

# ภาคผนวก ค

ใบรับรองผลการตรวจวิเคราะห์



# ภาคผนวก ค.1

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คุณภาพอากาศจากแหล่งกำเนิด



## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phrakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211760  
Date Received : Feb 22, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215491-1

Page 1 of 2

Sample Number	2211760-1
Sampled Date	Feb 22, 2022
Sample Description	Emission from Stationary Source
Location	PT_Boiler Stack No.1 - S1
Date Analysis Commenced	Feb 23, 2022
Condition of Sample	Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

Stack Description							
Ambient Pressure	758	mmHg	Diameter	0.46	m	Oxygen	5.6 %
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	8.7 %
Type of Process	Combustion		Stack Temperature	89.5	°C	Gas Velocity	2.4 m/s
Type of Fuel	Natural Gas		Moisture	7.72	%	Flow Rate (Actual O2)	1087 Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result at 7 %O <sub>2</sub>	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	10:50 AM - 11:00 AM	ppm	-	1.0	8.5	690	-	US EPA, Method 10	Rayong
Oxides of Nitrogen *	10:40 AM - 10:50 AM	ppm	-	1.06	33.7	200	60	US EPA, Method 7	Rayong
Sulfur dioxide *	10:30 AM - 11:00 AM	ppm	-	2.0	<2.0	60	20	US EPA, Method 6	Rayong
Total Suspended Particulate	10:30 AM - 11:18 AM	mg/m3	-	0.5	0.6	320	40	US EPA, Method 5	Rayong

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Technical Management

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Thanita Kulsuriwong  
Scientist (4)  
โทร: 0323-9-9447

Approved by

*D. Chanchon*

Dej Chanchon  
Senior Manager  
โทร: 0323-9-9442

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phrakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211760  
Date Received : Feb 22, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215491-1

Page 2 of 2

Sample Number	2211760-1
Sampled Date	Feb 22, 2022
Sample Description	Emission from Stationary Source
Location	PT_Boiler Stack No.1 - S1
Date Analysis Commenced	Feb 23, 2022
Condition of Sample	Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

Stack Description							
Ambient Pressure	758	mmHg	Diameter	0.46	m	Oxygen	5.6 %
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	8.7 %
Type of Process	Combustion		Stack Temperature	89.5	°C	Gas Velocity	2.4 m/s
Type of Fuel	Natural Gas		Moisture	7.72	%	Flow Rate (Actual O2)	1087 Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	10:50 AM - 11:00 AM	g/s	-	-	0.003	-	-	Calculated	Rayong
Oxides of Nitrogen *	10:40 AM - 10:50 AM	g/s	-	-	0.021	-	0.0717	Calculated	Rayong
Sulfur dioxide *	10:30 AM - 11:00 AM	g/s	-	-	<0.002	-	0.0333	Calculated	Rayong
Total Suspended Particulate *	10:30 AM - 11:18 AM	g/s	-	-	0.0002	-	0.0254	Calculated	Rayong

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Sampled By : Suphanut Pisaipai

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

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Approved by

*D. Chanchon*

Dej Chanchon  
Senior Manager  
โทร: 0323-9-9442

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmC212925  
Project Name :  
Project Location :

Lot ID: 2211762  
Date Received : Feb 22, 2022  
Date Reported : Mar 02, 2022  
Report Number: 2215493-1

Page 1 of 2

Sample Number 2211762-1  
Sampled Date Feb 22, 2022  
Sample Description Emission from Stationary Source  
Location PT\_Boiler Stack No.2 - S2  
Date Analysis Commenced Feb 23, 2022  
Condition of Sample Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.31	m	Oxygen	7.3	%
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	7.8	%
Type of Process	Combustion		Stack Temperature	93.2	°C	Gas Velocity	3.4	m/s
Type of Fuel	Natural Gas		Moisture	7.48	%	Flow Rate (Actual O2)	697	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result at 7 %O <sub>2</sub>	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	11:40 AM - 11:50 AM	ppm	-	1.0	8.7	690	-	US EPA, Method 10	Rayong
Oxides of Nitrogen *	11:30 AM - 11:40 AM	ppm	-	1.06	55.2	200	60	US EPA, Method 7	Rayong
Sulfur dioxide *	11:25 AM - 11:55 AM	ppm	-	2.0	<2.0	60	20	US EPA, Method 6	Rayong
Total Suspended Particulate	11:20 AM - 12:16 PM	mg/m3	-	0.5	0.8	320	40	US EPA, Method 5	Rayong

Guideline : Guideline (1) 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)  
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Technical Management

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmC212925  
Project Name :  
Project Location :

Lot ID: 2211762  
Date Received : Feb 22, 2022  
Date Reported : Mar 02, 2022  
Report Number: 2215493-1

Page 2 of 2

Sample Number 2211762-1  
Sampled Date Feb 22, 2022  
Sample Description Emission from Stationary Source  
Location PT\_Boiler Stack No.2 - S2  
Date Analysis Commenced Feb 23, 2022  
Condition of Sample Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.31	m	Oxygen	7.3	%
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	7.8	%
Type of Process	Combustion		Stack Temperature	93.2	°C	Gas Velocity	3.4	m/s
Type of Fuel	Natural Gas		Moisture	7.48	%	Flow Rate (Actual O2)	697	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	11:40 AM - 11:50 AM	g/s	-	-	0.002	-	-	Calculated	Rayong
Oxides of Nitrogen *	11:30 AM - 11:40 AM	g/s	-	-	0.019	-	0.0362	Calculated	Rayong
Sulfur dioxide *	11:25 AM - 11:55 AM	g/s	-	-	<0.001	-	0.0168	Calculated	Rayong
Total Suspended Particulate *	11:20 AM - 12:16 PM	g/s	-	-	0.0002	-	0.0128	Calculated	Rayong

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Sampled By : Suphanut Pailpan

Remark :

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

Technical Management

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Senior Manager  
โทร: 0323-9-9442

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmlC212925  
Project Name :  
Project Location :

**Lot ID: 2211763**  
Date Received : Feb 22, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215494-1

Page 1 of 2

Sample Number	2211763-1
Sampled Date	Feb 22, 2022
Sample Description	Emission from Stationary Source
Location	PT_Boiler Stack No.3 - S3
Date Analysis Commenced	Feb 23, 2022
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	758	mmHg	Diameter	0.31	m	Oxygen	5.4 %
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	8.8 %
Type of Process	Combustion		Stack Temperature	156	°C	Gas Velocity	2.6 m/s
Type of Fuel	Natural Gas		Moisture	8.57	%	Flow Rate (Actual O2)	450 Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result at 7 %O <sub>2</sub>	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	10:15 AM - 10:25 AM	ppm	-	1.0	7.7	690	-	US EPA, Method 10	Rayong
Oxides of Nitrogen *	10:05 AM - 10:15 AM	ppm	-	1.06	49.1	200	75	US EPA, Method 7	Rayong
Sulfur dioxide *	09:30 AM - 10:00 AM	ppm	-	2.0	<2.0	60	20	US EPA, Method 6	Rayong
Total Suspended Particulate	09:30 AM - 10:26 AM	mg/m3	-	0.5	0.6	320	40	US EPA, Method 5	Rayong

Guideline : Guideline (1) 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)

Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Technical Management

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Approved by

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmlC212925  
Project Name :  
Project Location :

**Lot ID: 2211763**  
Date Received : Feb 22, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215494-1

Page 2 of 2

Sample Number	2211763-1
Sampled Date	Feb 22, 2022
Sample Description	Emission from Stationary Source
Location	PT_Boiler Stack No.3 - S3
Date Analysis Commenced	Feb 23, 2022
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	758	mmHg	Diameter	0.31	m	Oxygen	5.4 %
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	8.8 %
Type of Process	Combustion		Stack Temperature	156	°C	Gas Velocity	2.6 m/s
Type of Fuel	Natural Gas		Moisture	8.57	%	Flow Rate (Actual O2)	450 Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	10:15 AM - 10:25 AM	g/s	-	-	0.001	-	-	Calculated	Rayong
Oxides of Nitrogen *	10:05 AM - 10:15 AM	g/s	-	-	0.013	-	0.0792	Calculated	Rayong
Sulfur dioxide *	09:30 AM - 10:00 AM	g/s	-	-	<0.001	-	0.0294	Calculated	Rayong
Total Suspended Particulate *	09:30 AM - 10:26 AM	g/s	-	-	0.00008	-	0.0225	Calculated	Rayong

Guideline : Guideline (1) 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)

Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Sampled By : Suphanut Pitsaipan

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

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211764  
Date Received : Feb 22, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215495-1

Page 1 of 2

Sample Number 2211764-1  
Sampled Date Feb 22, 2022  
Sample Description Emission from Stationary Source  
Location PT\_Boiler Stack No.4 - S4  
Date Analysis Commenced Feb 23, 2022  
Condition of Sample Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.46	m	Oxygen	5.7	%
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	8.7	%
Type of Process	Combustion		Stack Temperature	117	°C	Gas Velocity	2.5	m/s
Type of Fuel	Natural Gas		Moisture	9.77	%	Flow Rate (Actual O2)	1028	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result at 7 %O <sub>2</sub>	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	12:40 PM - 12:50 PM	ppm	-	1.0	19.7	690	-	US EPA, Method 10	Rayong
Oxides of Nitrogen *	12:30 PM - 12:40 PM	ppm	-	1.06	1.24	200	75	US EPA, Method 7	Rayong
Sulfur dioxide *	12:20 PM - 12:50 PM	ppm	-	2.0	<2.0	60	20	US EPA, Method 6	Rayong
Total Suspended Particulate	12:20 PM - 01:08 PM	mg/m3	-	0.5	0.7	320	40	US EPA, Method 5	Rayong

Guideline : Guideline (1) 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)  
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Dej Chanchon  
Senior Manager  
โทรศัพท์ 0-323-9-9442

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## Analysis / Test Report



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No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211764  
Date Received : Feb 22, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215495-1

Page 2 of 2

Sample Number 2211764-1  
Sampled Date Feb 22, 2022  
Sample Description Emission from Stationary Source  
Location PT\_Boiler Stack No.4 - S4  
Date Analysis Commenced Feb 23, 2022  
Condition of Sample Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.46	m	Oxygen	5.7	%
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	8.7	%
Type of Process	Combustion		Stack Temperature	117	°C	Gas Velocity	2.5	m/s
Type of Fuel	Natural Gas		Moisture	9.77	%	Flow Rate (Actual O2)	1028	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	12:40 PM - 12:50 PM	g/s	-	-	0.007	-	-	Calculated	Rayong
Oxides of Nitrogen *	12:30 PM - 12:40 PM	g/s	-	-	0.001	-	0.0318	Calculated	Rayong
Sulfur dioxide *	12:20 PM - 12:50 PM	g/s	-	-	<0.001	-	0.0118	Calculated	Rayong
Total Suspended Particulate *	12:20 PM - 01:08 PM	g/s	-	-	0.0002	-	0.009	Calculated	Rayong

Guideline : Guideline (1) 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)  
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Sampled By : Suphanut Pisaijan

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- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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*D. Chanchon*

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No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211765  
Date Received : Feb 21, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215496-1

Page 1 of 2

Sample Number	2211765-1
Sampled Date	Feb 21, 2022
Sample Description	Emission from Stationary Source
Location	PT_Heating Furnace Stack - SS
Date Analysis Commenced	Feb 22, 2022
Condition of Sample	Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

Stack Description							
Ambient Pressure	758	mmHg	Diameter	0.49	m	Oxygen	14.9 %
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	3.4 %
Type of Process	Combustion (Open System)		Stack Temperature	360	°C	Gas Velocity	5.5 m/s
Type of Fuel	Natural Gas		Moisture	7.32	%	Flow Rate (Actual O2)	1635 Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	10:00 AM - 10:10 AM	ppm	-	1.0	477	690	-	US EPA, Method 10	Rayong
Oxides of Nitrogen *	09:45 AM - 09:55 AM	ppm	-	1.06	6.85	200	80	US EPA, Method 7	Rayong
Sulfur dioxide *	09:40 AM - 10:10 AM	ppm	-	2.0	<2.0	60	20	US EPA, Method 6	Rayong
Total Suspended Particulate	09:40 AM - 10:36 AM	mg/m3	-	0.5	0.6	320	40	US EPA, Method 5	Rayong

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Technical Management

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211765  
Date Received : Feb 21, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215496-1

Page 2 of 2

Sample Number	2211765-1
Sampled Date	Feb 21, 2022
Sample Description	Emission from Stationary Source
Location	PT_Heating Furnace Stack - SS
Date Analysis Commenced	Feb 22, 2022
Condition of Sample	Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

Stack Description							
Ambient Pressure	758	mmHg	Diameter	0.49	m	Oxygen	14.9 %
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	3.4 %
Type of Process	Combustion (Open System)		Stack Temperature	360	°C	Gas Velocity	5.5 m/s
Type of Fuel	Natural Gas		Moisture	7.32	%	Flow Rate (Actual O2)	1635 Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	10:00 AM - 10:10 AM	g/s	-	-	0.248	-	-	Calculated	Rayong
Oxides of Nitrogen *	09:45 AM - 09:55 AM	g/s	-	-	0.006	-	0.057	Calculated	Rayong
Sulfur dioxide *	09:40 AM - 10:10 AM	g/s	-	-	<0.002	-	0.0198	Calculated	Rayong
Total Suspended Particulate *	09:40 AM - 10:36 AM	g/s	-	-	0.0003	-	0.0151	Calculated	Rayong

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Sampled By : Suphanut Pisalpan

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

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Approved by

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Dej Chongchon  
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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : Sm/C212925  
Project Name :  
Project Location :

Lot ID: 2211766  
Date Received : Feb 21, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215498-1

Page 1 of 2

Sample Number 2211766-1  
Sampled Date Feb 21, 2022  
Sample Description Emission from Stationary Source  
Location PT\_Dust Collector Furnace Stack - S6  
Date Analysis Commenced Feb 22, 2022  
Condition of Sample Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.49	m	Oxygen	19.2	%
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	1.0	%
Type of Process	Combustion (Open System)		Stack Temperature	430	°C	Gas Velocity	5.3	m/s
Type of Fuel	Natural Gas		Moisture	7.27	%	Flow Rate (Actual O2)	1421	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	11:00 AM - 11:10 AM	ppm	-	1.0	124	690	-	US EPA, Method 10	Rayong
Oxides of Nitrogen *	10:45 AM - 10:55 AM	ppm	-	1.06	4.27	200	60	US EPA, Method 7	Rayong
Sulfur dioxide *	10:40 AM - 11:10 AM	ppm	-	2.0	<2.0	60	20	US EPA, Method 6	Rayong
Total Suspended Particulate	10:40 AM - 11:20 AM	mg/m3	-	0.5	4.6	320	50	US EPA, Method 5	Rayong

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Technical Management

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Approved by

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Senior Manager  
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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : Sm/C212925  
Project Name :  
Project Location :

Lot ID: 2211766  
Date Received : Feb 21, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215498-1

Page 2 of 2

Sample Number 2211766-1  
Sampled Date Feb 21, 2022  
Sample Description Emission from Stationary Source  
Location PT\_Dust Collector Furnace Stack - S6  
Date Analysis Commenced Feb 22, 2022  
Condition of Sample Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.49	m	Oxygen	19.2	%
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	1.0	%
Type of Process	Combustion (Open System)		Stack Temperature	430	°C	Gas Velocity	5.3	m/s
Type of Fuel	Natural Gas		Moisture	7.27	%	Flow Rate (Actual O2)	1421	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	11:00 AM - 11:10 AM	g/s	-	-	0.056	-	-	Calculated	Rayong
Oxides of Nitrogen *	10:45 AM - 10:55 AM	g/s	-	-	0.003	-	0.0261	Calculated	Rayong
Sulfur dioxide *	10:40 AM - 11:10 AM	g/s	-	-	<0.002	-	0.0121	Calculated	Rayong
Total Suspended Particulate *	10:40 AM - 11:20 AM	g/s	-	-	0.002	-	0.0116	Calculated	Rayong

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Sampled By : Suphanut Pisalpan

Remark :

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

Technical Management

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Approved by

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Senior Manager  
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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangpomi, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : Sm/C212925  
Project Name :  
Project Location :

Lot ID: 2211767  
Date Received : Feb 21, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215499-1

Page 1 of 2

Sample Number	2211767-1
Sampled Date	Feb 21, 2022
Sample Description	Emission from Stationary Source
Location	PT_Dust Collector Diffusion Furnace Stack No.1 - S7
Date Analysis Commenced	Feb 22, 2022
Condition of Sample	Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

Stack Description							
Ambient Pressure	758	mmHg	Diameter	0.49	m	Oxygen	11.9 %
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	5.2 %
Type of Process	Combustion (Open System)		Stack Temperature	422	°C	Gas Velocity	7.5 m/s
Type of Fuel	Natural Gas		Moisture	7.09	%	Flow Rate (Actual O2)	2012 Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	01:50 PM - 02:00 PM	ppm	-	1.0	<1.0	-	-	US EPA, Method 10	Rayong
Oxides of Nitrogen *	01:30 PM - 01:45 PM	ppm	-	1.06	13.7	180	50	US EPA, Method 7	Rayong
Sulfur dioxide *	01:30 PM - 02:00 PM	ppm	-	2.0	<2.0	800	20	US EPA, Method 6	Rayong
Total Suspended Particulate	01:30 PM - 02:18 PM	mg/m3	-	0.5	1.8	120	50	US EPA, Method 5	Rayong

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

Technical Management

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Approved by

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Senior Manager  
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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangpomi, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : Sm/C212925  
Project Name :  
Project Location :

Lot ID: 2211767  
Date Received : Feb 21, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215499-1

Page 2 of 2

Sample Number	2211767-1
Sampled Date	Feb 21, 2022
Sample Description	Emission from Stationary Source
Location	PT_Dust Collector Diffusion Furnace Stack No.1 - S7
Date Analysis Commenced	Feb 22, 2022
Condition of Sample	Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

Stack Description							
Ambient Pressure	758	mmHg	Diameter	0.49	m	Oxygen	11.9 %
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	5.2 %
Type of Process	Combustion (Open System)		Stack Temperature	422	°C	Gas Velocity	7.5 m/s
Type of Fuel	Natural Gas		Moisture	7.09	%	Flow Rate (Actual O2)	2012 Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	01:50 PM - 02:00 PM	g/s	-	-	<0.0006	-	-	Calculated	Rayong
Oxides of Nitrogen *	01:30 PM - 01:45 PM	g/s	-	-	0.014	-	0.0331	Calculated	Rayong
Sulfur dioxide *	01:30 PM - 02:00 PM	g/s	-	-	<0.003	-	0.0184	Calculated	Rayong
Total Suspended Particulate *	01:30 PM - 02:18 PM	g/s	-	-	0.0010	-	0.0176	Calculated	Rayong

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

Sampled By : Suphanut Pisalpan

Remark :

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

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : Sm/C212925  
Project Name :  
Project Location :

Lot ID: 2211768  
Date Received : Feb 21, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215500-1

Page 1 of 2

Sample Number	2211768-1
Sampled Date	Feb 21, 2022
Sample Description	Emission from Stationary Source
Location	PT_Dust Collector Diffusion Furnace Stack No.2 - S8
Date Analysis Commenced	Feb 22, 2022
Condition of Sample	Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.49	m	Oxygen	12.4	%
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	4.9	%
Type of Process	Combustion (Open System)		Stack Temperature	448	°C	Gas Velocity	8.7	m/s
Type of Fuel	Natural Gas		Moisture	8.56	%	Flow Rate (Actual O2)	2226	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	02:50 PM - 03:00 PM	ppm	-	1.0	4.2	-	-	US EPA, Method 10	Rayong
Oxides of Nitrogen *	02:35 PM - 02:45 PM	ppm	-	1.06	9.65	180	50	US EPA, Method 7	Rayong
Sulfur dioxide *	02:20 PM - 02:50 PM	ppm	-	2.0	<2.0	800	20	US EPA, Method 6	Rayong
Total Suspended Particulate	02:20 PM - 03:00 PM	mg/m3	-	0.5	2.5	120	50	US EPA, Method 5	Rayong

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

Technical Management

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หมายเลขโทรศัพท์ 3-323-9-9442

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : Sm/C212925  
Project Name :  
Project Location :

