Liquid Chromatographic Method ^(a)
3	Aldicarb Sulfoxide	High-Performance Liquid Chromatographic Method ^(a)
4	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
5	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
6	Barium	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
7	α-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
8	β-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
9	δ-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
10	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
11	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method ^(a) 2) 5-Day BOD Test, Membrane Electrode Method ^(a)
12	Carbaryl	High-Performance Liquid Chromatographic Method ^(a)
13	Carbofuran	High-Performance Liquid Chromatographic Method ^(a)
14	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
15	Chemical Oxygen Demand	1) Closed Reflux, Colorimetric Method ^(a) 2) Closed Reflux, Titrimetric Method ^(a)
16	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
17	Chromium	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
18	Color	ADMI Weighted-Ordinate Spectrophotometric Method ^(a)

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	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	Mass Spectrometric Method ⁽⁴⁾
34	Free Chlorine	Distillation, Colorimetric Method ⁽⁴⁾ 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 Phosphorus	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	วิธีการหา
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
8	Barium	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
9	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
13	Benzoic Acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
15	Benzo(g,h,i)perylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)

18 Bis(2-ethylhexyl)phthalate...

ลำดับที่	สารเคมี	วิธีการหา
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
22	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
27	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ^(a)
35	Chromium (VI)	Colorimetric Method ^(a)

36 Chrysene...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
36	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
37	Cyanide	Distillation, Colorimetric Method ⁽⁴⁾
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
39	DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
40	DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
41	DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
42	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
43	Di-n-Butyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
47	3,3-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

ลำดับที่	สารเคมี	วิธีวิเคราะห์
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
57	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
58	Diethyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
63	Di-n-octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
64	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
65	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
67	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
68	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
69	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
70	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
74	α-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
75	β-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

ลำดับที่	สารเคมี	วิธีวิเคราะห์
76	γ-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
81	Lead	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
83	Mercury	Mass Spectrometric Method ^(a) 1) Digestion, Cold Vapor Atomic Absorption Spectrometric Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
84	Methanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
86	Methyl bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
87	Methylene chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
89	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
90	Methyl tert-butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
91	Naphthalene	Mass Spectrometric Method ^(a) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)

94 N-Nitrosodiphenylamine...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
95	N-Nitrosodi-n-Propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
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 ^(a)
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
98	pH	Electrometric Method ^(a)
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
100	Phenol	1) Distillation, Chloroform Extraction Method ^(a) 2) Distillation, Direct Photometric Method ^(a) 3) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
102	Selenium	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
103	Silver	1) Digestion, Inductively Coupled Plasma Method ^(a) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(a)
104	Styrene	Mass Spectrometric Method ^(a) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
105	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
106	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
107	Toluene	Mass Spectrometric Method ^(a) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)
108	Toxaphene	Mass Spectrometric Method ^(a) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
109	TPH (C ₅ -C ₉)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a,23)

110 TPH (C₈-C₁₆)...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
110	TPH (C ₈ -C ₁₆)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,22)
111	TPH (C ₁₆ -C ₃₅)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,22)
112	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
113	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
114	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
115	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
118	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
119	Vanadium	1) Digestion, Inductively Coupled Plasma Method ⁽³⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁶⁾
120	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
121	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
122	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
123	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
124	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
125	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽⁶⁾
126	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽³⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁶⁾

อื่นๆ

หมายเหตุ...

ภาคผนวก (ต่อตาราง) จำนวน 28 รายการ

ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Antimony	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽³⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽³⁾
2	Arsenic	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽³⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽³⁾
3	Beryllium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽³⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽³⁾
4	Cadmium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽³⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽³⁾
5	Carbon Monoxide	1) Instrumental Analyzer Method ⁽³⁾ 2) Sampling Bag Non-Dispersive Infrared Method ⁽³⁾
6	Chlorine	1) Absorption Sampling, Ion Chromatographic Method ⁽³⁾ 2) Isokinetic Sampling, Ion Chromatographic Method ⁽³⁾
7	Chromium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽³⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽³⁾
8	Cobalt	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽³⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽³⁾
9	Copper	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽³⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽³⁾
10	Cresol	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽³⁾ Adsorption Sampling, Gas Chromatographic Method ⁽³⁾
11	Dioxins	Isokinetic Sampling ⁽³⁾
12	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method ⁽³⁾ 2) Isokinetic Sampling, Ion Chromatographic Method ⁽³⁾
13	Hydrogen Fluoride	1) Absorption Sampling, Ion Chromatographic Method ⁽³⁾ 2) Isokinetic Sampling, Ion Chromatographic Method ⁽³⁾
14	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ⁽³⁾

อื่นๆ

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]

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,26]
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 ^[1,16] 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 ^[1,16] 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 ^[1,16] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,17]

3 mg/L

5 Beryllium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.16) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7.17)
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.16) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7.17)
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.26) 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.16) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7.17)
9	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method ^(1.6.16.19) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method ^(1.6.17.19) 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.16.19) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.17.19)

10 Chromium (VI)...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^(1.6.19) 2) Alkaline Digestion, Colorimetric Method ^(8.19)
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.16) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7.17)
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.16) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7.17)
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.26) 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.26) 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.26) 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.26)

2) Soxhlet...

ลำดับที่	สารเคมี	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 - 2,3,3',4',6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5',6-Heptachlorobiphenyl - 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl - Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,26) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26) Electrometric Method ^(2,24) 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)
29	pH	
30	Selenium	

31 Silver...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,16) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,16) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,26) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,26)
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,16) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
35	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,16) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)

31 Silver...

ดูฉบับ 125 รายการ

ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Acenaphthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
2	Acetone	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25) 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ⁽¹³⁾
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
4	Anthracene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
8	Barium	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
9	Benz(a)anthracene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)

11 Benzo(b)fluoranthene

ลำดับที่	สารเคมี	วิธีวิเคราะห์
11	Benzo(b)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
12	Benzo(k)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
13	Benzoic acid	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
14	Benzo(a)pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
15	Benzo(g,h,i)perylene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
17	Bis(2-chloroethyl)ether	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
18	Bis(2-ethylhexyl)phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
21	Butanol	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(13,23)
22	Butyl Benzyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)

Smpl

23 Cadmium...

ลำดับที่	สารเคมี	วิธีการหาค่า
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^(7.16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7.17)
24	Carbazole	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
25	Carbon Disulfide	Mass Spectrometric Method ^(11.26) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.25)
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.25)
27	Chlordane	Mass Spectrometric Method ^(11.26) 1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
28	p-Chloroaniline	Mass Spectrometric Method ^(10.26) 1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
29	Chlorobenzene	Mass Spectrometric Method ^(15.25) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.25)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.25)
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.25)
32	2-Chlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
33	Chromium	Mass Spectrometric Method ^(11.26) 1) Digestion, Inductively Coupled Plasma Method ^(7.16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7.17)
34	Chromium (III)	Mass Spectrometric Method ^(7.17) 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

ลำดับที่	สารเคมี	วิธีการหาค่า
36	Chrysene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
37	Cyanide	Extraction, Distillation, Colorimetric Method ^(27.28,29)
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
39	DDD	Mass Spectrometric Method ^(10.26) 1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
40	DDE	Mass Spectrometric Method ^(10.26) 1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
41	DDT	Mass Spectrometric Method ^(10.26) 1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
42	Dibenz(a,h)anthracene	Mass Spectrometric Method ^(10.26) 1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
43	Di-n-Butyl Phthalate	Mass Spectrometric Method ^(10.26) 1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
44	1,2-Dichlorobenzene	Mass Spectrometric Method ^(11.26) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.25)
45	1,3-Dichlorobenzene	Mass Spectrometric Method ^(15.25) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.25)
46	1,4-Dichlorobenzene	Mass Spectrometric Method ^(15.25) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.25)
47	3,3-Dichlorobenzidine	Mass Spectrometric Method ^(10.26) 1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.26)
48	1,1-Dichloroethane	Mass Spectrometric Method ^(15.25) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.25)