Lot ID: 2211768  
Date Received : Feb 21, 2022  
Date Reported : Mar 01, 2022  
Report Number: 2215500-1

Page 2 of 2

Sample Number	2211768-1
Sampled Date	Feb 21, 2022
Sample Description	Emission from Stationary Source
Location	PT_Dust Collector Diffusion Furnace Stack No.2 - S8
Date Analysis Commenced	Feb 22, 2022
Condition of Sample	Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish, one plastic bottle, one 10-L air sampling bag and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.49	m	Oxygen	12.4	%
Ambient Temperature	31.0	°C	Shape	Circle		Carbon Dioxide	4.9	%
Type of Process	Combustion (Open System)		Stack Temperature	448	°C	Gas Velocity	8.7	m/s
Type of Fuel	Natural Gas		Moisture	8.56	%	Flow Rate (Actual O2)	2226	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Carbon Monoxide *	02:50 PM - 03:00 PM	g/s	-	-	0.003	-	-	Calculated	Rayong
Oxides of Nitrogen *	02:35 PM - 02:45 PM	g/s	-	-	0.011	-	0.0406	Calculated	Rayong
Sulfur dioxide *	02:20 PM - 02:50 PM	g/s	-	-	<0.003	-	0.0226	Calculated	Rayong
Total Suspended Particulate *	02:20 PM - 03:00 PM	g/s	-	-	0.002	-	0.0216	Calculated	Rayong

Guideline : Guideline (1) Notification of the Ministry of Science Technology and Environment dated March 9, B.E. 2544 (2001), published in the Royal Government Gazette, Vol. 118 Special Part 37 dated May 8, B.E.2544 (2001) : New Source  
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Sampled By : Suphanut Pisalpan

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Technical Management

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Approved by

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmlC212925  
Project Name :  
Project Location :

Lot ID: 2211758  
Date Received : Feb 23, 2022  
Date Reported : Mar 03, 2022  
Report Number: 2215304-1

Page 1 of 2

Sample Number 2211758-1  
Sampled Date Feb 23, 2022  
Sample Description Emission from Stationary Source  
Location DD\_Dry Drawing Process Stack No.1-S9 (Dust Collector)  
Date Analysis Commenced Feb 26, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.55	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	45.0	°C	Gas Velocity	12.8	m/s
Type of Fuel	-		Moisture	2.54	%	Flow Rate (Actual O2)	9938	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Total Suspended Particulate	09:40 AM - 10:28 AM	mg/m3	-	0.5	18.5	120	20	US EPA, Method 5	Rayong

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

Technical Management

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Approved by

*D. Chanchon*

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmlC212925  
Project Name :  
Project Location :

Lot ID: 2211758  
Date Received : Feb 23, 2022  
Date Reported : Mar 03, 2022  
Report Number: 2215304-1

Page 2 of 2

Sample Number 2211758-1  
Sampled Date Feb 23, 2022  
Sample Description Emission from Stationary Source  
Location DD\_Dry Drawing Process Stack No.1-S9 (Dust Collector)  
Date Analysis Commenced Feb 26, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.55	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	45.0	°C	Gas Velocity	12.8	m/s
Type of Fuel	-		Moisture	2.54	%	Flow Rate (Actual O2)	9938	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Total Suspended Particulate *	09:40 AM - 10:28 AM	g/s	-	-	0.05	-	0.0805	Calculated	Rayong

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

Sampled By : Suphanut Pisalpan, Thitipong Buadaeng

Remark :

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

Technical Management

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211759  
Date Received : Feb 23, 2022  
Date Reported : Mar 03, 2022  
Report Number: 2215307-1

Page 1 of 2

Sample Number 2211759-1  
Sampled Date Feb 23, 2022  
Sample Description Emission from Stationary Source  
Location DD\_Dry Drawing Process Stack No.2-S10 (Dust Collector)  
Date Analysis Commenced Feb 26, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.55	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	48.8	°C	Gas Velocity	16.0	m/s
Type of Fuel	-		Moisture	2.99	%	Flow Rate (Actual O2)	12241	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Total Suspended Particulate	10:40 AM - 11:20 AM	mg/m3	-	0.5	18.3	120	20	US EPA, Method 5	Rayong

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

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211759  
Date Received : Feb 23, 2022  
Date Reported : Mar 03, 2022  
Report Number: 2215307-1

Page 2 of 2

Sample Number 2211759-1  
Sampled Date Feb 23, 2022  
Sample Description Emission from Stationary Source  
Location DD\_Dry Drawing Process Stack No.2-S10 (Dust Collector)  
Date Analysis Commenced Feb 26, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.55	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	48.8	°C	Gas Velocity	16.0	m/s
Type of Fuel	-		Moisture	2.99	%	Flow Rate (Actual O2)	12241	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Total Suspended Particulate *	10:40 AM - 11:20 AM	g/s	-	-	0.06	-	0.0984	Calculated	Rayong

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

Sampled By : Suphanut Pisalpan , Thitipong Buadaeng

Remark :

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

Technical Management

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Approved by

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211755  
Date Received : Feb 23, 2022  
Date Reported : Mar 08, 2022  
Report Number: 2253712-1

Page 1 of 2

Sample Number 2211755-1  
Sampled Date Feb 23, 2022  
Sample Description Emission from Stationary Source  
Location PK\_Pickling Line Stack No.1-S11 (Wet Scrubber1)  
Date Analysis Commenced Feb 26, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish, one plastic bottle and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	mmHg	Diameter	1.25	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	40.0	°C	Gas Velocity	7.2	m/s
Type of Fuel	-		Moisture	2.51	%	Flow Rate (Actual O2)	29289	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Total Suspended Particulate	01:50 PM - 02:50 PM	mg/m3	-	0.5	<0.5	400	-	US EPA, Method 5	Rayong

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211755  
Date Received : Feb 23, 2022  
Date Reported : Mar 08, 2022  
Report Number: 2253712-1

Page 2 of 2

Sample Number 2211755-1  
Sampled Date Feb 23, 2022  
Sample Description Emission from Stationary Source  
Location PK\_Pickling Line Stack No.1-S11 (Wet Scrubber1)  
Date Analysis Commenced Feb 26, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish, one plastic bottle and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	mmHg	Diameter	1.25	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	40.0	°C	Gas Velocity	7.2	m/s
Type of Fuel	-		Moisture	2.51	%	Flow Rate (Actual O2)	29289	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Total Suspended Particulate *	01:50 PM - 02:50 PM	g/s	-	-	<0.004	-	-	Calculated	Rayong

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

### Note:

This Analysis test report is reissued to supersede report No. 2215280-1 Date Reported : Mar 07, 2022 due to revise analytical information.

Sampled By : Suphanut Pisaipan, Thilipong Buadaeng

### Remark :

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

Technical Management

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Approved by

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## Analysis / Test Report



TESTING  
No.0009

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Puakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211755  
Date Received : Feb 23, 2022  
Date Reported : Mar 08, 2022  
Report Number: 2253712-2

Page 1 of 2

Sample Number 2211755-1  
Sampled Date Feb 23, 2022  
Sample Description Emission from Stationary Source  
Location PK\_Pickling Line Stack No.1-S11 (Wet Scrubber1)  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish, one plastic bottle and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	mmHg	Diameter	1.25	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	40.0	°C	Gas Velocity	7.2	m/s
Type of Fuel	-		Moisture	2.51	%	Flow Rate (Actual O2)	29289	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Hydrogen Chloride	01:50 PM - 02:50 PM	mg/m3	-	0.01	0.57	200	3	Based on US EPA, Method 25	Bangkok

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Technical Management

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โทรเลขเบอร์ 2-204-3-4717

Approved by

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Kanokkorn Anek  
Senior Manager  
โทรเลขเบอร์ 2-204-3-6111

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## Analysis / Test Report



TESTING  
No.0009

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Puakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211755  
Date Received : Feb 23, 2022  
Date Reported : Mar 08, 2022  
Report Number: 2253712-2

Page 2 of 2

Sample Number 2211755-1  
Sampled Date Feb 23, 2022  
Sample Description Emission from Stationary Source  
Location PK\_Pickling Line Stack No.1-S11 (Wet Scrubber1)  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish, one plastic bottle and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	mmHg	Diameter	1.25	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	40.0	°C	Gas Velocity	7.2	m/s
Type of Fuel	-		Moisture	2.51	%	Flow Rate (Actual O2)	29289	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Hydrogen Chloride *	01:50 PM - 02:50 PM	g/s	-	-	0.005	-	0.0796	Calculated	Bangkok

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

### Note:

This Analysis test report is reissued to supersede report No. 2215280-2 Date Reported : Mar 07, 2022 due to revise analytical information.

Sampled By : Suphanut Pisalpan, Thitipong Buadaeng

### Remark :

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

Technical Management

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Approved by

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Senior Manager  
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## Analysis / Test Report



TESTING  
No.0009

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211757  
Date Received : Feb 23, 2022  
Date Reported : Mar 07, 2022  
Report Number: 2215286-2

Page 1 of 2

Sample Number 2211757-1  
Sampled Date Feb 23, 2022  
Sample Description Emission from Stationary Source  
Location PK\_Pickling Line Stack No.2-S12 (Wet Scrubber2)  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish, one plastic bottle and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	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	37.0	°C	Gas Velocity	13.0	m/s
Type of Fuel	-		Moisture	2.64	%	Flow Rate (Actual O2)	22010	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Hydrogen Chloride	01:00 PM - 01:48 PM	mg/m3	-	0.01	0.57	200	3	Based on US EPA, Method 26	Bangkok

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Technical Management

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โทร: 02-04-4717

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Senior Manager  
โทร: 02-04-6111

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## Analysis / Test Report



TESTING  
No.0009

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211757  
Date Received : Feb 23, 2022  
Date Reported : Mar 07, 2022  
Report Number: 2215286-2

Page 2 of 2

Sample Number 2211757-1  
Sampled Date Feb 23, 2022  
Sample Description Emission from Stationary Source  
Location PK\_Pickling Line Stack No.2-S12 (Wet Scrubber2)  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish, one plastic bottle and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	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	37.0	°C	Gas Velocity	13.0	m/s
Type of Fuel	-		Moisture	2.64	%	Flow Rate (Actual O2)	22010	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Hydrogen Chloride *	01:00 PM - 01:48 PM	g/s	-	-	0.004	-	0.0377	Calculated	Bangkok

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Sampled By : Suphanut Pisalpan, Thitpong Buadaeng

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

*Saranya C.*  
Saranya Chalermthamrong  
Scientist (4)  
โทร: 02-04-4717

Approved by

*Kanokorn Anek*  
Kanokorn Anek  
Senior Manager  
โทร: 02-04-6111

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmlC212925  
Project Name :  
Project Location :

Lot ID: 2211757  
Date Received : Feb 23, 2022  
Date Reported : Mar 04, 2022  
Report Number: 2215286-1

Page 1 of 2

Sample Number 2211757-1  
Sampled Date Feb 23, 2022  
Sample Description Emission from Stationary Source  
Location PK\_Pickling Line Stack No.2-S12 (Wet Scrubber2)  
Date Analysis Commenced Feb 26, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish, one plastic bottle and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	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	37.0	°C	Gas Velocity	13.0	m/s
Type of Fuel	-		Moisture	2.64	%	Flow Rate (Actual O2)	22010	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
---------	--------------	------	-----	-----------	--------	---------------	---------------	--------	------------------

<b>Air Testing</b>									
Total Suspended Particulate	01:00 PM - 01:48 PM	mg/m3	-	0.5	0.8	400	-	US EPA, Method 5	Rayong

Guideline : Guideline (1) 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)

Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Technical Management

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Approved by

*D. Chanchon*

Dej Chanchon  
Senior Manager  
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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmlC212925  
Project Name :  
Project Location :

Lot ID: 2211757  
Date Received : Feb 23, 2022  
Date Reported : Mar 04, 2022  
Report Number: 2215286-1

Page 2 of 2

Sample Number 2211757-1  
Sampled Date Feb 23, 2022  
Sample Description Emission from Stationary Source  
Location PK\_Pickling Line Stack No.2-S12 (Wet Scrubber2)  
Date Analysis Commenced Feb 26, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish, one plastic bottle and one amber plastic bottle, refrigerated

### Stack Description

Ambient Pressure	758	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	37.0	°C	Gas Velocity	13.0	m/s
Type of Fuel	-		Moisture	2.64	%	Flow Rate (Actual O2)	22010	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
---------	--------------	------	-----	-----------	----------------------	---------------	---------------	--------	------------------

<b>Air Testing</b>									
Total Suspended Particulate *	01:00 PM - 01:48 PM	g/s	-	-	0.005	-	-	Calculated	Rayong

Guideline : Guideline (1) 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)

Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Sampled By : Suphanut Pisalpan , Thitipong Buadaeng

Remark :

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

Technical Management

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Approved by

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

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phrakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211851  
Date Received : Feb 24, 2022  
Date Reported : Mar 03, 2022  
Report Number: 2215511-1

Page 1 of 2

Sample Number 2211851-1  
Sampled Date Feb 24, 2022  
Sample Description Emission from Stationary Source  
Location PT\_Plating Line Stack No.1 - S13 (Wet Scrubber 1)  
Date Analysis Commenced Feb 26, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish, one plastic bottle and one amber plastic bottle, refrigerated

Stack Description									
Ambient Pressure	758	mmHg	Diameter	0.60	m	Oxygen	20.9	%	
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%	
Type of Process	Process		Stack Temperature	32.5	°C	Gas Velocity	12.6	m/s	
Type of Fuel	-		Moisture	2.74	%	Flow Rate (Actual O2)	12140	Nm3/hr	

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Sulfuric acid *	10:20 AM - 11:16 AM	ppm	-	0.01	<0.01	25	3.5	US EPA, Method 8	Rayong
Total Suspended Particulate	11:20 AM - 12:16 PM	mg/m3	-	0.5	<0.5	400	-	US EPA, Method 5	Rayong

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Technical Management

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Approved by

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Senior Manager  
เบอร์โทรภายใน 3-323-9-9442

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phrakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211851  
Date Received : Feb 24, 2022  
Date Reported : Mar 03, 2022  
Report Number: 2215511-1

Page 2 of 2

Sample Number 2211851-1  
Sampled Date Feb 24, 2022  
Sample Description Emission from Stationary Source  
Location PT\_Plating Line Stack No.1 - S13 (Wet Scrubber 1)  
Date Analysis Commenced Feb 26, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish, one plastic bottle and one amber plastic bottle, refrigerated

Stack Description									
Ambient Pressure	758	mmHg	Diameter	0.60	m	Oxygen	20.9	%	
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%	
Type of Process	Process		Stack Temperature	32.5	°C	Gas Velocity	12.6	m/s	
Type of Fuel	-		Moisture	2.74	%	Flow Rate (Actual O2)	12140	Nm3/hr	

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Sulfuric acid *	10:20 AM - 11:16 AM	g/s	-	-	<0.0002	-	0.0376	Calculated	Rayong
Total Suspended Particulate *	11:20 AM - 12:16 PM	g/s	-	-	<0.002	-	-	Calculated	Rayong

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Sampled By : Suphanut Pisalpan , Thitpong Buadaeng

Remark :

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

Technical Management

*Tharita K.*  
Thanita Kulsuriwong  
Scientist (4)  
เบอร์โทรภายใน 3-323-9-9447

Approved by

*D. Chanchon*  
Dej Chanchon  
Senior Manager  
เบอร์โทรภายใน 3-323-9-9442

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : Sm/C212925  
Project Name :  
Project Location :

Lot ID: 2211848  
Date Received : Feb 24, 2022  
Date Reported : Mar 08, 2022  
Report Number: 2215503-1

Page 1 of 2

Sample Number 2211848-1  
Sampled Date Feb 24, 2022  
Sample Description Emission from Stationary Source  
Location PT\_Plating Line Stack No.2 - S14 (Wet Scrubber 2)  
Date Analysis Commenced Feb 25, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.90	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	31.0	°C	Gas Velocity	13.5	m/s
Type of Fuel	-		Moisture	2.36	%	Flow Rate (Actual O2)	29507	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Total Suspended Particulate	09:30 AM - 10:18 AM	mg/m3	-	0.5	<0.5	400	-	US EPA, Method 5	Rayong

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Technical Management

*Thanitak.*

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

Approved by

*D. Khunsa.*

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

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : Sm/C212925  
Project Name :  
Project Location :

Lot ID: 2211848  
Date Received : Feb 24, 2022  
Date Reported : Mar 08, 2022  
Report Number: 2215503-1

Page 2 of 2

Sample Number 2211848-1  
Sampled Date Feb 24, 2022  
Sample Description Emission from Stationary Source  
Location PT\_Plating Line Stack No.2 - S14 (Wet Scrubber 2)  
Date Analysis Commenced Feb 25, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.90	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	31.0	°C	Gas Velocity	13.5	m/s
Type of Fuel	-		Moisture	2.36	%	Flow Rate (Actual O2)	29507	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Air Testing</b>									
Total Suspended Particulate *	09:30 AM - 10:18 AM	g/s	-	-	<0.002	-	-	Calculated	Rayong

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Sampled By : Suphanut Pitsaipan, Thitpong Buadaeng

Remark :

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

Technical Management

*Thanitak.*

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

Approved by

*D. Khunsa.*

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

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211848  
Date Received : Feb 24, 2022  
Date Reported : Mar 08, 2022  
Report Number: 2215503-2

Page 1 of 1

Sample Number 2211848-1  
Sampled Date Feb 24, 2022  
Sample Description Emission from Stationary Source  
Location PT\_Plating Line Stack No.2 - S14 (Wet Scrubber 2)  
Date Analysis Commenced Mar 07, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.90	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	31.0	°C	Gas Velocity	13.5	m/s
Type of Fuel	-		Moisture	2.36	%	Flow Rate (Actual O2)	29507	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Metals Testing</b>									
Copper	09:30 AM - 10:18 AM	mg/m3	-	0.04	<0.04	30	1	US EPA, Method 29	Bangkok

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Sampled By : Suphanut Pisalpan, Thitpong Buadaeng

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

Technical Management

*Sawitree N.*  
Sawitree Naisanglam  
Assistant Manager  
เบอร์โทรติดต่อ 2-204-4709

Approved by

*Kanokkom Anek*  
Kanokkom Anek  
Senior Manager  
เบอร์โทรติดต่อ 2-204-6111

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211848  
Date Received : Feb 24, 2022  
Date Reported : Mar 08, 2022  
Report Number: 2215503-3

Page 1 of 1

Sample Number 2211848-1  
Sampled Date Feb 24, 2022  
Sample Description Emission from Stationary Source  
Location PT\_Plating Line Stack No.2 - S14 (Wet Scrubber 2)  
Date Analysis Commenced Mar 07, 2022  
Condition of Sample Extracted into one filter paper placed in plastic petri dish and one plastic bottle

### Stack Description

Ambient Pressure	758	mmHg	Diameter	0.90	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	31.0	°C	Gas Velocity	13.5	m/s
Type of Fuel	-		Moisture	2.36	%	Flow Rate (Actual O2)	29507	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
<b>Metals Testing</b>									
Zinc	09:30 AM - 10:18 AM	mg/m3	-	0.03	<0.03	-	1	US EPA, Method 29	Bangkok

Guideline : Guideline (1) 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)  
Guideline (2) Environmental Impact Assessment Report of Sumiden Steel Wire (Thailand) Co., Ltd.

Sampled By : Suphanut Pisalpan, Thitpong Buadaeng

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

Approved by

*Sawitree N.*  
Sawitree Naisanglam  
Assistant Manager

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# ภาคผนวก ค.2

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คุณภาพอากาศในบรรยากาศ



## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Puakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 1 of 21

Sample Number 2211732-1  
Sample Date Feb 21, 2022  
Sample Description Air Quality  
Location หมู่ที่ 3 ตำบลมบายน (A1) (GPS 47P 0737742, 1438163)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	21/02/22 - 22/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	21/02/22 - 22/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	21/02/22 - 22/02/22	mg/m3	-	0.00001	0.00006	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	21/02/22 - 22/02/22	mg/m3	-	0.00001	0.00008	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Savitree N.*

Savitree Nongsanglam  
Manager

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10/31-22/ENAL

S:\Reports\_Air\_Working\_NGL\pt (215544)



## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Puakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 2 of 21

Sample Number 2211732-2  
Sample Date Feb 22, 2022  
Sample Description Air Quality  
Location หมู่ที่ 3 ตำบลมบายน (A1) (GPS 47P 0737742, 1438163)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 30.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	22/02/22 - 23/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	22/02/22 - 23/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	22/02/22 - 23/02/22	mg/m3	-	0.00001	0.00006	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	22/02/22 - 23/02/22	mg/m3	-	0.00001	0.00009	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Savitree N.*

Savitree Nongsanglam  
Manager

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S:\Reports\_Air\_Working\_NGL\pt (215544)



## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 3 of 21

Sample Number 2211732-3  
Sampled Date Feb 23, 2022  
Sample Description Air Quality  
Location หมู่ที่ 3 ตำบลบางพลอง (A1) (GPS 47P 0737742, 1438163)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	23/02/22 - 24/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	23/02/22 - 24/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	23/02/22 - 24/02/22	mg/m3	-	0.00001	0.00009	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	23/02/22 - 24/02/22	mg/m3	-	0.00001	0.00009	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Sawitree N.*

Sawitree Nisanglam  
Manager

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10731-22/EN40

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 4 of 21

Sample Number 2211732-4  
Sampled Date Feb 24, 2022  
Sample Description Air Quality  
Location หมู่ที่ 3 ตำบลบางพลอง (A1) (GPS 47P 0737742, 1438163)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	24/02/22 - 25/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	24/02/22 - 25/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	24/02/22 - 25/02/22	mg/m3	-	0.00001	0.00007	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	24/02/22 - 25/02/22	mg/m3	-	0.00001	0.00008	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Sawitree N.*

Sawitree Nisanglam  
Manager

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10731-22/EN40

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Phrakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 5 of 21

Sample Number 2211732-5  
Sample Date Feb 25, 2022  
Sample Description Air Quality  
Location หมู่ที่ 3 ตำบลมาบตาพุด (A1) (GPS 47P 0737742, 1438163)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	25/02/22 - 26/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	25/02/22 - 26/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	25/02/22 - 26/02/22	mg/m3	-	0.00001	0.00008	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	25/02/22 - 26/02/22	mg/m3	-	0.00001	0.0001	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Sawitree N.*

Sawitree Noksanglam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Phrakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 6 of 21

Sample Number 2211732-6  
Sample Date Feb 26, 2022  
Sample Description Air Quality  
Location หมู่ที่ 3 ตำบลมาบตาพุด (A1) (GPS 47P 0737742, 1438163)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	26/02/22 - 27/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	26/02/22 - 27/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	26/02/22 - 27/02/22	mg/m3	-	0.00001	0.00009	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	26/02/22 - 27/02/22	mg/m3	-	0.00001	0.0002	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Sawitree N.*

Sawitree Noksanglam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phrakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 7 of 21

Sample Number 2211732-7  
Sampled Date Feb 27, 2022  
Sample Description Air Quality  
Location หมู่ที่ 3 บ้านนาบารม (A1) (GPS 47P 0737742, 1438163)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	27/02/22 - 28/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	27/02/22 - 28/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	27/02/22 - 28/02/22	mg/m3	-	0.00001	0.00007	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	27/02/22 - 28/02/22	mg/m3	-	0.00001	0.0002	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chakchana

Remark :

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

Approved by

*Sawitree N.*

Sawitree Naisangiam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phrakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 8 of 21

Sample Number 2211732-8  
Sampled Date Feb 21, 2022  
Sample Description Air Quality  
Location หมู่ที่ 5 บ้านนาโพธิ์ (A2) (GPS 47P 0725750, 1434297)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	21/02/22 - 22/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	21/02/22 - 22/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	21/02/22 - 22/02/22	mg/m3	-	0.00001	0.00005	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	21/02/22 - 22/02/22	mg/m3	-	0.00001	0.0002	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chakchana

Remark :

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

Approved by

*Sawitree N.*

Sawitree Naisangiam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 9 of 21

Sample Number 2211732-9  
Sample Date Feb 22, 2022  
Sample Description Air Quality  
Location หมู่ที่ 5 ตำบลโพธิ์ (A2) (GPS 47P 0725750, 1434297)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 30.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	22/02/22 - 23/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	22/02/22 - 23/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	22/02/22 - 23/02/22	mg/m3	-	0.00001	0.00007	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	22/02/22 - 23/02/22	mg/m3	-	0.00001	0.00007	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Sawitree N.*  
Sawitree Nolsanglam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 10 of 21

Sample Number 2211732-10  
Sample Date Feb 23, 2022  
Sample Description Air Quality  
Location หมู่ที่ 5 ตำบลโพธิ์ (A2) (GPS 47P 0725750, 1434297)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	23/02/22 - 24/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	23/02/22 - 24/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	23/02/22 - 24/02/22	mg/m3	-	0.00001	0.00006	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	23/02/22 - 24/02/22	mg/m3	-	0.00001	0.00006	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Sawitree N.*  
Sawitree Nolsanglam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 11 of 21

Sample Number 2211732-11  
Sampled Date Feb 24, 2022  
Sample Description Air Quality  
Location หมู่ที่ 5 ตำบลวังใหม่ (A2) (GPS 47P 0725750, 1434297)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	24/02/22 - 25/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	24/02/22 - 25/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	24/02/22 - 25/02/22	mg/m3	-	0.00001	0.00006	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	24/02/22 - 25/02/22	mg/m3	-	0.00001	0.0001	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chalchana

Remark :

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

Approved by

*Sawitree N.*

Sawitree Nolsangiam  
Manager

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10731-22/ EHAJL

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 12 of 21

Sample Number 2211732-12  
Sampled Date Feb 25, 2022  
Sample Description Air Quality  
Location หมู่ที่ 5 ตำบลวังใหม่ (A2) (GPS 47P 0725750, 1434297)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	25/02/22 - 26/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	25/02/22 - 26/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	25/02/22 - 26/02/22	mg/m3	-	0.00001	0.00007	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	25/02/22 - 26/02/22	mg/m3	-	0.00001	0.0002	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chalchana

Remark :

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

Approved by

*Sawitree N.*

Sawitree Nolsangiam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Puakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 13 of 21

Sample Number 2211732-13  
Sampled Date Feb 26, 2022  
Sample Description Air Quality  
Location หมู่ที่ 5 ตำบลโพธิ์ (A2) (GPS 47P 0725750, 1434297)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	26/02/22 - 27/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	26/02/22 - 27/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	26/02/22 - 27/02/22	mg/m3	-	0.00001	0.00008	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	26/02/22 - 27/02/22	mg/m3	-	0.00001	0.0002	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chalchana

Remark :

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

Approved by

*Sawitree N.*  
Sawitree Naisangiam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Puakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 14 of 21

Sample Number 2211732-14  
Sampled Date Feb 27, 2022  
Sample Description Air Quality  
Location หมู่ที่ 5 ตำบลโพธิ์ (A2) (GPS 47P 0725750, 1434297)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	27/02/22 - 28/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	27/02/22 - 28/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	27/02/22 - 28/02/22	mg/m3	-	0.00001	0.00007	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	27/02/22 - 28/02/22	mg/m3	-	0.00001	0.0002	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chalchana

Remark :

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

Approved by

*Sawitree N.*  
Sawitree Naisangiam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmitC212925  
Project Name :  
Project Location :

**Lot ID: 2211732**  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 15 of 21

Sample Number 2211732-15  
Sampled Date Feb 21, 2022  
Sample Description Air Quality  
Location บ้านดอน (A3) (GPS 47P 0728650, 1428893)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	21/02/22 - 22/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	21/02/22 - 22/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	21/02/22 - 22/02/22	mg/m3	-	0.00001	0.00004	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	21/02/22 - 22/02/22	mg/m3	-	0.00001	0.0001	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Savitree N.*

Savitree Nolsanglam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmitC212925  
Project Name :  
Project Location :

**Lot ID: 2211732**  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 16 of 21

Sample Number 2211732-16  
Sampled Date Feb 22, 2022  
Sample Description Air Quality  
Location บ้านดอน (A3) (GPS 47P 0728650, 1428893)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 30.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	22/02/22 - 23/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	22/02/22 - 23/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	22/02/22 - 23/02/22	mg/m3	-	0.00001	0.00004	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	22/02/22 - 23/02/22	mg/m3	-	0.00001	0.0003	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Savitree N.*

Savitree Nolsanglam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
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P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 17 of 21

Sample Number 2211732-17  
Sample Date Feb 23, 2022  
Sample Description Air Quality  
Location รังนก (A3) (GPS 47P 0728650, 1428893)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	23/02/22 - 24/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	23/02/22 - 24/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	23/02/22 - 24/02/22	mg/m3	-	0.00001	0.00003	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	23/02/22 - 24/02/22	mg/m3	-	0.00001	0.0001	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Sawitree N.*

Sawitree Noksanglam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phrakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 18 of 21

Sample Number 2211732-18  
Sample Date Feb 24, 2022  
Sample Description Air Quality  
Location รังนก (A3) (GPS 47P 0728650, 1428893)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	24/02/22 - 25/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	24/02/22 - 25/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	24/02/22 - 25/02/22	mg/m3	-	0.00001	0.00005	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	24/02/22 - 25/02/22	mg/m3	-	0.00001	0.0002	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Sawitree N.*

Sawitree Noksanglam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 19 of 21

Sample Number 2211732-19  
Sampled Date Feb 25, 2022  
Sample Description Air Quality  
Location รังนก (A3) (GPS 47P 0728650, 1428893)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	25/02/22 - 26/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	25/02/22 - 26/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	25/02/22 - 26/02/22	mg/m3	-	0.00001	0.00003	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	25/02/22 - 26/02/22	mg/m3	-	0.00001	0.0002	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Savitree N.*

Savitree Noisanglam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 20 of 21

Sample Number 2211732-20  
Sampled Date Feb 26, 2022  
Sample Description Air Quality  
Location รังนก (A3) (GPS 47P 0728650, 1428893)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	26/02/22 - 27/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	26/02/22 - 27/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	26/02/22 - 27/02/22	mg/m3	-	0.00001	0.00005	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	26/02/22 - 27/02/22	mg/m3	-	0.00001	0.0004	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chaichana

Remark :

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

Approved by

*Savitree N.*

Savitree Noisanglam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211732  
Date Received : Feb 28, 2022  
Date Reported : Jun 28, 2022  
Report Number : 2215240-1

Page 21 of 21

Sample Number 2211732-21  
Sampled Date Feb 27, 2022  
Sample Description Air Quality  
Location บ้านดอน (A3) (GPS 47P 0728650, 1428893)  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
<b>Air Testing</b>							
Hydrogen chloride	27/02/22 - 28/02/22	ppm	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
Sulfuric acid	27/02/22 - 28/02/22	mg/m3	-	0.05	<0.05	Based on OSHA, ID-174-SG	Bangkok
<b>Metals Testing</b>							
Copper	27/02/22 - 28/02/22	mg/m3	-	0.00001	0.00004	Based on US EPA, IO Compendium Method IO-3.4	Bangkok
Zinc	27/02/22 - 28/02/22	mg/m3	-	0.00001	0.0003	Based on US EPA, IO Compendium Method IO-3.4	Bangkok

Sampled By : Santi Chalchana

Remark :

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

Approved by

*Sawitree N.*

Sawitree Nolsangiam  
Manager

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# ภาคผนวก ค.3

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ระดับเสียง



## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211754  
Date Received : Mar 01, 2022  
Date Reported : Mar 03, 2022  
Report Number: 2247021-1

Page 1 of 1

Sample Number 2211754-1  
Parameter Noise (Leq 24 hrs.)  
Location บริเวณโครงการทางทิศตะวันออก (N1) (GPS 47P 729205, 1433615)  
Measurement Date Feb 21 - Feb 22, 2022  
Measurement by Santi Chaichana  
Sound Level meter Serial No. 296516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	60.0	76.3	54.4
10:00 AM - 11:00 AM	59.8	78.3	53.5
11:00 AM - 12:00 PM	60.6	87.8	53.7
12:00 PM - 01:00 PM	61.3	80.4	54.9
01:00 PM - 02:00 PM	59.5	77.3	54.8
02:00 PM - 03:00 PM	60.3	84.5	54.6
03:00 PM - 04:00 PM	59.7	85.4	54.8
04:00 PM - 05:00 PM	60.4	79.4	55.2
05:00 PM - 06:00 PM	61.7	83.6	56.0
06:00 PM - 07:00 PM	61.4	77.8	56.0
07:00 PM - 08:00 PM	62.1	79.1	56.6
08:00 PM - 09:00 PM	60.5	80.0	55.3
09:00 PM - 10:00 PM	58.0	75.1	54.7
10:00 PM - 11:00 PM	57.2	76.7	54.0
11:00 PM - 12:00 AM	55.6	71.8	53.3
12:00 AM - 01:00 AM	55.1	68.6	53.4
01:00 AM - 02:00 AM	54.8	68.0	53.1
02:00 AM - 03:00 AM	55.3	71.3	53.2
03:00 AM - 04:00 AM	55.7	74.9	53.1
04:00 AM - 05:00 AM	56.7	76.7	52.9
05:00 AM - 06:00 AM	57.4	73.3	53.7
06:00 AM - 07:00 AM	63.2	81.6	58.5
07:00 AM - 08:00 AM	65.2	82.2	59.4
08:00 AM - 09:00 AM	62.1	83.9	56.2

Leq Average 24 hrs. (dB(A)) 60.2  
Lmax (dB(A)) 87.8  
L90 (dB(A)) 54.6  
Ldn (dB(A)) 64.8  
Standard (dB(A)) 70

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศกระทรวงมหาดไทย เรื่อง ค่าระดับเสียงโดยทั่วไป  
2. ประกาศกระทรวงอุตสาหกรรม เรื่อง กำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Technical Management

Thanita K.

Thanita Kulsuriwong  
Scientist (4)

Approved by

Supot S.

Supot Salamteh  
Section Head

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211754  
Date Received : Mar 01, 2022  
Date Reported : Mar 03, 2022  
Report Number: 2247022-1

Page 1 of 1

Sample Number 2211754-2  
Parameter Noise (Leq 24 hrs.)  
Location บริเวณโครงการทางทิศตะวันออก (N1) (GPS 47P 729205, 1433615)  
Measurement Date Feb 22 - Feb 23, 2022  
Measurement by Santi Chaichana  
Sound Level meter Serial No. 296516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	60.6	78.7	55.6
10:00 AM - 11:00 AM	60.5	75.7	54.9
11:00 AM - 12:00 PM	60.4	81.8	53.8
12:00 PM - 01:00 PM	57.9	72.5	52.9
01:00 PM - 02:00 PM	59.1	73.5	53.8
02:00 PM - 03:00 PM	59.8	75.4	53.6
03:00 PM - 04:00 PM	60.0	75.0	54.7
04:00 PM - 05:00 PM	61.5	81.2	55.4
05:00 PM - 06:00 PM	61.4	80.0	56.0
06:00 PM - 07:00 PM	61.2	81.8	56.2
07:00 PM - 08:00 PM	61.7	77.7	55.8
08:00 PM - 09:00 PM	60.8	81.5	54.7
09:00 PM - 10:00 PM	58.0	81.6	54.2
10:00 PM - 11:00 PM	56.8	76.9	54.1
11:00 PM - 12:00 AM	57.0	76.9	53.0
12:00 AM - 01:00 AM	55.8	74.5	52.5
01:00 AM - 02:00 AM	55.1	73.6	52.1
02:00 AM - 03:00 AM	55.6	73.5	53.6
03:00 AM - 04:00 AM	54.9	73.8	51.7
04:00 AM - 05:00 AM	57.5	82.9	52.4
05:00 AM - 06:00 AM	57.9	71.7	54.2
06:00 AM - 07:00 AM	62.2	82.2	57.1
07:00 AM - 08:00 AM	64.9	86.9	59.3
08:00 AM - 09:00 AM	61.7	83.4	56.6

Leq Average 24 hrs. (dB(A)) 60.0  
Lmax (dB(A)) 86.9  
L90 (dB(A)) 54.2  
Ldn (dB(A)) 64.7  
Standard (dB(A)) 70

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศกระทรวงมหาดไทย เรื่อง ค่าระดับเสียงโดยทั่วไป  
2. ประกาศกระทรวงอุตสาหกรรม เรื่อง กำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Technical Management

Thanita K.

Thanita Kulsuriwong  
Scientist (4)

Approved by

Supot S.

Supot Salamteh  
Section Head

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## Analysis / Test Report



TESTING  
No.0042

Client: Sumiden Steel Wire (Thailand) Co., Ltd.

7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140

P/O : SmtC212925

Project Name :

Project Location :

Lot ID: 2211754

Date Received : Mar 01, 2022

Date Reported : Mar 03, 2022

Report Number: 2247023-1

Page 1 of 1

Sample Number 2211754-3  
Parameter Noise (Leq 24 hrs.)  
Location รั้วโรงการทางพิเศษนอก (N1) (GPS 47P 729205, 1433615)  
Measurement Date Feb 23 - Feb 24, 2022  
Measurement by Santi Chaichana  
Sound Level meter Serial No. 295516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	60.3	74.4	54.7
10:00 AM - 11:00 AM	60.6	76.9	55.7
11:00 AM - 12:00 PM	61.2	83.8	54.3
12:00 PM - 01:00 PM	58.7	78.6	52.7
01:00 PM - 02:00 PM	60.3	88.0	53.9
02:00 PM - 03:00 PM	60.5	90.3	54.0
03:00 PM - 04:00 PM	59.5	78.8	54.1
04:00 PM - 05:00 PM	61.0	80.0	54.7
05:00 PM - 06:00 PM	61.3	77.8	56.2
06:00 PM - 07:00 PM	60.7	78.0	55.4
07:00 PM - 08:00 PM	62.4	79.1	56.6
08:00 PM - 09:00 PM	60.9	82.5	55.0
09:00 PM - 10:00 PM	57.7	80.9	53.5
10:00 PM - 11:00 PM	57.9	84.9	53.3
11:00 PM - 12:00 AM	56.1	74.0	53.8
12:00 AM - 01:00 AM	55.3	74.2	53.6
01:00 AM - 02:00 AM	55.5	71.6	53.3
02:00 AM - 03:00 AM	55.7	73.9	52.7
03:00 AM - 04:00 AM	55.5	69.5	53.4
04:00 AM - 05:00 AM	56.5	80.3	53.3
05:00 AM - 06:00 AM	56.6	71.3	52.8
06:00 AM - 07:00 AM	62.9	86.9	57.0
07:00 AM - 08:00 AM	64.2	86.3	59.2
08:00 AM - 09:00 AM	61.3	75.1	56.8

Leq Average 24 hrs. (dB(A))

60.0

Lmax (dB(A))

90.3

L90 (dB(A))

54.0

Ldn (dB(A))

64.8

Standard (dB(A))

70

115

Reference Method : ISO1996-1 and 1996-2

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

Technical Management

Thanita K.

Thanita Kulsuriwong  
Scientist (4)

Approved by

Supot S.

Supot Salamteh  
Section Head

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## Analysis / Test Report



TESTING  
No.0042

Client: Sumiden Steel Wire (Thailand) Co., Ltd.