39

ลำดับที่	สารเคมี	วิธีวิเคราะห์
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
53	2,4-Dichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
58	Diethyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
59	2,4-Dimethylphenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
60	2,4-Dinitrophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
61	2,4-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
62	2,6-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)

ลำดับที่	สารเคมี	วิธีวิเคราะห์
63	Di-n-Octyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
67	Fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
68	Fluorene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
70	Heptachlor epoxide	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
73	n-Hexane	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25) 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ⁽¹³⁾

ลำดับที่	สารเคมี	วิธีวิเคราะห์
74	α -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
75	β -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
76	γ -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
77	Hexachlorocyclopentadiene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
78	Hexachloroethane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 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 ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
80	Isophorone	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
81	Lead	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽²⁰⁾ 2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry ⁽²¹⁾ 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽²⁰⁾

84 Methanol...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25) 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^(13,25)
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 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 ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
89	2-Methylnaphthalene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 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 ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
93	Nitrobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
94	N-Nitrosodiphenylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
95	N-Nitrosodi-n-propylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)

96 Polychlorinated biphenyls (PCBs)

ลำดับที่	สารเคมี	วิธีวิเคราะห์
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3,3',4',5'-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',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5',6'-Heptachlorobiphenyl - 2,2',3,4,4',5,5',6'-Heptachlorobiphenyl - 2,2',3,4,4',5,5',6'-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl Pentachlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
97		1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26) 1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
98	Phenanthrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)

99 Phenol...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
99	Phenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
100	Pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
101	Selenium	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
102	Silver	1) Digestion, Inductively Coupled Plasma Method ^(7,16) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,17)
103	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
106	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,26)
108	TPH (C ₅ -C ₈)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15,25)
109	TPH (C ₉ -C ₁₆)	1) Automate Extraction, Gas Chromatographic Method ^(11,22) 2) Solvent Extraction, Gas Chromatographic Method ^(12,22) 3) Ultrasonic Extraction, Gas Chromatographic Method ^(23,31)
110	TPH (C ₁₆ - C ₃₅)	1) Automate Extraction, Gas Chromatographic Method ^(11,22) 2) Solvent Extraction, Gas Chromatographic Method ^(12,22) 3) Ultrasonic Extraction, Gas Chromatographic Method ^(23,31)
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...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
115	2,4,5-Trichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
116	2,4,6-Trichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
117	1,3,5-Trimethylbenzene	Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
118	Vanadium	1) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹⁾⁽⁶⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁷⁾⁽¹⁾⁽⁷⁾
119	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
120	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
121	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
122	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
123	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
125	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹⁾⁽⁶⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁷⁾⁽¹⁾⁽⁷⁾

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ในวันที่ ๒ กันยายน ๒๕๖๕
 อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสืออาัยุ์ขึ้นทะเบียนของปฏิวัติการพิเศษ

การผสมพันธุ์

ขอแสดงความนับถือ



นางสาวเบญจมาภรณ์ ลานิช
นางสาวเบญจมาภรณ์ ลานิช
(รองนายก อบจ.จ.ลพบุรี)

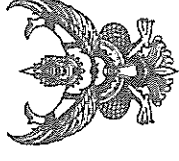
นางสาวสุภาวดี งามน้อย

กลุ่มเกษตรกรชาวไร่การัว^{๔๖}เกราะ^{๔๗}ทดสอบผลพืชและทะเบียนห้องปฏิบัติการ

ମୁଖ୍ୟ ଚଳଚ୍ଚିତ୍ର ନିର୍ଦ୍ଦେଶକଙ୍କୁ ସମ୍ମାନିତ କରିବା ପାଇଁ

ଅନୁଷ୍ଠାନର ନାମ: ଓଡ଼ିଶା ଶିକ୍ଷା ଓ ଶିକ୍ଷକ ଶିକ୍ଷଣ ବିଭାଗ

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กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

မူလမူဝါဒ ၁၁

เรื่อง ขุนทะเบียนห้องปฏิบัติการวิเคราะห์เอกสาร

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบริวอรี่ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคคลกร และชนิดสารเสพติดของหน่วยงาน
ลงวันที่ ๒๙ เมษายน ๒๕๕๔

สิ่งที่ส่งมาด้วย เอกสารแบบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน บริษัท เอแอลเอส แลборาทอรี กรีน (ประเทศไทย) จำกัด จำนวน ๒ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แอสเซทส์ กรุ๊ป (ประเทศไทย) จำกัด ขอชี้แจงไปยัง
ห้องปฏิบัติการวิเคราะห์เอกชน พร้อมรายชื่อผู้ควบคุมดูแลปฏิบัติการวิเคราะห์ เจ้าหน้าที่ประจำ
ห้องปฏิบัติการวิเคราะห์ และรายงานผลการที่จะทำการวิเคราะห์ ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอนแอลส แลเบอร์ทอรี่ กรุ๊ป (ประเทศไทย) จำกัด ขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์อาหารคน มีเลขทะเบียน ๖-๓๓๓ สถานที่ตั้งเลขที่ ๒๓๖/๑๐ หมู่ที่ ๕ ตำบลแม่แก้ว อำเภอลำลูกเกด จังหวัดระยอง โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

- ๑) นายเดช ช่างชน
- ๒) นางวิลาวัณย์ บริรักษ์
- ๓) นายสุพจน์ สลามตะเะ

๒. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์

- ๑) นางสาวณุลล บรรจงกิจ
- ๒) นางพจนา สีด้า
- ๓) นางสาวอนิตา กุลสุริวงศ์
- ๔) นายพิทยา ทองแดง
- ๕) นางขสธิชา สุกกศ
- ๖) ว่าที่ ร.ต.ฉะยัย ม่วงมา
- ๗) นายวรวิฐ หัฒพา
- ๘) นายศักดิ์เทียรพนธ์ จรัสกาย
- ๙) นายสุรศักดิ์ สาขิน
- ๑๐) นางสาวเพชรชล ภูวดานนพท์
- ๑๑) นายสหพร งามแก้ว
- ๑๒) นายสหศักดิ์วงค์ ไชยศิริดิษฐ์

๑๓) นายวิไลภ...




๑๓) นายวัลลภ หันไชยเนาว์	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๔๗
๑๔) นางสาววาสนาสิี เจริญบุตรกุล	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๔๘
๑๕) นางสาววาสนา ผดุงจิตต์	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๔๙
๑๖) นายธนะสิทธิ์ วงศ์ชาติไทย	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๖๐
๑๗) นายชัยสุรพันธ์ เลิศนันทกุลชัย	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๖๑
๑๘) นายสัจจา เพ็ชรแสง	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๖๒
๑๙) นายกันตวณ มณีสัมพันธ์	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๖๓
๒๐) นางสาวจันทิพย์ โกเมนสมะ	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๖๔
๒๑) นายธารินทร์ อธิกจินดา	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๖๕
๒๒) นายศุภณัฐ ทิพย์พันธ์	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๖๖
๒๓) นายศุภชัย วงศ์สุริยฉาย	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๖๗
๒๔) นายปฐมพงศ์ กรสวัสดิ์	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๖๘
๒๕) นายไสว ดันโพธิ์	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๖๙
๒๖) นางสาวกิตติยา สุธัญญาริยากรณ์	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๗๐
๒๗) นางสาวเจษฎาพร ศรีบุญเรือง	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๗๑
๒๘) นางสาวธนรินทร์ สิงห์งา	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๗๒
๒๙) นางสาวจิรรัตน์ ศิริมงคลโร	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๗๓
๓๐) นายพิพัฒน์ นิภัทรเศรษฐ์	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๗๔
๓๑) นายศิริวิทย์ เรืองสม	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๗๕
๓๒) นายปารเมศ สัตยาคูณ	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๗๖
๓๓) นายณนาท ธรรมสะโร	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๗๗
๓๔) นางสาวศุภรัตน์ ไสจินทร์	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๗๘
๓๕) นายพรกร อินทรเสนา	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๗๙
๓๖) นายทิวากร เชื้อมาก	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๘๐
๓๗) นายอนุรักษ ทองจรรักษ์ดา	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๘๑
๓๘) นายอภิชาติ วิลาศ	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๘๒
๓๙) นายจรัสร์วี ศรีรักษา	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๘๓
๔๐) นายประสาสมัคร เจื้อนเพชร	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๘๔
๔๑) นายภาณุวัฒน์ รังบง	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๘๕
๔๒) นายสันติ ชัยชนะ	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๘๖
๔๓) นายสิทธิชัย แก้วนาตุ	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๘๗
๔๔) นายพิทกร กุลชาติ	ทะเบียนเลขที่	ว-๓๒๓-จ-๙๔๘๘