7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140

P/O : SmtC212925

Project Name :

Project Location :

Lot ID: 2211754

Date Received : Mar 01, 2022

Date Reported : Mar 03, 2022

Report Number: 2247024-1

Page 1 of 1

Sample Number 2211754-4  
Parameter Noise (Leq 24 hrs.)  
Location รั้วโรงการทางพิเศษนอก (N1) (GPS 47P 729205, 1433615)  
Measurement Date Feb 24 - Feb 25, 2022  
Measurement by Santi Chaichana  
Sound Level meter Serial No. 295516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	61.3	78.3	55.5
10:00 AM - 11:00 AM	60.2	78.3	55.0
11:00 AM - 12:00 PM	60.6	86.1	55.3
12:00 PM - 01:00 PM	59.1	78.6	53.8
01:00 PM - 02:00 PM	60.3	83.4	54.7
02:00 PM - 03:00 PM	60.1	83.4	54.3
03:00 PM - 04:00 PM	60.6	80.7	54.2
04:00 PM - 05:00 PM	62.6	88.0	56.0
05:00 PM - 06:00 PM	61.1	78.5	56.0
06:00 PM - 07:00 PM	61.5	83.0	56.1
07:00 PM - 08:00 PM	62.3	79.5	56.7
08:00 PM - 09:00 PM	59.4	78.0	54.6
09:00 PM - 10:00 PM	55.9	76.1	52.0
10:00 PM - 11:00 PM	57.4	77.3	51.9
11:00 PM - 12:00 AM	57.4	82.6	51.2
12:00 AM - 01:00 AM	57.6	79.4	50.5
01:00 AM - 02:00 AM	53.8	72.2	50.8
02:00 AM - 03:00 AM	54.7	75.1	52.1
03:00 AM - 04:00 AM	54.9	72.2	52.3
04:00 AM - 05:00 AM	57.0	82.4	51.8
05:00 AM - 06:00 AM	58.7	84.4	52.8
06:00 AM - 07:00 AM	61.7	76.8	56.6
07:00 AM - 08:00 AM	64.1	82.1	59.1
08:00 AM - 09:00 AM	61.5	80.8	57.2

Leq Average 24 hrs. (dB(A))

60.1

Lmax (dB(A))

88.0

L90 (dB(A))

54.3

Ldn (dB(A))

64.7

Standard (dB(A))

70

115

Reference Method : ISO1996-1 and 1996-2

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

Technical Management

Thanita K.

Thanita Kulsuriwong  
Scientist (4)

Approved by

Supot S.

Supot Salamteh  
Section Head

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211754  
Date Received : Mar 01, 2022  
Date Reported : Mar 03, 2022  
Report Number: 2247025-1

Page 1 of 1

Sample Number	2211754-5
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณโรงงานอุตสาหกรรม (N1) (GPS 47P 729205, 1433615)
Measurement Date	Feb 25 - Feb 26, 2022
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	60.4	76.1	55.7
10:00 AM - 11:00 AM	60.6	84.7	54.5
11:00 AM - 12:00 PM	61.1	78.8	55.6
12:00 PM - 01:00 PM	59.8	78.4	54.2
01:00 PM - 02:00 PM	60.8	82.4	55.2
02:00 PM - 03:00 PM	60.4	86.5	54.6
03:00 PM - 04:00 PM	59.2	74.5	54.3
04:00 PM - 05:00 PM	60.9	77.5	55.6
05:00 PM - 06:00 PM	60.6	75.8	56.0
06:00 PM - 07:00 PM	61.3	79.2	56.4
07:00 PM - 08:00 PM	61.9	79.4	56.5
08:00 PM - 09:00 PM	60.3	83.0	54.8
09:00 PM - 10:00 PM	58.2	82.3	53.6
10:00 PM - 11:00 PM	56.8	73.1	53.8
11:00 PM - 12:00 AM	56.0	78.1	52.0
12:00 AM - 01:00 AM	55.6	72.9	52.6
01:00 AM - 02:00 AM	54.5	67.2	52.7
02:00 AM - 03:00 AM	55.7	72.5	52.0
03:00 AM - 04:00 AM	54.3	72.4	52.2
04:00 AM - 05:00 AM	55.7	72.6	52.0
05:00 AM - 06:00 AM	56.8	74.4	52.5
06:00 AM - 07:00 AM	61.4	79.0	55.2
07:00 AM - 08:00 AM	63.2	83.9	57.3
08:00 AM - 09:00 AM	61.2	82.8	55.1

Leq Average 24 hrs. (dB(A))	59.7		
Lmax (dB(A))		86.5	
L90 (dB(A))			54.5
Ldn (dB(A))	64.1		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศกระทรวงมหาดไทย เรื่อง กำหนดมาตรฐานระดับเสียงโดยทั่วไป  
2. ประกาศกระทรวงอุตสาหกรรม เรื่อง กำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Technical Management

Thanita K.

Thanita Kulsuriwong  
Scientist (4)

Approved by

Supt S

Supot Salameh  
Section Head

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211754  
Date Received : Mar 01, 2022  
Date Reported : Mar 03, 2022  
Report Number: 2247026-1

Page 1 of 1

Sample Number	2211754-6
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณโรงงานอุตสาหกรรม (N1) (GPS 47P 729205, 1433615)
Measurement Date	Feb 26 - Feb 27, 2022
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	61.1	84.4	53.9
10:00 AM - 11:00 AM	60.4	96.4	53.5
11:00 AM - 12:00 PM	58.9	88.1	52.8
12:00 PM - 01:00 PM	58.0	89.9	52.3
01:00 PM - 02:00 PM	58.3	75.6	53.6
02:00 PM - 03:00 PM	58.5	81.0	52.1
03:00 PM - 04:00 PM	57.8	76.5	52.7
04:00 PM - 05:00 PM	60.5	80.2	54.3
05:00 PM - 06:00 PM	59.6	77.2	53.9
06:00 PM - 07:00 PM	60.6	77.1	55.0
07:00 PM - 08:00 PM	62.1	83.2	56.0
08:00 PM - 09:00 PM	59.4	80.7	53.2
09:00 PM - 10:00 PM	56.3	79.7	52.7
10:00 PM - 11:00 PM	54.9	72.3	51.3
11:00 PM - 12:00 AM	54.9	75.1	51.2
12:00 AM - 01:00 AM	54.9	80.0	51.1
01:00 AM - 02:00 AM	55.0	69.9	51.2
02:00 AM - 03:00 AM	54.1	76.6	50.8
03:00 AM - 04:00 AM	53.8	72.0	50.5
04:00 AM - 05:00 AM	55.0	82.7	50.6
05:00 AM - 06:00 AM	55.1	74.6	50.4
06:00 AM - 07:00 AM	60.2	80.2	52.3
07:00 AM - 08:00 AM	63.3	86.0	56.0
08:00 AM - 09:00 AM	60.6	87.4	51.1

Leq Average 24 hrs. (dB(A))	58.9		
Lmax (dB(A))		96.4	
L90 (dB(A))			52.3
Ldn (dB(A))	63.1		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศกระทรวงมหาดไทย เรื่อง กำหนดมาตรฐานระดับเสียงโดยทั่วไป  
2. ประกาศกระทรวงอุตสาหกรรม เรื่อง กำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Technical Management

Thanita K.

Thanita Kulsuriwong  
Scientist (4)

Approved by

Supt S

Supot Salameh  
Section Head

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## Analysis / Test Report



TESTING  
No.0042

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phukdaeng, Rayong Thailand 21140  
P/O : Sm/C212925  
Project Name :  
Project Location :

Lot ID: 2211754  
Date Received : Mar 01, 2022  
Date Reported : Mar 03, 2022  
Report Number: 2247027-1

Page 1 of 1

Sample Number 2211754-7  
Parameter Noise (Leq 24 hrs.)  
Location บ้านไร่โครงการทางพิเศษบ้านกล้วย (N1) (GPS 47P 729205, 1433615)  
Measurement Date Feb 27 - Feb 28, 2022  
Measurement by Santi Chaitana  
Sound Level meter Serial No. 296516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	57.5	87.1	50.1
10:00 AM - 11:00 AM	57.9	87.8	50.5
11:00 AM - 12:00 PM	57.7	77.6	50.1
12:00 PM - 01:00 PM	56.9	82.5	48.9
01:00 PM - 02:00 PM	56.6	73.4	49.9
02:00 PM - 03:00 PM	55.5	72.0	49.0
03:00 PM - 04:00 PM	55.1	71.3	50.4
04:00 PM - 05:00 PM	57.2	79.6	50.8
05:00 PM - 06:00 PM	57.8	82.0	50.5
06:00 PM - 07:00 PM	58.9	83.4	51.4
07:00 PM - 08:00 PM	59.9	77.4	52.6
08:00 PM - 09:00 PM	58.8	75.6	51.6
09:00 PM - 10:00 PM	54.8	71.7	50.3
10:00 PM - 11:00 PM	54.4	71.5	50.0
11:00 PM - 12:00 AM	52.9	73.0	49.5
12:00 AM - 01:00 AM	52.4	71.1	49.3
01:00 AM - 02:00 AM	53.6	70.2	49.6
02:00 AM - 03:00 AM	53.2	69.1	50.1
03:00 AM - 04:00 AM	54.1	76.6	50.0
04:00 AM - 05:00 AM	55.0	74.9	49.5
05:00 AM - 06:00 AM	58.1	81.7	50.2
06:00 AM - 07:00 AM	61.7	82.6	55.0
07:00 AM - 08:00 AM	63.1	77.0	57.5
08:00 AM - 09:00 AM	60.3	78.4	53.9
Leq Average 24 hrs. (dB(A))	57.7		
Lmax (dB(A))		87.8	
L90 (dB(A))			50.1
Ldn (dB(A))	63.0		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2

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

Technical Management

*Thanita K.*

Thanita Kulsuriwong  
Scientist (4)

Approved by

*Supot S.*

Supot Salameh  
Section Head

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# ภาคผนวก ค.4

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คุณภาพน้ำทิ้ง



## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

TESTING  
No.0042  
Lot ID: 21152960  
Date Received : Jan 07, 2022  
Date Reported : Jan 14, 2022  
Report Number : 2205508-1

Page 1 of 1

Sample Number 21152960-2  
Sampled Date Jan 07, 2022 2:31 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Jan 07, 2022  
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
<b>Water Testing</b>							
BOD (5 days at 20 Degree C)	mg/L	-	2	<2	≤500	APHA (2017), 5210 B	Rayong
COD	mg/L	1.5	5	10	≤750	APHA (2017), 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	<5	≤600	APHA (2017), 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	<5	≤600	APHA (2017), 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤10	Based on APHA (2017), 5520 B	Rayong
pH at 25 degree C	-	-	-	7.9	5.5-9.0	Based on APHA (2017), 4500-H (B)	Rayong
Temperature *	Degree C	-	-	31.3	≤45	Based on APHA (2017), 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	2440	≤3000	APHA (2017), 2540 C	Rayong
Total Kjeldahl Nitrogen as N	mg/L	-	1.0	<1.0	≤100	APHA (2017), 4500-Norg (C), NH3 (D)	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤200	APHA (2017), 2540 D	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Tanasit Wongsachai , Panupong Manit

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

Technical Management

N. Banphat

Narumon Banchongkit  
Supervisor  
โทรศัพท์ 0-323-9-9445

Approved by

D. Chamon

Dej Changchon  
Senior Manager  
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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

TESTING  
No.0009  
Lot ID: 21152960  
Date Received : Jan 07, 2022  
Date Reported : Jan 14, 2022  
Report Number : 2205508-2

Page 1 of 1

Sample Number 21152960-2  
Sampled Date Jan 07, 2022 2:31 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Jan 10, 2022  
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
<b>Metals Testing</b>							
Copper	mg/L	0.0003	0.0005	0.02	≤2.0	Based on APHA (2017), 3125	Bangkok
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.2	Based on APHA (2017), 3125	Bangkok
Zinc	mg/L	0.003	0.005	2.02	≤5.0	Based on APHA (2017), 3125	Bangkok

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Tanasit Wongsachai , Panupong Manit

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

Technical Management

Savitree N.

Savitree Naisangiam  
Assistant Manager  
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Approved by

Kanokorn Anek

Kanokorn Anek  
Senior Manager  
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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

TESTING  
No.0009  
Lot ID: 21152960  
Date Received : Jan 07, 2022  
Date Reported : Jan 14, 2022  
Report Number : 2205508-3

Page 1 of 1

Sample Number 21152960-2  
Sample Date Jan 07, 2022 2:31 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Jan 08, 2022  
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
<b>Metals Testing</b>							
Iron	mg/L	0.003	0.005	0.28	≤10.0	Based on APHA (2017), 3125	Bangkok
<b>Water Testing</b>							
Chloride as Cl *	mg/L	0.5	1	565	No Standard	Based on APHA (2017), 4500-Cl(B)	Rayong
Odour *		-	-	Odourless	Non Objectionable	TIS, 257-2549	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Tanasit Wongsachai , Panupong Manit

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

*Sawitree N.*

Sawitree Niamsangiam  
Assistant Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

TESTING  
No.0042  
Lot ID: 222805  
Date Received : Feb 04, 2022  
Date Reported : Feb 11, 2022  
Report Number : 2231933-1

Page 1 of 1

Sample Number 222805-2  
Sample Date Feb 04, 2022 3:26 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Feb 04, 2022  
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
<b>Water Testing</b>							
BOD (5 days at 20 Degree C)	mg/L	-	2	<2	≤500	APHA (2017), 5210 B	Rayong
COD	mg/L	1.5	5	12	≤750	APHA (2017), 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	6	≤600	APHA (2017), 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	6	≤600	APHA (2017), 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤10	Based on APHA (2017), 5520 B	Rayong
pH at 25 degree C		-	-	8.1	5.5-9.0	Based on APHA (2017), 4500-H (B)	Rayong
Temperature *	Degree C	-	-	29.8	≤45	Based on APHA (2017), 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	2530	≤3000	APHA (2017), 2540 C	Rayong
Total Kjeldahl Nitrogen as N	mg/L	-	1.0	<1.0	≤100	APHA (2017), 4500-Norg (C), NH3 (D)	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤200	APHA (2017), 2540 D	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Tanasit Wongsachai , Panupong Manit

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

Technical Management

*N. Banchoangkit*

Narumon Banchoangkit  
Supervisor  
โทรศัพท์ ๖-323-๙-9445

Approved by

*D. Changchon*

Dej Changchon  
Senior Manager  
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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

TESTING  
No.0009  
Lot ID: 222805  
Date Received : Feb 04, 2022  
Date Reported : Feb 11, 2022  
Report Number : 2231933-2

Page 1 of 1

Sample Number 222805-2  
Sample Date Feb 04, 2022 3:26 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Feb 07, 2022  
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
<b>Metals Testing</b>							
Copper	mg/L	0.0003	0.0005	0.03	≤2.0	Based on APHA (2017), 3125	Bangkok
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.2	Based on APHA (2017), 3125	Bangkok
Zinc	mg/L	0.003	0.005	1.15	≤5.0	Based on APHA (2017), 3125	Bangkok

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Tanasit Wongsachai, Panupong Manit

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

*Sawitree N.*

Sawitree Nolsangiam  
Assistant Manager  
โทรศัพท์ 02-204-44709

Approved by

*Kanokkorn Anek*

Kanokkorn Anek  
Senior Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

TESTING  
No.0009  
Lot ID: 222805  
Date Received : Feb 04, 2022  
Date Reported : Feb 11, 2022  
Report Number : 2231933-3

Page 1 of 1

Sample Number 222805-2  
Sample Date Feb 04, 2022 3:26 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Feb 05, 2022  
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
<b>Metals Testing</b>							
Iron	mg/L	0.003	0.005	0.12	≤10.0	Based on APHA (2017), 3125	Bangkok
<b>Water Testing</b>							
Chloride as Cl *	mg/L	0.5	1	593	No Standard	Based on APHA (2017), 4500-Cl(B)	Rayong
Odour *	-	-	-	Odourless	Non Objectionable	TIS, 257-2549	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Tanasit Wongsachai, Panupong Manit

Remark :  
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Approved by

*Sawitree N.*

Sawitree Nolsangiam  
Assistant Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmIC212925  
Project Name :  
Project Location :



TESTING  
No.0042  
**Lot ID: 2218423**  
Date Received : Mar 04, 2022  
Date Reported : Mar 11, 2022  
Report Number : 2258276-1

Page 1 of 1

Sample Number 2218423-2  
Sample Date Mar 04, 2022 2:43 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Mar 04, 2022  
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
<b>Water Testing</b>							
BOD (5 days at 20 Degree C)	mg/L	-	2	<2	≤500	APHA (2017), 5210 B	Rayong
COD	mg/L	1.5	5	<5	≤750	APHA (2017), 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	6	≤600	APHA (2017), 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	5	≤600	APHA (2017), 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤10	Based on APHA (2017), 5520 B	Rayong
pH at 25 degree C	-	-	-	8.1	5.5-9.0	Based on APHA (2017), 4500-H (B)	Rayong
Temperature *	Degree C	-	-	32.6	≤45	Based on APHA (2017), 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	2740	≤3000	APHA (2017), 2540 C	Rayong
Total Kjeldahl Nitrogen as N	mg/L	-	1.0	<1.0	≤100	APHA (2017), 4500-Norg (C), NH3 (D)	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤200	APHA (2017), 2540 D	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Tanasit Wongsachai, Nantawat Sarin

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

Technical Management

N. Banchoit

Narumon Banchoit  
Supervisor  
โทร: 09-00000000 0-323-0-9445

Approved by

D. Chanchon

Dej Chanchon  
Senior Manager  
โทร: 09-00000000 0-323-0-9442

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmIC212925  
Project Name :  
Project Location :



TESTING  
No.0009  
**Lot ID: 2218423**  
Date Received : Mar 04, 2022  
Date Reported : Mar 11, 2022  
Report Number : 2258276-2

Page 1 of 1

Sample Number 2218423-2  
Sample Date Mar 04, 2022 2:43 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Mar 05, 2022  
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
<b>Metals Testing</b>							
Copper	mg/L	0.0003	0.0005	0.02	≤2.0	Based on APHA (2017), 3125	Bangkok
Lead	mg/L	0.0003	0.0005	0.0007	≤0.2	Based on APHA (2017), 3125	Bangkok
Zinc	mg/L	0.003	0.005	1.74	≤5.0	Based on APHA (2017), 3125	Bangkok

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Tanasit Wongsachai, Nantawat Sarin

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

Technical Management

Savitree N.