ค. ขอเช่าสารมลพิษที่ได้รับทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๑๔ รายการ
อากาศเสีย (ปล่องระบาย) จำนวน ๘ รายการ และน้ำใต้ดิน จำนวน ๓ รายการ รวมทั้งสิ้นจำนวน ๒๕ รายการ
ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้มีอายุ ๓ ปี นับจากวันที่กรมโรงงานอุตสาหกรรมออกหนังสือ หากประสงค์
จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบ
คำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ
วิเคราะห์เอกชน ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ


(นางจันทา เดษศรีจันทร์)
ผู้อำนวยการศูนย์และศูนย์มลพิษโรงงาน
ผู้ตรวจการแผนผังสิ่งกีดขวางโรงงานอุตสาหกรรม

๒๘ มิ.ย. ๒๕๖๕

กองวิจัยและเตือนภัยมลพิษโรงงาน
ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
โทร. ๐ ๓๘๐๕ ๗๖๑๑-๓
ไปรษณีย์อิเล็กทรอนิกส์ envresearch@mail.go.th

เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอนเอเอส แล็บอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๑๒๓
ที่ อภ ๐๓๑๑(๓)/ ๒๔ ๗๐ ลงวันที่ ๒๔ มิถุนายน ๒๕๖๕

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๔ รายการ

น้ำเสีย จำนวน 14 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Biochemical Oxygen Demand	1) 5-Day BOD Test, Membrane Electrode Method ⁽²⁾ 2) 5-Day BOD Test, Azide Modification Method ⁽²⁾
2	Chemical Oxygen Demand	1) Open Reflux, Titrimetric Method ⁽²⁾ 2) Closed Reflux, Colorimetric Method ⁽²⁾ 3) Closed Reflux, Titrimetric Method ⁽²⁾
3	Color	ADMI Weighted – Ordinate Spectrophotometric Method ⁽²⁾
4	Cyanide	Distillation, Colorimetric Method ⁽²⁾
5	Formaldehyde	Distillation, Colorimetric Method ⁽¹⁾
6	Free Chlorine	DPD-Ferrous Titrimetric Method ⁽²⁾
7	Oil and Grease	Liquid-Liquid Partition-Gravimetric Method ⁽²⁾
8	pH	Electrometric Method ⁽²⁾
9	Phenols	1) Distillation, Chloroform Extraction Method ⁽²⁾ 2) Distillation, Direct Photometric Method ⁽²⁾ ZnS Precipitation, Iodometric Method ⁽²⁾
10	Sulfide	Laboratory and Field Method ⁽²⁾
11	Temperature	Dried at 180 °C ⁽²⁾
12	Total Dissolved Solids	Semi-Micro Kjeldahl Method ⁽²⁾
13	Total Kjeldahl Nitrogen	Dried at 103-105 °C ⁽²⁾
14	Total Suspended Solids	

อากาศเสีย (ปล่องระบาย) จำนวน 7 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Carbon Monoxide	1) Sampling Bag, Non-Dispersive Infrared Method ⁽⁵⁾ 2) Instrumental Analyzer Method ⁽⁶⁾
2	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ⁽⁵⁾ Ringelmann's Method ^(3,4)
3	Opacity	1) Absorption Sampling, Phenoldisulfonic Acid Method ⁽⁶⁾ 2) Instrumental Analyzer Method ⁽⁹⁾
4	Oxide of Nitrogen	1) Absorption Sampling, Barium-Thorin Titrimetric Method ⁽⁵⁾ 2) Instrumental Analyzer Method ⁽¹⁰⁾
5	Sulfur Dioxide	

วิศ. สหฤๅ
(นางสาววิชุดา สันฤทธิ์ผล)
ผู้อำนวยการ
ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
Sulfuric Acid...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
6	Sulfuric Acid	Isokinetic Sampling, Barium – Thorin Titrimetric Method ⁽⁶⁾
7	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ⁽⁷⁾

น้ำดื่ม จำนวน 3 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Cyanide	Distillation, Colorimetric Method ⁽²⁾
2	pH	Electrometric Method ⁽²⁾
3	Phenols	Distillation, Direct Photometric Method ⁽²⁾

เอกสารอ้างอิง

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รพช. 4 ธันวาคม 2549. เล่มที่ 123 ตอนพิเศษ 125ง.

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รพช. 4 ธันวาคม 2549. เล่มที่ 123 ตอนพิเศษ 125จ.

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วิศ. สหฤๅ
(นางสาววิชุดา สันฤทธิ์ผล)
ผู้อำนวยการ

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
กรมโรงงานอุตสาหกรรม โทร ๐ ๙๖๐๕ ๗๖๑๓

ที่ อก ๐๓๒๐/ ๒๐๕๓

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒ ๒ มิ.ค. ๒๕๖๖

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แล็บอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอเปลี่ยนแปลงบุคลากร ของห้องปฏิบัติการวิเคราะห์เอกสาร ลงวันที่ ๑๔ มีนาคม ๒๕๖๖

ตามหนังสือที่ยังถึง บริษัท เอแอลเอส แล็บอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกสาร เลขทะเบียน ๖-๓๒๓ สถานที่ตั้งเลขที่ ๖๑๖/๑๐ หมู่ที่ ๕ ตำบลแม่น้ำคู่ อำเภอบางบาล จังหวัดพระนครศรีอยุธยา ของห้องปฏิบัติการวิเคราะห์ ความละเอียดแล้วแล้ว น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

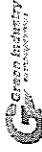
ก. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ ราย

- | | |
|------------------------------|-----------------------------|
| ๑) นางสาวเจษฎาพร ศรีบุญเรือง | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๕๓๑ |
| ๒) นางสาวรุณพร สิงห์งาม | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๕๓๒ |
| ๓) นางสาวนิตา ผดุงจิตต์ | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๕๓๕ |
| ๔) นายศุภณัฐ หิรัญพันธ์ | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๕๖๖ |
| ๕) นายสิทธิชัย แก้วเกตุ | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๕๔๗ |

ข. ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๒ ราย

- | | |
|------------------------------|-----------------------------|
| ๑) นายณัฐพงษ์ เห่งทาวนา | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๐๑๑ |
| ๒) นางสาวกัลยาพรรณ รักดี | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๐๑๒ |
| ๓) นางสาวจุฑารัตน์ สีทองกลาง | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๐๑๓ |
| ๔) นางสาวจิตสุภา ประเทืองสุข | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๐๑๔ |
| ๕) นายสรเสรีญ์ คู่ยอสุข | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๐๑๕ |
| ๖) นายณัฐวุฒิ ออมพรมราช | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๐๑๖ |
| ๗) นายจิตกร สีระสา | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๐๑๗ |
| ๘) นายสิทธิวิชญ์ สุวรรณรัตน์ | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๐๑๘ |
| ๙) นายสิทธิวัฒน์ เสนาจิวิ | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๐๑๙ |
| ๑๐) นายอนุวัฒน์ เฒา | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๑๐๐ |
| ๑๑) นายสุวิทย์ นราพงษ์ | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๑๐๑ |
| ๑๒) นายอดิศักดิ์ ตะริศบุญ | ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๑๐๒ |

อนึ่ง...