Savitree Nisangiam  
Assistant Manager  
โทร: 09-00000000 0-204-0-4709

Approved by

Kanokorn Anek

Kanokorn Anek  
Senior Manager  
โทร: 09-00000000 0-204-0-6111

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : Sm/C212925  
Project Name :  
Project Location :

TESTING  
No.0009  
Lot ID: 2218423  
Date Received : Mar 04, 2022  
Date Reported : Mar 11, 2022  
Report Number : 2258276-3

Page 1 of 1

Sample Number 2218423-2  
Sampled Date Mar 04, 2022 2:43 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Mar 05, 2022  
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
<b>Metals Testing</b>							
Iron	mg/L	0.003	0.005	0.06	≤10.0	Based on APHA (2017), 3125	Bangkok
<b>Water Testing</b>							
Chloride as Cl *	mg/L	0.5	1	588	No Standard	Based on APHA (2017), 4500-Cl(B)	Rayong
Odour *	-	-	-	Odourless	Non Objectionable	TIS, 257-2549	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Tanasit Wongsachai, Nantawat Sarin

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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Approved by

*Sawitree N.*

Sawitree Naisangiam  
Assistant Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : Sm/C212925  
Project Name :  
Project Location :

TESTING  
No.0042  
Lot ID: 2226429  
Date Received : Apr 01, 2022  
Date Reported : Apr 08, 2022  
Report Number : 2282083-1

Page 1 of 1

Sample Number 2226429-2  
Sampled Date Apr 01, 2022 3:10 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Apr 01, 2022  
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
<b>Water Testing</b>							
BOD (5 days at 20 Degree C)	mg/L	-	2	<2	≤500	APHA (2017), 5210 B	Rayong
COD	mg/L	1.5	5	7	≤750	APHA (2017), 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	6	≤600	APHA (2017), 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	5	≤600	APHA (2017), 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤10	Based on APHA (2017), 5520 B	Rayong
pH at 25 degree C	-	-	-	7.7	5.5-9.0	Based on APHA (2017), 4500-H (B)	Rayong
Temperature *	Degree C	-	-	31.3	≤45	Based on APHA (2017), 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	2630	≤3000	APHA (2017), 2540 C	Rayong
Total Kjeldahl Nitrogen as N	mg/L	-	1.0	<1.0	≤100	APHA (2017), 4500-Norg (C), NH3 (D)	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤200	APHA (2017), 2540 D	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Tanasit Wongsachai, Nantawat Sarin

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

Technical Management

*N. Banichongkit*

Narumon Banichongkit  
Supervisor  
โทรศัพท์ 0-323-9-9445

Approved by

*D. Changchon*

Dej Changchon  
Senior Manager  
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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location:

TESTING  
No.0009  
Lot ID: 2226429  
Date Received : Apr 01, 2022  
Date Reported : Apr 08, 2022  
Report Number : 2282083-2

Page 1 of 1

Sample Number 2226429-2  
Sampled Date Apr 01, 2022 3:10 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Apr 04, 2022  
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
<b>Metals Testing</b>							
Copper	mg/L	0.0003	0.0005	0.02	≤2.0	Based on APHA (2017), 3125	Bangkok
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.2	Based on APHA (2017), 3125	Bangkok
Zinc	mg/L	0.003	0.005	1.65	≤5.0	Based on APHA (2017), 3125	Bangkok

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant

Sampled By : Tanasit Wongsachai, Nantawat Sarin

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

Technical Management

*Chanatt L.*

Chanattagarn Imchom  
Supervisor  
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Approved by

*Kanokkorn Anek*

Kanokkorn Anek  
Senior Manager  
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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location:

TESTING  
No.0009  
Lot ID: 2226429  
Date Received : Apr 01, 2022  
Date Reported : Apr 08, 2022  
Report Number : 2282083-3

Page 1 of 1

Sample Number 2226429-2  
Sampled Date Apr 01, 2022 3:10 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Apr 02, 2022  
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
<b>Metals Testing</b>							
Iron	mg/L	0.003	0.005	0.08	≤10.0	Based on APHA (2017), 3125	Bangkok
<b>Water Testing</b>							
Chloride as Cl *	mg/L	0.5	1	603	No Standard	Based on APHA (2017), 4500-Cl(B)	Rayong
Odour *		-	-	Odourless	Non Objectionable	TIS, 257-2549	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant

Sampled By : Tanasit Wongsachai, Nantawat Sarin

Remark :  
- LOD : Limit of Detection  
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Approved by

*Chanatt L.*

Chanattagarn Imchom  
Supervisor

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
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P/O : SmtC212925  
Project Name :  
Project Location :



TESTING  
No.0042  
Lot ID: 2239671  
Date Received : May 06, 2022  
Date Reported : May 12, 2022  
Report Number : 2312174-1

Page 1 of 1

Sample Number 2239671-2  
Sampled Date May 06, 2022 3:10 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced May 06, 2022  
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
<b>Water Testing</b>							
BOD (5 days at 20 Degree C)	mg/L	-	2	<2	≤500	APHA (2017), 5210 B	Rayong
COD	mg/L	1.5	5	13	≤750	APHA (2017), 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	<5	≤600	APHA (2017), 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	<5	≤600	APHA (2017), 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤10	Based on APHA (2017), 5520 B	Rayong
pH at 25 degree C		-	-	7.9	5.5-9.0	Based on APHA (2017), 4500-H (B)	Rayong
Temperature *	Degree C	-	-	30.6	≤45	Based on APHA (2017), 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	2460	≤3000	APHA (2017), 2540 C	Rayong
Total Kjeldahl Nitrogen as N	mg/L	-	1.0	<1.0	≤100	APHA (2017), 4500-Norg (C), NH3 (D)	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤200	APHA (2017), 2540 D	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant

Sampled By : Tanasit Wongsachai, Nantawat Sarin

Remark :

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

Technical Management

N. Banphat

Narumon Banchongkit  
Supervisor  
โทร: 09-099-9445

Approved by

D. Changchon

Dej Changchon  
Senior Manager  
โทร: 09-099-9442

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phuaekdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :



TESTING  
No.0009  
Lot ID: 2239671  
Date Received : May 06, 2022  
Date Reported : May 13, 2022  
Report Number : 2312174-2

Page 1 of 1

Sample Number 2239671-2  
Sampled Date May 06, 2022 3:10 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced May 09, 2022  
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
<b>Metals Testing</b>							
Copper	mg/L	0.0003	0.0005	0.04	≤2.0	Based on APHA (2017), 3125	Bangkok
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.2	Based on APHA (2017), 3125	Bangkok
Zinc	mg/L	0.003	0.005	0.49	≤5.0	Based on APHA (2017), 3125	Bangkok

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant

Sampled By : Tanasit Wongsachai, Nantawat Sarin

Remark :

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

Technical Management

Sawitree N.

Sawitree Nisangiam  
Manager  
โทร: 09-099-4709

Approved by

Kanokorn Anek

Kanokorn Anek  
Senior Manager  
โทร: 09-099-6111

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location:

TESTING  
No.0009  
Lot ID: 2239671  
Date Received : May 06, 2022  
Date Reported : May 13, 2022  
Report Number : 2312174-3

Page 1 of 1

Sample Number 2239671-2  
Sampled Date May 06, 2022 3:10 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced May 07, 2022  
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
<b>Metals Testing</b>							
Iron	mg/L	0.003	0.005	0.08	≤10.0	Based on APHA (2017), 3125	Bangkok
<b>Water Testing</b>							
Chloride as Cl *	mg/L	0.5	1	521	No Standard	Based on APHA (2017), 4500-Cl(B)	Rayong
Odour *		-	-	Odourless	Non Objectionable	TIS, 257-2549	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Tanasit Wongsachai, Nantawat Sarin

Remark :  
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Approved by

*Sawitree N.*

Sawitree Nolsangiam  
Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location:

TESTING  
No.0042  
Lot ID: 2266482  
Date Received : Jun 02, 2022  
Date Reported : Jun 10, 2022  
Report Number : 2339932-1

Page 1 of 1

Sample Number 2266482-2  
Sampled Date Jun 02, 2022 2:45 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Jun 02, 2022  
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
<b>Water Testing</b>							
BOD (5 days at 20 Degree C)	mg/L	-	2	<2	≤500	APHA (2017), 5210 B	Rayong
COD	mg/L	1.5	5	6	≤750	APHA (2017), 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	8	≤600	APHA (2017), 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	8	≤600	APHA (2017), 2120 F	Rayong
Oil & Grease	mg/L	-	3	<3	≤10	Based on APHA (2017), 5520 B	Rayong
pH at 25 degree C		-	-	7.7	5.5-9.0	Based on APHA (2017), 4500-H (B)	Rayong
Temperature *	Degree C	-	-	31.1	≤45	Based on APHA (2017), 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	2340	≤3000	APHA (2017), 2540 C	Rayong
Total Kjeldahl Nitrogen as N	mg/L	-	1.0	<1.0	≤100	APHA (2017), 4500-Norg (C), NH3 (D)	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤200	APHA (2017), 2540 D	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Paramet Sattayakun, Thanasoun Namakunna

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

Technical Management

*N. Banchoangkit*

Narumon Banchoangkit  
Supervisor  
หมายเลขโทรศัพท์ 0-323-9-9445

Approved by

*D. Changchon*

Dej Changchon  
Senior Manager  
หมายเลขโทรศัพท์ 0-323-9-9442

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phluakdaeng, Rayong Thailand 21140  
P/O : Sm/C212925  
Project Name :  
Project Location :



TESTING  
No.0009  
Lot ID: 2266482  
Date Received : Jun 02, 2022  
Date Reported : Jun 10, 2022  
Report Number : 2339932-2

Page 1 of 1

Sample Number 2266482-2  
Sampled Date Jun 02, 2022 2:45 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Jun 06, 2022  
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
<b>Metals Testing</b>							
Copper	mg/L	0.0003	0.0005	0.01	≤2.0	Based on APHA (2017), 3125	Bangkok
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.2	Based on APHA (2017), 3125	Bangkok
Zinc	mg/L	0.003	0.005	0.89	≤5.0	Based on APHA (2017), 3125	Bangkok

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Paramet Sattayakun , Thanasoun Namakunna

### Remark :

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

Technical Management

*Sawitree N.*  
Sawitree Nolsangiam  
Manager  
โทร: 02-204-4-4709

Approved by

*Kanokorn Anek*  
Kanokorn Anek  
Senior Manager  
โทร: 02-204-4-6111

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phluakdaeng, Rayong Thailand 21140  
P/O : Sm/C212925  
Project Name :  
Project Location :



TESTING  
No.0009  
Lot ID: 2266482  
Date Received : Jun 02, 2022  
Date Reported : Jun 10, 2022  
Report Number : 2339932-3

Page 1 of 1

Sample Number 2266482-2  
Sampled Date Jun 02, 2022 2:45 PM  
Sample Description Wastewater  
Location Effluent WWTP  
Date Analysis Commenced Jun 06, 2022  
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
<b>Metals Testing</b>							
Iron	mg/L	0.003	0.005	0.14	≤10.0	Based on APHA (2017), 3125	Bangkok
<b>Water Testing</b>							
Chloride as Cl *	mg/L	0.5	1	596	No Standard	Based on APHA (2017), 4500-Cl(B)	Rayong
Odour *	-	-	-	Odourless	Non Objectionable	TIS, 257-2549	Rayong

Guideline : Notification of the Industrial Estate Authority of Thailand No.76, B.E. 2560 : Criteria of wastewater characteristic from factory discharge to central wastewater Treatment Plant  
Sampled By : Paramet Sattayakun , Thanasoun Namakunna

### 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.

Approved by

*Sawitree N.*  
Sawitree Nolsangiam  
Manager

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S:\Reports\AL\_GLP (4-2499)

# ภาคผนวก ค.5

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ความร้อนในสถานที่ทำงาน



## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Puakdaeng, Rayong Thailand  
21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2236472  
Date Received : Apr 28, 2022  
Date Reported : May 03, 2022  
Report Number: 2266489-1

Page 1 of 5

Sample Number	2236472-1				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Apr 28, 2022				
Measurement by	Supot Salamteh				
Location	ปฏิบัติงาน 1 พื้นที่ (ผ้า-บานพับทุก ยู่ปฏิบัติงาน : อุณหภูมิ ห้องผ้า แทน : DD )				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
DD_Dry Drawing Line	120	31.6	29.2	37.3	37.2
Average (WBGT)		31.6			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

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

Technical Management

*Supot S*  
Supot Salamteh  
Section Head

Approved by

*Wichan Ch*  
Wichan Choonharat  
Assistant Manager

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10731-22 / EMAIL

S:\Reports\_Air Heat rpt (3.12PM)



## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Puakdaeng, Rayong Thailand  
21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2236472  
Date Received : Apr 28, 2022  
Date Reported : May 03, 2022  
Report Number: 2266489-1

Page 2 of 5

Sample Number	2236472-2				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Apr 28, 2022				
Measurement by	Supot Salamteh				
Location	ปฏิบัติงาน 1 พื้นที่ (ผ้า-บานพับทุก ยู่ปฏิบัติงาน : อุณหภูมิห้องผ้า แทน : WD )				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
WD_Wet Drawing Line	120	32.6	29.9	38.9	39.0
Average (WBGT)		32.6			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

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

Technical Management

*Supot S*  
Supot Salamteh  
Section Head

Approved by

*Wichan Ch*  
Wichan Choonharat  
Assistant Manager

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S:\Reports\_Air Heat rpt (3.12PM)



## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand  
21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2236472  
Date Received : Apr 28, 2022  
Date Reported : May 03, 2022  
Report Number: 2266489-1

Page 3 of 5

Sample Number	2236472-3				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Apr 28, 2022				
Measurement by	Supot Salamteh				
Location	ปฏิบัติงาน 1 ชั้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : คุณเจริญภา ประเสริฐกร แผนก : ST )				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
ST_Stranding Line	120	32.8	29.8	39.7	39.7
Average (WBGT)		32.8			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

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

Technical Management

*Supot S.*  
Supot Salamteh  
Section Head

Approved by

*Wichan Ch.*  
Wichan Choonharat  
Assistant Manager

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S:\Report\Air Heat\pl (31294)



## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand  
21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2236472  
Date Received : Apr 28, 2022  
Date Reported : May 03, 2022  
Report Number: 2266489-1

Page 4 of 5

Sample Number	2236472-4				
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)				
Measurement Date	Apr 28, 2022				
Measurement by	Supot Salamteh				
Location	ปฏิบัติงาน 1 ชั้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : คุณรัตนชาติ งามสง่า แผนก : RW )				
Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
RW_Rewinding Area	120	28.6	26.9	32.7	32.7
Average (WBGT)		28.6			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

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

Technical Management

*Supot S.*  
Supot Salamteh  
Section Head

Approved by

*Wichan Ch.*  
Wichan Choonharat  
Assistant Manager

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S:\Report\Air Heat\pl (31294)



## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phrakdaeng, Rayong Thailand  
21140  
P/O : SmlC212925  
Project Name :  
Project Location :

Lot ID: 2236472  
Date Received : Apr 28, 2022  
Date Reported : May 03, 2022  
Report Number: 2266489-1

Page 5 of 5

Sample Number 2236472-5  
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)  
Measurement Date Apr 28, 2022  
Measurement by Supot Salamteh  
Location ปลัดขังงาน 1 ชั้นที่ (ห้อง-งานตาก ฝักรับสินค้า : หุตตะนารถ คำช มานะ : RW )

Location	Duration (min)	WGBT (°C)	NWB (°C)	GT (°C)	DB (°C)
RW_Check reel	120	30.9	28.7	36.1	36.0
Average (WGBT)		30.9			
Guideline WGBT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

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

Technical Management

*Supot S*

Supot Salamteh  
Section Head

Approved by

*Wichan Ch*

Wichan Choonharat  
Assistant Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phrakdaeng, Rayong Thailand  
21140  
P/O : SmlC212925  
Project Name :  
Project Location :

Lot ID: 2236469  
Date Received : Apr 28, 2022  
Date Reported : May 03, 2022  
Report Number: 2266481-1

Page 1 of 3

Sample Number 2236469-1  
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)  
Measurement Date Apr 28, 2022  
Measurement by Supot Salamteh  
Location ปลัดขังงาน 1 ชั้นที่ (ห้อง-งานตาก ฝักรับสินค้า : หุตตะนารถ คำช มานะ : PK )

Location	Duration (min)	WGBT (°C)	NWB (°C)	GT (°C)	DB (°C)
PK_Pickling line-H1	120	30.6	28.6	35.3	35.1
Average (WGBT)		30.6			
Guideline WGBT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

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

Technical Management

*Supot S*

Supot Salamteh  
Section Head

Approved by

*Wichan Ch*

Wichan Choonharat  
Assistant Manager

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## Analysis / Test Report

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7/325 Moo 6, Tambol Mabyangporm, Amphur Phuakdaeng, Rayong Thailand  
21140  
P/O : SmiC212925  
Project Name :  
Project Location :

Lot ID: 2236469  
Date Received : Apr 28, 2022  
Date Reported : May 03, 2022  
Report Number: 2266481-1

Page 2 of 3

Sample Number 2236469-2  
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)  
Measurement Date Apr 28, 2022  
Measurement by Supot Salamteh  
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : อุทิศพงษ์ ประเสริฐศรี แทน PT)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
PT_Heating Furnace Line-H2	120	33.9	31.6	39.4	39.1
Average (WBGT)		33.9			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

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

Technical Management

*Supot S.*

Supot Salamteh  
Section Head

Approved by

*Wichan Ch.*

Wichan Choonharat  
Assistant Manager

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SVReport\_Air Heat.rpt ( 4/3796)



## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phuakdaeng, Rayong Thailand  
21140  
P/O : SmiC212925  
Project Name :  
Project Location :

Lot ID: 2236469  
Date Received : Apr 28, 2022  
Date Reported : May 03, 2022  
Report Number: 2266481-1

Page 3 of 3

Sample Number 2236469-3  
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)  
Measurement Date Apr 28, 2022  
Measurement by Supot Salamteh  
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : อุทิศพงษ์ หนูฤกษ์ แทน PT)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
PT_Heating Diffusion Furnace Line-H3	120	33.1	29.6	41.4	40.3
Average (WBGT)		33.1			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

### Guideline:

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

Technical Management

*Supot S.*

Supot Salamteh  
Section Head

Approved by

*Wichan Ch.*

Wichan Choonharat  
Assistant Manager

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SVReport\_Air Heat.rpt ( 4/3796)



# ภาคผนวก ค.6

คุณภาพอากาศในสถานประกอบการ





## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211859  
Date Received : Feb 23, 2022  
Date Reported : Apr 07, 2022  
Report Number : 2215529-1 Rev. No.1

Page 3 of 36

Sample Number 2211859-3  
Sampled Date Feb 22, 2022  
Sample Description Air Quality  
Location DD\_Dry Drawing Line-T1  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Drawn into one filter paper placed in plastic cassette  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
<b>Air Testing</b>									
Total Dust	10:00 AM - 12:00 PM	mg/m3	-	0.15	2.25	15	Based on NIOSH (1994), 0500	OSHA	Rayong

### Guideline :

OSHA : Occupational Safety and Health Administration

Note : This Analysis test report is reissued to supersede report No.2215529-1, Date Reported : Mar 18, 2022 due to revise analytical information.

Sampled By : Saknarin Jaraskay

### Remark :

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

Approved by

*Sawitree N.*

Sawitree Naisangiam  
Assistant Manager

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10731-22/ ENA3



## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211859  
Date Received : Feb 23, 2022  
Date Reported : Apr 07, 2022  
Report Number : 2215529-1 Rev. No.1

Page 8 of 36

Sample Number 2211859-8  
Sampled Date Feb 23, 2022  
Sample Description Air Quality  
Location DD\_Dry Drawing Line-T1  
Personal Sampling กุมภาพันธ์ 2022  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Drawn into one filter paper placed in plastic cassette  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 30.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
<b>Air Testing</b>									
Respirable Dust	10:00 AM - 12:00 PM	mg/m3	-	0.15	<0.15	5	Based on NIOSH (1998), 0600	OSHA	Rayong

### Guideline :

OSHA : Occupational Safety and Health Administration

Note : This Analysis test report is reissued to supersede report No.2215529-1, Date Reported : Mar 18, 2022 due to revise analytical information.

Sampled By : Saknarin Jaraskay

### Remark :

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

Approved by

*Sawitree N.*

Sawitree Naisangiam  
Assistant Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211859  
Date Received : Feb 23, 2022  
Date Reported : Apr 07, 2022  
Report Number : 2215529-1 Rev. No.1

Page 4 of 36

Sample Number 2211859-4  
Sampled Date Feb 22, 2022  
Sample Description Air Quality  
Location PT\_Diffusion Furnace-T2  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Drawn into one filter paper placed in plastic cassette  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Total Dust	10:00 AM - 12:00 PM	mg/m3	-	0.15	0.25	15	Based on NIOSH (1994), OSHA 0500		Rayong

### Guideline :

OSHA : Occupational Safety and Health Administration

Note : This Analysis test report is reissued to supersede report No.2215529-1, Date Reported : Mar 18, 2022 due to revise analytical information.

Sampled By : Saknarin Jaraskay

### Remark :

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

Approved by

*Sawitree N.*

Sawitree Nisangiam  
Assistant Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211859  
Date Received : Feb 23, 2022  
Date Reported : Apr 07, 2022  
Report Number : 2215529-1 Rev. No.1

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Sample Number 2211859-9  
Sampled Date Feb 23, 2022  
Sample Description Air Quality  
Location PT\_Diffusion Furnace-T2  
Personal Sampling อุตสาหกรรม อ่างทอง  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Drawn into one filter paper placed in plastic cassette  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 30.0 °C

Analyte	Sampled Date/time	Unit	LOD	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), OSHA 0600		Rayong

### Guideline :

OSHA : Occupational Safety and Health Administration

Note : This Analysis test report is reissued to supersede report No.2215529-1, Date Reported : Mar 18, 2022 due to revise analytical information.

Sampled By : Saknarin Jaraskay

### Remark :

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

Approved by

*Sawitree N.*

Sawitree Nisangiam  
Assistant Manager

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211859  
Date Received : Feb 23, 2022  
Date Reported : Apr 07, 2022  
Report Number : 2215529-1 Rev. No.1

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Sample Number 2211859-5  
Sampled Date Feb 22, 2022  
Sample Description Air Quality  
Location PT\_Heating Furnace-T3  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Drawn into one filter paper placed in plastic cassette  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
<b>Air Testing</b>									
Total Dust	10:00 AM - 12:00 PM	mg/m3	-	0.15	0.25	15	Based on NIOSH (1994), OSHA 0500		Rayong

**Guideline :**  
OSHA : Occupational Safety and Health Administration  
**Note :** This Analysis test report is reissued to supersede report No.2215529-1, Date Reported : Mar 18, 2022 due to revise analytical information.

**Sampled By :** Saknarin Jaraskay

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

Approved by

*Sawitree N.*

Sawitree Nolsangiam  
Assistant Manager

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P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211859  
Date Received : Feb 23, 2022  
Date Reported : Apr 07, 2022  
Report Number : 2215529-1 Rev. No.1

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Sample Number 2211859-10  
Sampled Date Feb 23, 2022  
Sample Description Air Quality  
Location PT\_Heating Furnace-T3  
Personal Sampling อุตสาหกรรม อุตสาหกรรม  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Drawn into one filter paper placed in plastic cassette  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 30.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
<b>Air Testing</b>									
Respirable Dust	10:00 AM - 12:00 PM	mg/m3	-	0.15	<0.15	5	Based on NIOSH (1998), OSHA 0600		Rayong

**Guideline :**  
OSHA : Occupational Safety and Health Administration  
**Note :** This Analysis test report is reissued to supersede report No.2215529-1, Date Reported : Mar 18, 2022 due to revise analytical information.

**Sampled By :** Saknarin Jaraskay

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

Approved by

*Sawitree N.*

Sawitree Nolsangiam  
Assistant Manager

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P/O : SmfC212925

Project Name :

Project Location :

Lot ID: 2211859

Date Received : Feb 23, 2022

Date Reported : Apr 07, 2022

Report Number : 2215529-1 Rev. No.1

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Sample Number 2211859-13  
Sampled Date Feb 22, 2022  
Sample Description Air Quality  
Location PT\_Diffusion Furnace - T4  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Drawn into one filter paper placed in plastic cassette  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
<b>Air Testing</b>									
Silica (Cristobalite)	10:00 AM - 12:00 PM	mg/m3	-	0.02	<0.020	0.025 (R)	NIOSH (2003), 7500	MOL	Bangkok
Silica (Quartz)	10:00 AM - 12:00 PM	mg/m3	-	0.02	<0.020	0.025 (R)	NIOSH (2003), 7500	MOL	Bangkok
Silica (Tridymite)	10:00 AM - 12:00 PM	mg/m3	-	0.08	<0.080	No Standard	NIOSH (2003), 7500	-	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.2215529-1, Date Reported : Mar 18, 2022 due to revise analytical information.

Sampled By : Saknarin Jaraskay

### Remark :

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

Approved by

*Sawitree N.*

Sawitree Naisangiam  
Assistant Manager

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7/325 Moo 6, Tambol Mabyangpoin, Amphur Phuaakdaeng, Rayong Thailand 21140

P/O : SmfC212925

Project Name :

Project Location :

Lot ID: 2211859

Date Received : Feb 23, 2022

Date Reported : Apr 07, 2022

Report Number : 2215529-1 Rev. No.1

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Sample Number 2211859-1  
Sampled Date Feb 23, 2022  
Sample Description Air Quality  
Location PK\_Pickling line - T5  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Drawn into one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 30.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
<b>Air Testing</b>									
Hydrogen chloride	10:00 AM - 12:00 PM	ppm	-	0.05	<0.05	5(C)	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)

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Sampled By : Saknarin Jaraskay

### Remark :

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

Approved by

*Sawitree N.*

Sawitree Naisangiam  
Assistant Manager

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P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211859  
Date Received : Feb 23, 2022  
Date Reported : Apr 07, 2022  
Report Number : 2215529-1 Rev. No.1

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Sample Number 2211859-14  
Sampled Date Feb 21, 2022  
Sample Description Air Quality  
Location PT\_Plating Line 1 - T6 ไลน์ 1  
Date Analysis Commenced Mar 01, 2022  
Condition of Sample Drawn into one filter paper placed in plastic cassette

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Sodium hydroxide as NaOH	09:30 AM - 11:30 AM	mg/m3	-	0.05	0.09	2	NIOSH (1994), 7401	MOL	Rayong

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)

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Sampled By : Saknarin Jaraskay

Remark :

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Approved by

*Sawitree N.*

Sawitree Nisanglam  
Assistant Manager

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P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211859  
Date Received : Feb 23, 2022  
Date Reported : Apr 07, 2022  
Report Number : 2215529-1 Rev. No.1

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Sample Number 2211859-15  
Sampled Date Feb 21, 2022  
Sample Description Air Quality  
Location PT\_Plating Line 1 - T6 ไลน์ 2  
Date Analysis Commenced Feb 25, 2022  
Condition of Sample Drawn into one filter paper placed in plastic cassette  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Metals Testing									
Copper (Fume)	09:30 AM - 11:30 AM	mg/m3	-	0.001	0.01	0.2	NIOSH (2003), 7301	ACGIH	Bangkok

Guideline :

ACGIH : The American Conference of Governmental Industrial Hygiene, The 6th edition of the Documentation of the Threshold Limit Values and Biological Exposure Indices (2020).

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Sampled By : Saknarin Jaraskay

Remark :

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Approved by

*Sawitree N.*

Sawitree Nisanglam  
Assistant Manager

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P/O : SmfC212925  
Project Name :  
Project Location :

**Lot ID: 2211859**  
Date Received : Feb 23, 2022  
Date Reported : Apr 07, 2022  
Report Number : 2215529-1 Rev. No.1

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Sample Number 2211859-16  
Sampled Date Feb 21, 2022  
Sample Description Air Quality  
Location PT\_Plating Line 1 - T6 3rd 3  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Drawn into one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
<b>Air Testing</b>									
Nitric acid	09:30 AM - 11:30 AM	ppm	-	0.05	<0.05	2	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)

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**Sampled By :** Saknarin Jaraskay

**Remark :**

- LOD : Limit of Detection
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Approved by

*Sawitree N.*

Sawitree Nolsangiam  
Assistant Manager

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P/O : SmfC212925  
Project Name :  
Project Location :

**Lot ID: 2211859**  
Date Received : Feb 23, 2022  
Date Reported : Apr 07, 2022  
Report Number : 2215529-1 Rev. No.1

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Sample Number 2211859-17  
Sampled Date Feb 21, 2022  
Sample Description Air Quality  
Location PT\_Plating Line 1 - T6 3rd 4  
Date Analysis Commenced Feb 24, 2022  
Condition of Sample Drawn into one sorbent tube, refrigerated  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
<b>Air Testing</b>									
Sulfuric acid	09:30 AM - 11:30 AM	mg/m3	-	0.05	0.17	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)

**Note :** This Analysis test report is reissued to supersede report No.2215529-1, Date Reported : Mar 18, 2022 due to revise analytical information.

**Sampled By :** Saknarin Jaraskay

**Remark :**

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Approved by

*Sawitree N.*

Sawitree Nolsangiam  
Assistant Manager

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P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211859  
Date Received : Feb 23, 2022  
Date Reported : Apr 07, 2022  
Report Number : 2215529-1 Rev. No.1

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Sample Number 2211859-18  
Sampled Date Feb 21, 2022  
Sample Description Air Quality  
Location PT\_Plating Line 1 - T6 4x4 5  
Date Analysis Commenced Feb 25, 2022  
Condition of Sample Drawn into one filter paper placed in plastic cassette  
Barometric Pressure 758 mmHg  
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
<b>Metals Testing</b>									
Zinc Oxide (Inhalable dust) (Fume)	09:30 AM - 11:30 AM	mg/m3	-	0.002	0.22	5	NIOSH (2003), 7301	MDL	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)

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Sampled By : Saknarin Jaraskay

### Remark :

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

Approved by

*Sawitree N.*

Sawitree Nisanglam  
Assistant Manager

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7/325 Moo 6, Tambol Mabyangporm, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211863  
Date Received : Feb 24, 2022  
Date Reported : Mar 02, 2022  
Report Number: 2245448-1

Page 1 of 1

Sample Number 2211863-1  
Parameter Noise (Leq 8 hrs.)  
Location PK Pickling Line - C1 (Center Area Operating working)  
Measurement Date Feb 22, 2022  
Measurement by Sawal Tonpho

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:55 AM - 09:55 AM	85.7	90.2	85.2
09:55 AM - 10:55 AM	84.6	93.5	77.2
10:55 AM - 11:55 AM	77.1	87.9	76.5
11:55 AM - 12:55 PM	84.7	92.5	77.1
12:55 PM - 01:55 PM	85.7	92.2	85.3
01:55 PM - 02:55 PM	85.4	89.7	84.9
02:55 PM - 03:55 PM	85.4	87.1	84.9
03:55 PM - 04:55 PM	85.5	92.0	85.1

Leq Average 8 hrs. (dB(A)) 84.8  
Lmax (dB(A)) 93.5  
Standard (dB(A)) 90  
Reference Method : ISO1996-1 and 1996-2  
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรฐานการคุ้มครองความปลอดภัย  
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Technical Management

Thanita K.

Thanita Kulsuriwong  
Scientist (4)

Approved by

Supt S

Supot Salamteh  
Section Head

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P/O : SmfC212925  
Project Name :  
Project Location :

Lot ID: 2211863  
Date Received : Feb 24, 2022  
Date Reported : Mar 02, 2022  
Report Number: 2245449-1

Page 1 of 1

Sample Number 2211863-2  
Parameter Noise (Leq 8 hrs.)  
Location DD Dry Drawing Line - C2 (DDM no.04)  
Measurement Date Feb 22, 2022  
Measurement by Sawal Tonpho

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:35 AM - 09:35 AM	84.1	86.7	83.6
09:35 AM - 10:35 AM	84.5	92.3	82.9
10:35 AM - 11:35 AM	83.0	86.7	82.4
11:35 AM - 12:35 PM	80.5	86.8	72.9
12:35 PM - 01:35 PM	81.3	85.3	73.5
01:35 PM - 02:35 PM	81.6	88.6	80.9
02:35 PM - 03:35 PM	81.2	91.3	79.8
03:35 PM - 04:35 PM	81.1	85.1	73.3

Leq Average 8 hrs. (dB(A)) 82.4  
Lmax (dB(A)) 92.3  
Standard (dB(A)) 90  
Reference Method : ISO1996-1 and 1996-2  
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรฐานการคุ้มครองความปลอดภัย  
ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๔๖

Technical Management

Thanita K.

Thanita Kulsuriwong  
Scientist (4)

Approved by

Supt S

Supot Salamteh  
Section Head

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S:\Reports\Air Noise.rpt ( 9:32AM)



## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211863  
Date Received : Feb 24, 2022  
Date Reported : Mar 02, 2022  
Report Number: 2245450-1

Page 1 of 1

Sample Number 2211863-3  
Parameter Noise (Leq 8 hrs.)  
Location PT\_Plating Line - C5  
Measurement Date Feb 22, 2022  
Measurement by Sawai Tonpho

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:29 AM - 09:29 AM	85.0	93.3	84.8
09:29 AM - 10:29 AM	84.9	87.1	84.7
10:29 AM - 11:29 AM	84.9	90.6	84.8
11:29 AM - 12:29 PM	84.9	90.5	84.7
12:29 PM - 01:29 PM	84.8	90.0	84.0
01:29 PM - 02:29 PM	84.3	87.9	83.8
02:29 PM - 03:29 PM	84.2	86.2	83.8
03:29 PM - 04:29 PM	84.0	86.5	83.6

Leq Average 8 hrs. (dB(A)) 84.6  
Lmax (dB(A)) 93.3  
Standard (dB(A)) 90  
Reference Method : ISO1996-1 and 1996-2  
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรฐานการวัดความดังเสียง  
ในการประกอบกิจการโรงงานเกี่ยวกับสถานะแวดล้อมในการทำงาน พ.ศ.๒๕๖๖

Technical Management

*Thanitak.*

Thanita Kulsuriwong  
Scientist (4)

Approved by

*Supot S.*

Supot Salamteh  
Section Head

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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporn, Amphur Pluakdaeng, Rayong Thailand 21140  
P/O : SmtC212925  
Project Name :  
Project Location :

Lot ID: 2211863  
Date Received : Feb 24, 2022  
Date Reported : Mar 02, 2022  
Report Number: 2245451-1

Page 1 of 1

Sample Number 2211863-4  
Parameter Noise (Leq 8 hrs.)  
Location WD\_Wet Drawing line - C3 (WDM no.237)  
Measurement Date Feb 22, 2022  
Measurement by Sawai Tonpho

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:33 AM - 09:33 AM	88.5	100.0	84.3
09:33 AM - 10:33 AM	88.7	101.4	84.3
10:33 AM - 11:33 AM	87.7	97.6	87.5
11:33 AM - 12:33 PM	87.7	97.6	87.3
12:33 PM - 01:33 PM	87.3	95.5	85.4
01:33 PM - 02:33 PM	87.7	97.7	88.4
02:33 PM - 03:33 PM	86.5	94.6	83.6
03:33 PM - 04:33 PM	88.3	98.2	88.9

Leq Average 8 hrs. (dB(A)) 87.8  
Lmax (dB(A)) 101.4  
Standard (dB(A)) 90  
Reference Method : ISO1996-1 and 1996-2  
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรฐานการวัดความดังเสียง  
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Technical Management

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*Supot S.*

Supot Salamteh  
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## Analysis / Test Report

Client : Sumiden Steel Wire (Thailand) Co., Ltd.  
7/325 Moo 6, Tambol Mabyangporm, Amphur Phuaakdaeng, Rayong Thailand 21140  
P/O : SmlC212925  
Project Name :  
Project Location :

Lot ID: 2211863  
Date Received : Feb 24, 2022  
Date Reported : Mar 02, 2022  
Report Number: 2245452-1

Page 1 of 1

Sample Number : 2211863-5  
Parameter : Noise (Leq 8 hrs.)  
Location : ST\_Stranding line - C4 (RHA no.132)  
Measurement Date : Feb 22, 2022  
Measurement by : Sawal Tonpho

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:42 AM - 09:42 AM	87.3	99.7	86.6
09:42 AM - 10:42 AM	87.7	91.0	87.4
10:42 AM - 11:42 AM	86.7	97.7	86.0
11:42 AM - 12:42 PM	87.1	100.7	86.4
12:42 PM - 01:42 PM	87.1	89.7	86.5
01:42 PM - 02:42 PM	86.7	100.6	85.5
02:42 PM - 03:42 PM	86.8	89.7	86.6
03:42 PM - 04:42 PM	87.0	89.6	86.4

Leq Average 8 hrs. (dB(A))

87.1

Lmax (dB(A))

100.7

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรฐานการวัดของความปลอดภัย  
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Technical Management

*Thanita K.*

Thanita Kulsuriwong  
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Approved by

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Supot Salamteh  
Section Head

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# ภาคผนวก ง

เอกสารการสอบเทียบเครื่องมือตรวจวิเคราะห์



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Stack	Total Suspended Particulate	Console Control Unit	RYG_FS0315	12-Jan-22	12-Jul-22	6
Stack	Total Suspended Particulate	Analytical Balance 4 D.	RYG_EN0003	31-Mar-21	31-Mar-22	12
Stack	Oxides of Nitrogen	Console Control Unit	RYG_FS0315	12-Jan-22	12-Jul-22	6
Stack	Oxides of Nitrogen	Vacuum Gauge	RYG_FS0333	6-Oct-21	6-Apr-23	18
Stack	Oxides of Nitrogen	SPECTROPHOTOMETER	RYG_EN0037	1-Apr-21	1-Oct-22	18
Stack	Sulfur Dioxide	Console Control Unit	RYG_FS0315	12-Jan-22	12-Jul-22	6
Stack	Sulfur Dioxide	Dry Gas	RYG_FS0317	12-Jan-22	12-Jul-22	6
Stack	Hydrogen Chloride	Console Control Unit	RYG_FS0315	12-Jan-22	12-Jul-22	6
Stack	Hydrogen Chloride	Ion Chromatography	BKK_EN0069	12-Jan-22	12-Jan-23	12
Stack	Sulfuric Acid	Console Control Unit	RYG_FS0315	12-Jan-22	12-Jul-22	6
Stack	Copper	Console Control Unit	RYG_FS0315	12-Jan-22	12-Jul-22	6
Stack	Copper	ICP-OES	BKK_EL0037	13-Sep-21	12-Mar-23	18
Stack	Zinc	Console Control Unit	RYG_FS0315	12-Jan-22	12-Jul-22	6
Stack	Zinc	ICP-OES	BKK_EL0037	13-Sep-21	12-Mar-23	18
Ambient	Copper	High Volume	RYG_FS0292	-	-	On site Calibration
Ambient	Copper	High Volume	RYG_FS0395	-	-	On site Calibration
Ambient	Copper	High Volume	RYG_FS0393	-	-	On site Calibration
Ambient	Copper	ICP-OES	BKK_EL0037	13-Sep-21	12-Mar-23	18
Ambient	Zinc	High Volume	RYG_FS0292	-	-	On site Calibration
Ambient	Zinc	High Volume	RYG_FS0395	-	-	On site Calibration
Ambient	Zinc	High Volume	RYG_FS0393	-	-	On site Calibration



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Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Ambient	Zinc	ICP-OES	BKK_EL0037	13-Sep-21	12-Mar-23	18
Ambient	Hydrogen Chloride	Field Rotameter	BKK_FS1004	4-Jan-22	4-Apr-22	3
Ambient	Hydrogen Chloride	Ion Chromatography	BKK_EN0069	12-Jan-22	12-Jan-23	12
Ambient	Sulfuric Acid	Field Rotameter	BKK_FS1004	4-Jan-22	4-Apr-22	3
Ambient	Sulfuric Acid	Ion Chromatography	BKK_EN0069	12-Jan-22	12-Jan-23	12
Workplace	Sodium hydroxide	Field Rotameter	BKK_FS1040	4-Jan-22	4-Apr-22	3
Workplace	Total Dust	Field Rotameter	BKK_FS1040	4-Jan-22	4-Apr-22	3
Workplace	Total Dust	Analytical Balance 5 D.	RYG_EN0004	6-May-21	6-May-22	12
Workplace	Respirable Dust	Field Rotameter	BKK_FS1040	4-Jan-22	4-Apr-22	3
Workplace	Respirable Dust	Analytical Balance 5 D.	RYG_EN0004	6-May-21	6-May-22	12
Workplace	Hydrogen Chloride	Field Rotameter	BKK_FS1004	4-Jan-22	4-Apr-22	3
Workplace	Hydrogen Chloride	Ion Chromatography	BKK_EN0069	12-Jan-22	12-Jan-23	12
Workplace	Copper	Field Rotameter	BKK_FS1040	4-Jan-22	4-Apr-22	3
Workplace	Copper	ICP-OES	BKK_EL0037	13-Sep-21	12-Mar-23	18
Workplace	Zinc	Field Rotameter	BKK_FS1040	4-Jan-22	4-Apr-22	3
Workplace	Zinc	ICP-OES	BKK_EL0037	13-Sep-21	12-Mar-23	18
Workplace	Nitric Acid	Field Rotameter	BKK_FS1004	4-Jan-22	4-Apr-22	3
Workplace	Nitric Acid	Ion Chromatography	BKK_EN0069	12-Jan-22	12-Jan-23	12
Workplace	Silica (Cristobalite)	Field Rotameter	BKK_FS1040	4-Jan-22	4-Apr-22	3
Workplace	Silica (Quartz)	Field Rotameter	BKK_FS1040	4-Jan-22	4-Apr-22	3
Workplace	Silica (Tridymite)	Field Rotameter	BKK_FS1040	4-Jan-22	4-Apr-22	3