"อุตสาหกรรมก้าวไกล ประสพไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกสาร ที่ อก ๐๓๑๑(๓)/๒๕๖๐ ลงวันที่ ๒๘ มิถุนายน ๒๕๖๕ คือในวันที่ ๒๘ มิถุนายน ๒๕๖๗ ทั้งนี้ ส่วนการยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ทันนำไปใช้สมัครโรงงานอุตสาหกรรมตาม QR Code ห้าหมื่นสี่ร้อย

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายทวี อำพันอัน)

ผู้อำนวยการศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

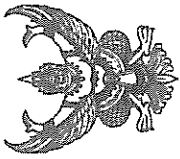


ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

โทร. ๐ ๓๓๓๓ ๖๐๕๕ ต่อ ๕๐๐๑-๒

ไปรษณีย์อิเล็กทรอนิกส์ airw@dlw.mol.go.th

รับคำขอผ่านระบบอิเล็กทรอนิกส์



ที่ อภ ๐๓๒๐/๑๕๖๕๔

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๐ พ.ย. ๒๕๖๕

เรื่อง เปลี่ยนแปลงสารมลพิษของห้องปฏิบัติการวิเคราะห์
เรียน กรมการผู้จัดการ บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด
อ้างถึง คำขอเปลี่ยนแปลงสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกสาร ลงวันที่ ๒๕ ตุลาคม ๒๕๖๖
สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกสาร
บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำนวน ๑ แผ่น

ตามที่หนังสือที่อ้างถึง บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกสาร เลขทะเบียน ๖-๒๒๓ สถานที่ตั้งเลขที่ ๖๓๖/๑๐ หมู่ที่ ๕ ตำบลแม่ไม้ อำเภอสว่างแดน
จังหวัดระยอง ขอเปลี่ยนแปลงสารมลพิษของห้องปฏิบัติการวิเคราะห์ ความละเอียดแล้ว นั้น

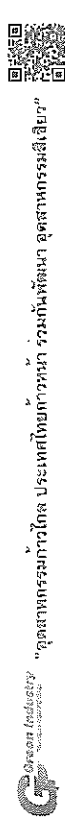
กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย)
จำกัด เพิ่มขอเปลี่ยนแปลงสารมลพิษที่วิเคราะห์ในน้ำเสีย จำนวน ๑๓ รายการ และน้ำใต้ดิน ๓ รายการ ตามสิ่งที่ส่ง
มาด้วย

อนึ่ง หนังสือฉบับนี้จะมีผลย้อนหลังออกนับตั้งแต่วันที่เปลี่ยนแปลงห้องปฏิบัติการวิเคราะห์
เอกสารที่ อภ ๐๓๒๐(๓)/๖๕๔๐ ลงวันที่ ๒๘ มิถุนายน ๒๕๖๕ คือในวันที่ ๒๘ มิถุนายน ๒๕๖๕ ทั้งนี้ สามารถ
ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ทันทีนับแต่วันรับใช้กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ
ขอแสดงความนับถือ
(นายทวี อำพันธ)

ผู้อำนวยการศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
ปฏิบัติการตามแผนปฏิบัติการกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
โทร. ๐ ๓๓๓๓ ๖๐๕๕ ต่อ ๕๐๐๑-๒
ไปรษณีย์อิเล็กทรอนิกส์ env@dew.mail.go.th



เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกสาร
บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๒๒๓
ที่ อภ ๐๓๒๐/๑๕๖๕๔

ขอเปลี่ยนแปลงสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๖ รายการ
แนบท้าย จำนวน ๑๓ รายการ