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Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Workplace	Sulfuric Acid	Field Rotameter	BKK_FS1004	4-Jan-22	4-Apr-22	3
Workplace	Sulfuric Acid	Ion Chromatography	BKK_EN0069	12-Jan-22	12-Jan-23	12
Noise	Leq 24 hrs	Sound Calibrator	RYG_FS0215	9-Aug-21	9-Aug-22	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0433	21-Jan-22	21-Jan-23	12
Noise	Leq 8 hrs	Sound Calibrator	RYG_FS0215	9-Aug-21	9-Aug-22	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0492	10-Jan-22	10-Jan-23	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0437	6-Aug-21	6-Aug-22	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0491	10-Jan-22	10-Jan-23	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0495	10-Jan-22	10-Jan-23	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0493	10-Jan-22	10-Jan-23	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0357	16-Feb-22	16-Feb-23	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0236	30-Sep-21	30-Sep-22	12
Heat	Heat Stress	Heat Stress Monitor	RYG_FS0237	10-May-21	10-May-22	12
Water Lab	Lead	ICP-MS	BKK_EL0043	30-Sep-21	29-Mar-23	18
Water Lab	Lead	Hot Block	BKK_EL0054	7-Apr-22	7-Oct-23	18
Water Lab	Lead	Chamber (Cold Room)	BKK_EN0167	18-May-21	16-Nov-22	18
Water Lab	Copper	ICP-MS	BKK_EL0043	30-Sep-21	29-Mar-23	18
Water Lab	Copper	Hot Block	BKK_EL0054	7-Apr-22	7-Oct-23	18
Water Lab	Copper	Chamber (Cold Room)	BKK_EN0167	18-May-21	16-Nov-22	18
Water Lab	Zinc	ICP-MS	BKK_EL0043	30-Sep-21	29-Mar-23	18
Water Lab	Zinc	Hot Block	BKK_EL0054	7-Apr-22	7-Oct-23	18



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Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Water Lab	Zinc	Chamber (Cold Room)	BKK_EN0167	18-May-21	16-Nov-22	18
Water Lab	Iron	ICP-MS	BKK_EL0043	30-Sep-21	29-Mar-23	18
Water Lab	Iron	Hot Block	BKK_EL0054	7-Apr-22	7-Oct-23	18
Water Lab	Iron	Chamber (Cold Room)	BKK_EN0167	18-May-21	16-Nov-22	18
Rayong Lab	BOD (5 days at 20°C)	DO meter with Sensor	RYG_EN0140	2-Feb-21	3-Aug-22	18
Rayong Lab	BOD (5 days at 20°C)	Incubator	RYG_EN0154	22-Apr-22	21-Oct-23	18
Rayong Lab	COD	Spectrophotometer	RYG_EN0037	1-Apr-21	1-Oct-22	18
Rayong Lab	Oil & Grease	Electronic Balance	RYG_EN0002	23-Mar-22	23-Mar-23	12
Rayong Lab	Oil & Grease	Chamber Oven	RYG_EN0006	5-May-21	3-Nov-22	18
Rayong Lab	Oil & Grease	Water Bath	RYG_EN0061	5-May-21	3-Nov-22	18
Rayong Lab	pH at 25 oC	pH meter	RYG_EN0183	17-Mar-22	17-Mar-23	12
Rayong Lab	Temperature	Digital Thermometer	RYG_FS0467	7-Jul-21	7-Jul-22	18
Rayong Lab	Total Dissolved Solids 180°C	Electronic Balance	RYG_EN0002	23-Mar-22	23-Mar-23	12
Rayong Lab	Total Dissolved Solids 180°C	Chamber Oven	RYG_EN0010	5-May-21	3-Nov-22	18
Rayong Lab	Total Kjeldahl Nitrogen	Block Digestion Unit	RYG_EN0188	17-Mar-22	17-Mar-23	12
Rayong Lab	Total Kjeldahl Nitrogen	pH Meter	RYG_EN0152	23-Dec-21	23-Dec-22	12
Rayong Lab	Total Suspended Solids	Electronic Balance	RYG_EN0002	23-Mar-22	23-Mar-23	12
Rayong Lab	Total Suspended Solids	Chamber Oven	RYG_EN0010	5-May-21	3-Nov-22	18
Rayong Lab	Chloride	Burette	243007	21-Sep-18	21-Sep-23	60





# CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Calibration Date : 12 Jan 22  
Need Cal. Date : 12 Jul 22

Barometric Pressure (mm.Hg) : 760  
Relative Humidity (%) : 58.3  
Temperature (°C) : 25.0

## Console Control Meter Data

Calibration No. : C-120122-RYG\_FS0315  
Dry Gas Meter No. : RYG\_FS0315  
Console Serial No. : 1708091  
Console Model No. : XC-572-V  
Next Calibration Date : 8 Apr 22

## Reference Dry Gas Meter Data

Serial No. : 1607009  
Model No. : DGM-S125RM-QS8  
Correction Factor (Y) : 1.0060  
Next Calibration Date : 8 Apr 22

ΔH (mmH <sub>2</sub> O)	Θ Minutes	Reference Dry Gas Meter Calibration						Console Control Dry Gas Meter						Dry Gas Meter Correction Factor (Y)	Orifice Calibration Factor ΔH/g
		Vr (Liters)			Tr (°C)			Vr (Liters)			Tr (°C)				
		Final	Initial	Total	Final	Initial	Total	Final	Initial	Total	Final	Initial	Total		
15	12.30	150.00	0.00	150.00	27.0	1274534.0	1274390.0	144.00	27.0	1274534.0	144.00	27.0	1.0464	46.8249	
25	9.45	150.00	0.00	150.00	30.0	1274469.0	1274345.0	144.00	28.0	1274469.0	144.00	28.0	1.0398	46.8395	
50	8.73	150.00	0.00	150.00	30.0	1274443.0	1274380.0	143.00	28.0	1274443.0	143.00	28.0	1.0452	46.8441	
60	5.22	150.00	0.00	150.00	30.0	1275063.0	1274860.0	143.00	30.0	1275063.0	143.00	30.0	1.0471	46.8593	
120	4.27	150.00	0.00	150.00	30.0	1275163.0	1275020.0	143.00	30.0	1275163.0	143.00	30.0	1.0437	46.8730	
													Avg.	45.8412	

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

ΔH/g Orifice pressure differential that equates to 21.24 in of air @ 25 °C and 760 mm of mercury; tolerance for individual values ± 5.08 from average.

Procedure: ISO 91/60 APP A METH. SEC 5.3 & 7

Calibrated by:

(Mr. Wisawat Pulpas)

Field Scientist (3)

Approved by:

(Mr. Wichan Choonharat)

Manager



## DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date : 12-Jan-22		Ambient Temperature (°C) : 24		
Calibration sheet No. : C-120122-RYG_FS0316		Relative Humidity (%) : 58.4		
Digital Temperature ID RYG_FS0316		Reference Temperature ID BKK_FS0809		
Console Serial No. : 1708091		Serial No. : 7688004		
Console Model : XC-572-V		Model : FLUKE 714		
		Next Calibrate : 13 Jan 22		
Location	Reference Temperature °C	Digital Temperature °C	Error °C	Remark
Stack	0	0	0	
	25	27	2	
	50	53	3	
	100	104	4	
	150	154	4	
	200	202	2	
	250	253	3	
	300	304	4	
	500	505	5	
	1000	1003	3	
Probe	1200	1202	2	
	100	104	4	
	125	129	4	
	150	154	4	
Oven	100	104	4	
	125	129	4	
	150	154	4	
Filter	100	104	4	
	125	129	4	
	150	154	4	
Exit	0	0	0	
	10	11	1	
	20	22	2	
Meter	0	0	0	
	25	27	2	
	50	52	2	
AUX	0	0	0	
	25	27	2	
	50	53	3	

Calibrated by:

(Mr. Wisawat Pulpas)

Field Scientist (3)

Approved by:

(Mr. Wichan Choonharat)

Manager

Form 281-016 (04/03/2021)



## PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

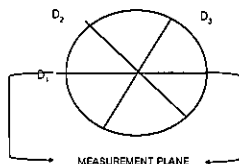
Calibration Date		12 Jan 22		Nozzle Set ID. :		RYG_FS0319	
Calibration Sheet No. : C-120122-RYG_FS0319				Vernier Caliper ID. : BKK_FS0626			
Nozzle ID #	Nozzle Diameter (cm.)			Hi - Lo $\Delta D$	$(D_1 + D_2 + D_3) / 3$ $D_{avg}$		
	$D_1$	$D_2$	$D_3$				
1	0.300	0.300	0.300	0.000	0.300		
2	0.470	0.465	0.465	0.005	0.467		
3	0.600	0.600	0.600	0.000	0.600		
4	0.770	0.760	0.755	0.015	0.762		
5	0.920	0.930	0.930	0.010	0.927		
6	1.080	1.080	1.085	0.005	1.082		
7	1.240	1.220	1.235	0.020	1.232		
8	1.550	1.570	1.540	0.030	1.553		

Where :

D<sub>1</sub>, D<sub>2</sub>, D<sub>3</sub> = Three different nozzle diameters at 60 degrees to each other, each measured the nearest 0.025 mm.

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

D<sub>avg</sub> = (D<sub>1</sub> + D<sub>2</sub> + D<sub>3</sub>) / 3



Calibrated by:

(Mr. Wisawat Pulpas)

Field Scientist (3)

Approved by:

(Mr. Wichan Choonharat)

Manager

Form No. 05 281-016 (11/10/2021)



## Pitot Tube Calibration Data

Pitot Tube Identification Number : RYG\_FS0320  
Lab test duct Number : 258-1-13-01  
Calibration Sheet No. : C-120122-RYG\_FS0320

Calibration Date : 12 Jan 22  
Standard Pitot ID : BKK\_FS0441  
Cp Standard : 0.99

Type S Pitot Tube Coefficient Data					
	Type S pitot tube Leg A,B	Standard pitot tube (ΔP, mm.H <sub>2</sub> O)	Type S pitot tube (ΔP, mm.H <sub>2</sub> O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
Test 2	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
Test 3	A	12.00	16.60	0.842	-
	B	12.00	16.60	-	0.842
			Cp	0.842	0.842

$$C_{p(s)} = C_p \cdot \sqrt{\frac{\Delta P_{(std)}}{\Delta P_{(s)}}}$$

$$\left\{ \bar{C}_{p(A)} - \bar{C}_{p(B)} \right\} \text{ must BE } \leq 0.01$$

$$\sum \left\{ C_p (s) - C_p (A \text{ or } B) \right\}$$

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

Calibrated by:

(Mr. Wisawat Pulpas)

Field Scientist (3)

Approved by:

(Mr. Wichan Choonharat)

Manager

Form 281-016 (04/03/2021)



### Pitot Tube Calibration Data

Pitot Tube Identification Number : RYG\_FS0321 Calibration Date : 12 Jan 22  
Lab test duct Number : 258-1-13-01 Standard Pitot ID : BKK\_FS0441  
Calibration Sheet No. : C-120122-RYG\_FS0321 Cp Standard : 0.99

#### Type S Pitot Tube Coefficient Data

	Type s pitot tube Leg A,B	Standard pitot tube ( $\Delta P$ , mm.H <sub>2</sub> O)	Type s pitot tube ( $\Delta P$ , mm.H <sub>2</sub> O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	16.80	0.842	-
	B	12.00	16.80	-	0.842
Test 2	A	12.00	16.80	0.842	-
	B	12.00	16.80	-	0.842
Test 3	A	12.00	16.80	0.842	-
	B	12.00	16.80	-	0.842
			Cp	0.842	0.842

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

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

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

Calibrated by

*(Signature)*

(Mr.Wasawat Pulphe)

Field Scientist (3)

Approved by

*(Signature)*

Mr.Wichan Choonharat

Manager

Rev 2011-010 124/103/1001

RYG\_EN0003

Sartorius (Thailand) Co., Ltd.  
128 Rama 9 Road, Huayhung, Huayhung, Bangkok 10310  
Tel : +66 2643 8241-4, e-mail: service.thailand@sartorius.com



SARTORIUS

## Certificate of Calibration

REVIEW BY *Thanyata K.*  
APPROVED BY *D. K.*  
NEXT CAL. DATE 31/03/2022

Model Number : MSU224S-100-DU  
Description : Analytical Balance  
Serial Number : 31709552  
Manufacturer : Sartorius

Certificate No. : 218C0111rev1  
Issued Date : Monday, April 26, 2021  
Reference No. : 501627  
Page No. : 1 of 2

Customer Name : ALS Laboratory Group (Thailand) Co., Ltd.(Rayong Branch)  
616/10 Moo 5 T.Maezai Khui, A.Phuakdaeng, Rayong,21140, Thailand.

Calibrated Place : ALS Laboratory Group (Thailand) Co., Ltd.(Balance Room)  
616/10 Moo 5 T.Maezai Khui, A.Phuakdaeng, Rayong,21140, Thailand.

Calibrated By : Mr.Chonchal Inthana  
Calibration Date : Wednesday, March 31, 2021

Calibration Procedure No. : This calibration was conducted by Using in-house calibration procedure number (M-003) Based on UKAS LAB 14

#### Metrological data :

Capacity : 220 g Readability : 0.0001 g

#### Ambients Conditions

Temperature : 24.0 °C ± 5.0 °C

Humidity : 60.0 % RH ± 10.0 % RH

Pressure : ±

#### Reasons for calibration

☐ New Installation ☐ Service / Required ☒ Re-calibration/ Maintenance

Equipment Condition: ☒ Good Operate ☐ Fail

#### Measurement Method UKAS Publication Ref :Lab 14

The measurement uncertainty stated in the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) in 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
YC011-522-00	Sartorius weight set 1mg - 200g E2.YC011-522-00	Sartorius	119934 D-6-19399-01-00	10-Sep-2021
MHB-38250	Humidity/Balometer/Temp. Labon MHB-38250	SPC-RT	C19203076	1-Sep-2021

This certificate is valid 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.

ISO/IEC 17025:2015 2016/03/2020 R2

*(Signature)*  
Mr.Chonchal Inthana(Technical Manager)

S  
T  
A  
M  
P



Sartorius (Thailand) Co., Ltd.  
128 Rama 9 Road, Huayhung, Huayhung, Bangkok 10310  
Tel : +66 2643 8241-4 Fax : +66 2643 4311, e-mail: service.thailand@sartorius.com

SARTORIUS

## Certificate of Calibration

Model Number : MSU224S-100-DU  
Description : Analytical Balance  
Serial Number : 31709552  
Manufacturer : Sartorius

Certificate No. : 218C0111rev1  
Issued Date : Monday, April 26, 2021  
Reference No. : 501627  
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 repeatability.			The off-center loading error is yielded by the difference between the reading of the load, 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (corner method according to OIML R111).		
Nominal Value : (Low Load)	20.0000	200.0001	Nominal value :	50	g
20 g	20.0000	200.0001	Tolerance	0.0004	g
Tolerance	0.0001 g				
	20.0000	200.0000			
	20.0000	200.0001			
	20.0000	200.0001			
Nominal Value : (High Load)	20.0001	200.0001			
200 g	20.0000	200.0002			
Tolerance	0.0001 g				
	20.0001	200.0001			
	20.0000	200.0001			
	20.0000	200.0001			
Standard Deviation	0.00004	0.00005			

#### Linearity

The linearity is also called accuracy 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	0.00012
0.1	0.1000	0.1000	0.0000	0.00012
0.5	0.5000	0.5000	0.0000	0.00012
1	1.0000	1.0000	0.0000	0.00012
5	5.0000	5.0001	0.0001	0.00013
10	10.0000	10.0000	0.0000	0.00013
20	20.0000	20.0000	0.0000	0.00013
50	50.0001	50.0001	0.0000	0.00014
100	100.0001	100.0000	-0.0001	0.00018
200	200.0001	200.0001	0.0000	0.00029

End of Report

ISO/IEC 17025:2015 2016/03/2020 R2

Note : This certificate is replacement with Certificate no.218C0111



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
3344 PATTANAKARN ROAD SOI 11, SUANLIANG, SUANLIANG, BANGKOK 10250  
TEL. 0-2715-3000-24 FAX. 0-2719-9484



## Certificate of Calibration

Certificate No. : 21P3344  
Page : 1 of 2

Equipment : Vacuum Gauge  
Manufacturer : QualityWell  
Model : F221AVD  
Serial No. : VQ02  
ID No. : RYG\_FS0333

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 As-Received: Used Item  
Received Date : 01 October 2021  
Calibration Date : 06 October 2021

Reference : 2110-0066WSC

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

Ambient Temperature : ( 23 ± 2 ) °C

Relative Humidity : ( 50 ± 15 ) %

Atmospheric Pressure : 1009 mbar

104 Phatthanakan 40, Phatthanakan Rd.,  
Khwaeng Phatthanakan, Khel Suan Luang,  
Bangkok 10250 Thailand

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments Standard according to in-house calibration procedure CP-P08, using "DKD-R 6-1" Calibration of Pressure Gauges, Edition 03/2014 " as a guidelines.

#### Condition of this result of calibration

##### 1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Digital Pressure Gauge	15PSIXP21	156670	21P2929	03 Sep 2022
2) This instrument was installed in vertical orientation and center of the dial was used as the reference level.				
3) This result of calibration was made on requested at the point specified by customer.				
4) Scale and conversion factor is 1 kPa = 0.2953 inHg				
5) This instrument was used clean air as pressure media.				
6) The certificate is valid only to the item calibrated on date and place of calibration.				
7) This Certification is traceable to the International System of Unit maintained at:- National Institute of Metrology Thailand (NIMT)				

REVIEW BY *Thanyata P.*  
APPROVED BY *(Signature)*  
NEXT CAL. DATE 6/4/23

Calibrated by : Nopparat Phonang  
Issue Date : 07 October 2021

Approved Signatory : *Atapol P.*  
[ ] Phatnue Prapalpai  
[ ] Sura Suwannarat  
[x] Atapol Panurach

B 0270821

SPC Calibration Center

Part of DKSH Group

Cert No.: 21P3344  
Page: 2 of 2

Result of calibration: Without adjustment  
Function: Vacuum Pressure Measurement  
Range: 0 inHg to -30 inHg  
Scale Interval: 0.5 inHg (The Fifth Estimate)

Applied Pressure (inHg)	0.00	-4.97	-9.97	-14.97	-19.99	-25.02
UUC* Indication (inHg)	0.0	-5.0	-10.0	-15.0	-20.0	-25.0
Error (inHg)	0.00	-0.03	-0.03	-0.03	-0.01	0.02

Decreasing Pressure

Applied Pressure (inHg)	-25.00	-19.97	-14.95	-9.96	-4.97	0.00
UUC* Indication (inHg)	-25.0	-20.0	-15.0	-10.0	-5.0	0.0
Error (inHg)	0.00	-0.03	-0.05	-0.04	-0.03	0.00

The uncertainty of measurement was  $\pm 0.12$  inHg  
\* UUC = Unit Under Calibration  
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 %.

-000-

Attachment P

A 1075036

SPC Calibration Center

Part of DKSH Group

Certificate of Calibration

Equipment: SPECTROPHOTOMETER  
Model: DR6000  
Serial No. (or ID.): 1627845 (RYG\_EN0037)  
Manufacturer: HACH  
Condition: In Condition

Certificate No.: C06210159  
Issued Date: 01 April 2021  
Job No.: KSPR2104738  
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 25.1 °C  $\pm$  0.4 °C  
Humidity 48.8 %RH  $\pm$  3.7 %RH

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

Calibration By: Mr. Chaituphon Folthong  
Calibration Date: 01 April 2021  
The Method used: In house method, SPCC-VI-24, base on ASTM E 275-08 and ASTM E 367-04  
Traceability: This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Slama Scientific Limited.

The standard for Wavelength Certificate No. 87148 and 87152  
The standard for Photometric Certificate No. 87220 and 87139  
The standard for Stray light Certificate No. 87163 and 87161  
The standard for Spectral resolution Certificate No. 87173

(Mr. Chaituphon Folthong)  
Person in charge

(Mr. Dumrong Boonsopon)  
Authorized signatory

The 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 SPC RT Co., Ltd.