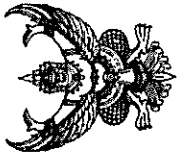
ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
1	Biochemical Oxygen Demand	1) 5-Day BOD Test, Membrane Electrode Method 2) 5-Day BOD Test, Azide Modification Method
2	Chemical Oxygen Demand	1) Open Reflux, Titrimetric Method 2) Closed Reflux, Colorimetric Method 3) Closed Reflux, Titrimetric Method
3	Color	ADMI Weighted-Ordinate Spectrophotometric Method
4	Cyanide	Distillation, Colorimetric Method
5	Free Chlorine	DPD Ferrous Titrimetric Method
6	Oil and Grease	Liquid-Liquid, Partition-Gravimetric Method
7	pH	Electrometric Method
8	Phenols	1) Distillation, Chloroform Extraction Method 2) Distillation, Direct Photometric Method ZnS Precipitation, Iodometric Method
9	Sulfide	Field Method
10	Temperature	Dried at 180 °C
11	Total Dissolved Solids	Semi-Macro Kjeldahl Method
12	Total Kjeldahl Nitrogen	Dried at 103-105 °C
13	Total Suspended Solids	

แนบท้าย จำนวน ๑๓ รายการ

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
1	Cyanide	Distillation, Colorimetric Method
2	pH	Electrometric Method
3	Phenols	Distillation, Direct Photometric Method

เอกสารอ้างอิง

APHA, AWWA, WEF. Standard Methods for the Examination of Water and
Wastewater. 24th ed. Washington, DC : APHA, 2023



ที่ อก ๐๓๒๐/ ๔ ๖ ๐ ๐ 1

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๔ พฤษภาคม ๒๕๖๗

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์
เรียน กรรมการผู้จัดการ บริษัท เอลเอส แลอร่าทอรี่ กรุ๊ป (ประเทศไทย) จำกัด
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๖๐ มีนาคม ๒๕๖๗

ตามคำขอฯ ที่อ้างถึง บริษัท เอลเอส แลอร่าทอรี่ กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๓๒๓ สถานที่ตั้งเลขที่ ๖๑๖/๑๐ หมู่ที่ ๕ ตำบลแม่น้ำขี้ อำเภอลำลูกนาง
จังหวัดระยอง ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดดังนี้

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑ ราย
นางสาวเพชรคุณ ภาณุตานนท์ ทะเบียนเลขที่ ๖-๓๒๓-จ-๙๕๕๔
๒. ให้เพิ่มเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๕ ราย
๑) นายณัฐพล เจียงวิวงศ์ ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๑๓
๒) นายชานนท์ บุญชื่น ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๑๔
๓) นายณัฐกานต์ วงศ์อินทร์อยู่ ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๑๕
๔) นายอานนท์ โพธิ์พระทอง ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๑๖
๕) นายณัฏฐพล ถักกลาง ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๑๗
๖) นายศุภณัฐ พิสัยพันธ์ ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๑๘
๗) นายสันต์ คิรินทร์ ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๑๙
๘) นายวัชรวิญญู อิมพาลี ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๒๐
๙) นายศุภณัฐ สุกสถิตมศักดิ์ ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๒๑
๑๐) นายเอกชัย ถิ่นทอง ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๒๒
๑๑) นายพงษ์เทพ สิริวิไล ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๒๓
๑๒) นายทินกร ภูภาชี ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๒๔
๑๓) นางสาวนันทิยา บุญจันทร์ ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๒๕
๑๔) นายสิทธิชัย ยันพิมาย ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๒๖
๑๕) นางสาวปานีน พลตพอง ทะเบียนเลขที่ ๖-๓๒๓-จ-๐๐๒๗

- ๒ -

อนึ่ง หนังสือฉบับนี้จะสลับคู่พร้อมหนังสือตอบรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ในวันที่ ๒๗ มิถุนายน ๒๕๖๗

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

๒๗

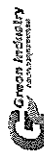
(นายพรชัย กลิ่นกรอง)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
โทร. ๐ ๓๓๑๓ ๖๐๕๕ ต่อ ๕๐๐๑-๒
ไปรษณีย์อิเล็กทรอนิกส์ eiw@diw.mail.go.th

อนึ่ง...



“อุตสาหกรรมก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”





บริษัท เอแอลเอส แล็บอราทอรี กรุ๊ป (ประเทศไทย) จำกัด (สำนักงานใหญ่)

104 ซอยพัฒนาการ 40 ถนนพัฒนาการ

แขวงพัฒนาการ เขตสวนหลวง กรุงเทพฯ 10250

ติดต่อเรา