SPC RT Co., Ltd.  
115/51 Moo 10, T. Maenam, A. Pluakdaeng, Rayong 21140, Thailand

SPC Calibration Center

Part of DKSH Group

Certificate No.: C06210159  
Page 2 of 3

Calibration Results:  
Without Adjustment

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

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.61	418.4	0.21	0.13
535.66	536.7	-0.04	0.13
637.98	638.3	-0.32	0.14
748.48	748.7	-0.22	0.14
807.03	807.4	-0.37	0.14

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.5890	0.590	-0.0010	0.0045
	0.7616	0.762	-0.0004	0.0045
	1.0263	1.027	-0.0007	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.5787	0.579	-0.0003	0.0045
	0.7442	0.744	0.0002	0.0045
	1.0039	1.004	-0.0001	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.5292	0.530	-0.0008	0.0045
	0.6865	0.687	-0.0005	0.0045
	0.9534	0.954	-0.0006	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.5468	0.546	0.0008	0.0045
	0.6957	0.695	0.0007	0.0045
	0.9991	0.998	0.0011	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.5851	0.584	0.0011	0.0045
	0.7238	0.723	0.0008	0.0045
	1.0957	1.094	0.0017	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.5692	0.568	0.0012	0.0045
	0.6914	0.691	0.0004	0.0045
	1.0881	1.087	0.0011	0.0045

SPC RT Co., Ltd.  
115/51 Moo 10, T. Maenam, A. Pluakdaeng, Rayong 21140, Thailand

SPC Calibration Center

Part of DKSH Group

Certificate No.: C06210159  
Page 3 of 3

Calibration Results:  
Without Adjustment

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0080
	0.7307	0.730	0.0007	0.0080
257 nm	0.0000	0.000	0.0000	0.0080
	0.8516	0.850	0.0016	0.0080
313 nm	0.0000	0.000	0.0000	0.0080
	0.2836	0.285	-0.0014	0.0080
350 nm	0.0000	0.000	0.0000	0.0080
	0.6319	0.629	0.0029	0.0080

Stray light \*

Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%)	Absorbance (A)
260.57 $\pm$ 0.11 nm	260.6	1.5	1.824
392.03 $\pm$ 0.11 nm	392.0	1.5	1.824

The stray light transmission reference is less than 1.0 T(%) and absorbance is greater than 2.0 (A)

Spectral Resolution \*

Nominal Concentration 0.02 % v/v	Peak	Trough	Ratio	SBW
Standard Wavelength (nm)	268.72	266.76	1.39	2.00
UUC: Wavelength (nm)	268.2	266.1		
Std Absorbance (A)	0.4816	0.2797		
Absorbance (A)	0.415	0.300		

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

The End of Certificate

SPC RT Co., Ltd.  
115/51 Moo 10, T. Maenam, A. Pluakdaeng, Rayong 21140, Thailand

## ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: KSPR2104738

ชนิดเครื่องมือ: SPECTROPHOTOMETER

รุ่น: DR6000

หมายเลขเครื่อง: 1627845

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
01 Apr 2021			01 Apr 2021		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด ( ซองใส่ตัวอย่าง, ภายใน-นอกเครื่อง )	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด – เปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		Spectrophotometer			
<input type="checkbox"/>	<input type="checkbox"/>	6. แบตเตอรี่สำรอง (Battery Backup) $\geq 2.5$ VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ส่วนควบคุมความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>	656.1=656.1 nm	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV $< 3,000$ hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible $< 5,000$ hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. ช่องรับหลอดตัวอย่าง (Carousel Module)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		pH Meter and Conductivity Meter			
<input type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด ( Electrode and Connection Cable )	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl )	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดแบบถาวร Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาตั้งอิเล็กโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
		Turbidimeter			
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ทดสอบ (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่งแสงของแสง ( $\geq 2.5$ ไมโคร 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
		Automatic titrator			
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาา Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบจ่ายยาบางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

เซ็นเซอร์แนะนำ :

Mr. Chattaphon Fothong  
Service Engineer

ใบ 16281 016 1-06  
© 3PC CO., LTD.  
วันที่ 08/03/21 154 หมู่ 10 ต.บ้านใหม่ อ.เมือง จ.ขอนแก่น 40000  
โทรศัพท์ 043-2221111 โทรสาร 043-2221112 E-mail: 3pc@3pc.co.th  
3PC 00002 154 So. Wichan Choonharat 17 Sukhavit 101 Road Ban Nuea, Khon Kaen 40000 Thailand



## DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date : 12 Jan 22		Ambient Temperature (°C) : 25		
Calibration sheet No. : C-120122-RYG_FS0317		Relative Humidity (%) : 55		
Digital Temperature ID : RYG_FS0317		Reference Temperature ID: BKK_FS0608		
Serial No. : 1705003		Serial No. : 7585004		
Model : XC-02-CV		Model : FLUKE 714		
		Next Calibrate : 19 Jan 22		
Location	Reference Temperature °C	Digital Temperature °C	Error °C	Remark
Stick	0	0	0	
	25	25	0	
	50	50	0	
	100	100	0	
	150	151	1	
	200	201	1	
Probe	250	251	1	
	300	301	1	
	500	501	1	
	1000	1002	2	
	1200	1203	3	
	100	100	0	
Filter	125	125	0	
	150	151	1	
	100	100	0	
Exit	125	125	0	
	150	151	1	
	0	0	0	
Meter	10	10	0	
	20	20	0	
	0	0	0	
AUX	25	25	0	
	50	50	0	
	0	0	0	
	25	25	0	
	50	50	0	

Calibrated by

(Mr. Warut Pabpa)  
Field Scientist (3)

Approved by

(Mr. Wichan Choonharat)  
Manager

Form 281-012 H (08/03/2021)



## DRY GAS METER CALIBRATION TEST REPORT

Calibration of Date : 12 Jan 22 Barometric Pressure (mm.Hg) : 760  
Next Calibration Date : 12 Jul 22 Relative Humidity (%) : 58.0  
Temperature (°C) : 25.0

**Dry Gas Meter Data**  
Calibration sheet No. : C-120122-RYG\_FS0317  
Dry Gas Meter No. : RYG\_FS0317  
Console Serial No. : 1705003  
Model No. : XC-02-CV

**Reference Dry Gas Meter Data**  
Serial No. : 1607009  
Model No. : DGM-SK25RM-G58  
Correction Factor (Y) : 1.0080  
Next Calibration Date : 6 Apr 22

Reference Dry Gas Meter Calibration				Dry Gas Meter						Dry Gas Meter
Vt (Liters)			Tt	Vm (Liters)			Ti	To	Avg. Tm	Correction
Final	Initial	Total	(°C)	Final	Initial	Total	(°C)	(°C)	(°C)	(%)
30.00	0.00	30.00	28.0	30.11	0.00	30.11	27.0	27.0	27.0	0.9999
30.00	0.00	30.00	28.0	30.10	0.00	30.10	28.0	28.0	28.0	1.0027
30.00	0.00	30.00	28.0	30.35	0.00	30.35	30.0	30.0	30.0	1.0088
30.00	0.00	30.00	28.0	30.20	0.00	30.20	30.0	30.0	30.0	1.0093
30.00	0.00	30.00	28.0	30.35	0.00	30.35	30.0	30.0	30.0	1.0261
30.00	0.00	30.00	28.0	30.00	0.00	30.00	31.0	31.0	31.0	1.0274
Avg.									1.0109	

Y = Ratio of reading of reference dry gas meter to dry gas meter ; tolerance for individual  $\pm 0.02$  from average.

Calibrate by

Mr. Warut Pabpa  
Field Scientist (3)

Approved by

Mr. Wichan Choonharat  
Manager

Form No 281-012 H (08/03/2021)



## Rotameter Calibration Report

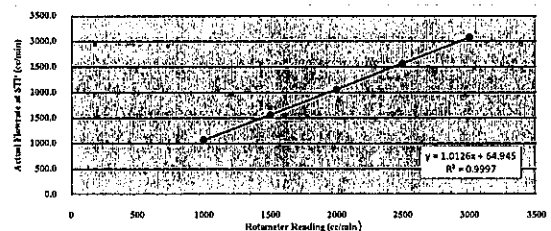
Calibration Date	12 Jan 22	Relative Humidity (%)	58.0
Rotameter ID	RYG_FS0322	Barometric Pressure (mmHg)	760
Calibration Sheet No	C-120122-RYG_FS0322	Temperature (°C)	25.0

## Primary Equipment Data

Brand	Blue	Model	Defender 520 M
Serial No.	120958	ID	RYG_FS0309

## Calibration Data

Rotameter Reading (cc/min)	Actual Flowrate (cc/min)				Actual Flowrate at STP (cc/min)
	1	2	3	Avg.	
1000	1085.0	1073.0	1065.0	1074.3	1074.3
1500	1548.0	1506.0	1565.0	1539.7	1559.6
2000	2065.0	2054.0	2058.0	2059.0	2059.0
2500	2573.0	2569.0	2567.0	2569.7	2569.6
3000	3064.0	3085.0	3085.0	3079.3	3079.3



Calibrated by

(Mr. Warut Pabpa)  
Field Scientist (3)

Approved by

(Mr. Wichan Choonharat)  
Manager

Form 281-012 H (08/03/2021)

## Certificate of System Qualification

### ES-CQ

System ID: MY18010005  
 Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.  
 Organization Location: 104 Phatthanakan 40 Phatthanakan Rd., Bangkok 10250

Date: September 13, 2021 5:49:11 PM  
 EQP Name: Agilent/Recommended  
 EQP Revision: ES.02.50  
 Overall Qualification Status: Pass

#### Preparation

Pass

#### Instrument Tests

Pass

#### Autosampler Operation

Pass

REVIEW BY Thitima B.  
 APPROVED BY Samet N.  
 NEXT CAL DATE 12/11/23

Date: September 13, 2021 5:49:11 PM  
 System ID: MY18010005

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REVIEW BY Autcharawan S.  
 APPROVED BY Samet N.  
 NEXT CAL DATE 12/11/23

## Certificate of Calibration

### ICS-2100: Anion (ID#659)

This certificate is to verify that Instrument below are calibrated  
 by Archemica Lab Co., Ltd.

ICS-2100 S/N: 15010977  
 AS-HV S/N: 5450A36659

For

ALS Laboratory Group (Thailand) Co., Ltd.



Operator Signature: [Signature] Date: Jan 12, 2022  
 (Mr. Thitipong Piromkripuk)  
 Applications Chemist

## Instrument Details

### Purpose

This section describes the as found system configuration.

### Details

#### Spectrometer 1

Manufacturer: Agilent Technologies  
 Name: S100 SVDV  
 Model Number: G8010A  
 Sample Introduction: Double pass glass cyclonic spraychamber and seaspray nebulizer  
 Serial Number: MY18010005  
 Firmware Revision: 5395

#### Chiller 1

Manufacturer: Agilent Technologies  
 Name: Other Unspecified  
 Other Unspecified Name: Chiller  
 Model Number: Other Unspecified  
 Other Unspecified Model Number: G3292-80201  
 Serial Number: 2008-00159

#### Autosampler 1

Manufacturer: Agilent Technologies  
 Name: SPS4  
 Model Number: G8410A  
 Serial Number: AU15440764

#### Switching Valve Accessory 1

Manufacturer: Agilent Technologies  
 Name: SVS 2+  
 Model Number: G8495A  
 Serial Number: AU18040115

Date: September 13, 2021 5:49:11 PM  
 System ID: MY18010005

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## Electronic Signature

### Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and login to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

### Details

Full Name of Signer: Kanyekorn Sutpaibhrajarn  
 Logged On User Name: phlmpaphe.jearaphong@agilent.com  
 Signature Creation Date: September 13, 2021  
 Reason for Signature: Executed protocol and published this original version of document

### Regulatory Disclaimer

This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not assure compliance. Agilent Technologies makes no promises or representations as to its sufficiency for any specific regulatory program.

### Warranty

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Date: September 13, 2021 5:49:11 PM  
 System ID: MY18010005

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User Name: phinapha.jemsphong  
Host Name: ASBKH000328

System ID: MY16010005  
Print Date: September 13, 2021 6:48:12 PM

## Q01WY \$100 ICPOES ALS 04Sep21 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 8, 2021 8:48:59 AM	Auto	Session Closed	Session	None
September 8, 2021 8:49:59 AM	Start	Configuration	Session	None
September 8, 2021 8:49:59 AM	Auto	Entitled	Licensing	User is Field Engineer and does not require an unlock code
September 8, 2021 9:07:06 AM	Auto	EqLoaded	Session	EQP details for primary technique [Eq] - File path: [ProtocolPackage\Config\inst\eq02.0005-02.00.00.exp], EQP File Name: [Eq.02.00.00.exp], EQP Name: [AgilentRecommended]
September 8, 2021 9:07:11 AM	End	Configuration	Session	None
September 8, 2021 9:07:16 AM	Start	Qualification	Session	OQ
September 8, 2021 9:07:16 AM	Start	Execution	Preparation: \$100 SVDV; Qualitative Test - No sample associated	None
September 8, 2021 9:34:36 AM	End	Execution	Preparation: \$100 SVDV; Qualitative Test - No sample associated	Run Count: 1
September 8, 2021 9:34:36 AM	Start	Execution	Instrument Tests: \$100 SVDV; Qualitative Test - No sample associated	None
September 8, 2021 9:51:27 AM	End	Execution	Instrument Tests: \$100 SVDV; Qualitative Test - No sample associated	Run Count: 1

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Date: September 13, 2021 5:48:11 PM  
System ID: MY16010005

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User Name: phinapha.jemsphong  
Host Name: ASBKH000328

System ID: MY16010005  
Print Date: September 13, 2021 6:49:12 PM

## Q01WY \$100 ICPOES ALS 04Sep21 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 8, 2021 6:51:30 AM	Start	Execution	Autosampler Operation: Autosampler 1 - SPS4; Qualitative Test - No sample associated	None
September 8, 2021 6:51:39 AM	End	Execution	Autosampler Operation: Autosampler 1 - SPS4; Qualitative Test - No sample associated	Run Count: 1
September 8, 2021 6:51:53 AM	End	Qualification	Session	OQ
September 8, 2021 6:51:58 AM	Start	Reporting	Session	None
September 8, 2021 10:55:40 AM	Auto	AccClosed	Session	None
September 13, 2021 6:01:28 PM	Auto	AccRestarted	Session	None
September 13, 2021 5:01:28 PM	Auto	Session Reloaded	Session	None
September 13, 2021 5:01:28 PM	Start	Qualification	Session	OQ
September 13, 2021 6:47:36 PM	Auto	Reporting	Session	Report Generated: Certificates

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Date: September 13, 2021 6:49:11 PM  
System ID: MY16010005

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## Agilent CrossLab Compliance

Qualification Type: ES-OQ

System ID: MY16010005

EQP Name: AgilentRecommended

EQP Details: Agilent Technologies System

EQP Revision: ES.02.50

EQP Release Date: March 2020

Date: September 13, 2021 5:50:41 PM

Report Type: Report

Org. Name: ALS Laboratory Group (Thailand) Co., Ltd.

Org. Location: 104 Phatthanakan 40 Phatthanakan Rd., Bangkok 10250

Date: September 13, 2021 5:50:41 PM  
System ID: MY16010005

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Date: September 13, 2021 5:50:41 PM  
System ID: MY16010005

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## Test Summary

### Purpose

This section includes a status for each scheduled test and the overall qualification. For each test that is run, (1) the status is automatically determined based on pre-defined limits, and (2) the total number of times the test was run is displayed. For detailed results and specifications for a test, refer to the test results in this EQR.

### Details

Test	Status	Runs
Preparation : 5100 SVDV	Pass	1
Instrument Tests : 5100 SVDV	Pass	1
Autosampler Operation : Autosampler 1 - SPS4	Pass	1

### Overall Qualification Status

Pass

Date: September 13, 2021 5:50:41 PM  
System ID: MY16010005

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## Service Details

### Purpose

This section includes local contact and delivery details for this service.

### General Details

Service Order No./Request: 6004823273  
EQP Name: Agilent Recommended  
EQP Revision: ES.02.50  
Report Type: Report

### Organization Details

Name: ALS Laboratory Group (Thailand) Co., Ltd.  
Location: 104 Phatthanakan 40 Phatthanakan Rd., Bangkok 10250

### Local Contact Details

Name: Khun Thilina Boonpeng  
Job Title: Scientist 2, Life Sciences  
Qualification Location: ICP Room

### Operator Details

Name: Kanyakorn sukphatrajareem  
Job Title: Field Service Engineer

### Data Acquisition Details

Acquisition Software Name: ICP Expert  
Acquisition Software Revision: 7.5.3.11953

Customer Data System (CDS): ES: ICP Expert

Date: September 13, 2021 5:50:41 PM  
System ID: MY16010005

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## Instrument Details

### Purpose

This section describes the as found system configuration.

### Details

#### Spectrometer 1

Manufacturer: Agilent Technologies  
Name: 5100 SVDV  
Model Number: G8010A  
Sample Introduction: Double pass glass cyclonic spraychamber and neaspray nebulizer  
Serial Number: MY16010005  
Firmware Revision: 5365

#### Chiller 1

Manufacturer: Agilent Technologies  
Name: Other Unspecified  
Other Unspecified Name: Chiller  
Model Number: Other Unspecified  
Other Unspecified Model Number: G3292-80201  
Serial Number: 2006-00159

#### Autosampler 1

Manufacturer: Agilent Technologies  
Name: SPS4  
Model Number: G8410A  
Serial Number: AU15440784

#### Switching Valve Accessory 1

Manufacturer: Agilent Technologies  
Name: SVS 2+  
Model Number: G8485A  
Serial Number: AU15040115

Date: September 13, 2021 5:50:41 PM  
System ID: MY16010005

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## Protocol Details

### Purpose

This section lists the revisions for all test units used in this report. For complete test-specific and high-level change details, refer to the Revision History document.

Test Revision	Test
ES.02.50	Autosampler Operation
ES.02.50	Instrument Tests
ES.02.50	Preparation

Date: September 13, 2021 5:50:41 PM  
System ID: MY16010005

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## Preparation

## Purpose

This test records a status for each preparation task for the Agilent ICP-OES.

## Configuration Details

Model/Serial No.: G8010A MY16010005

## Results

Criteria Observed Result Expected Result Status

Does the plasma ignite successfully in the first three attempts?

Yes Yes Pass

Was the detector calibration performed and completed successfully?

Yes Yes Pass

Was the instrument calibration performed and completed successfully?

Yes Yes Pass

Date: September 13, 2021 5:53:41 PM  
System ID: MY16010005

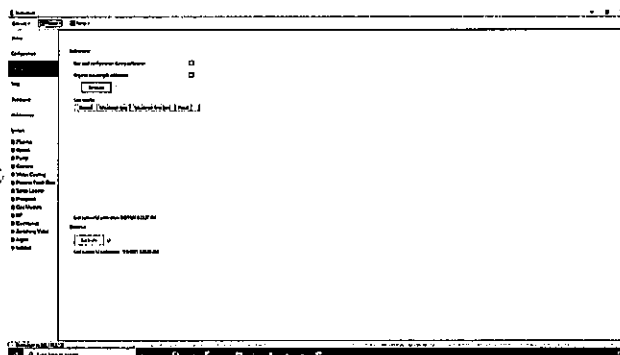
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## Test Evidence

Image Details: Was the detector calibration performed and completed successfully?

Date and Time: September 8, 2021 9:07:42 AM

Host Name: ASBKXW328



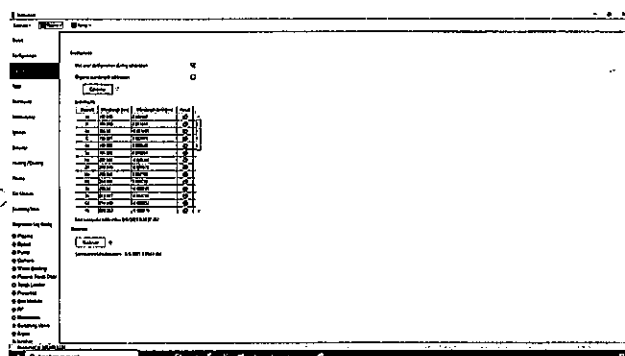
Date: September 13, 2021 5:53:41 PM  
System ID: MY16010005

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Image Details: Was the instrument calibration performed and completed successfully?

Date and Time: September 8, 2021 9:33:00 AM

Host Name: ASBKXW328



## Overall Test Status

Pass Runs: 1

Date: September 13, 2021 5:50:41 PM  
System ID: MY16010005

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## Instrument Tests

## Purpose

This test records a status for each of the automated tests within the Agilent ICP-OES CDS. For detailed test criteria, refer to the attached report.

## Configuration Details

Model/Serial No.: G8010A MY16010005

Results Observed Result Expected Result Status

Are the Functional Tests results within acceptance criteria?

Subsystem Communications

Yes Yes Pass

Air Flow

Yes Yes Pass

Water Flow

Yes Yes Pass

Gas Flows

Yes Yes Pass

RF Generator

Yes Yes Pass

Camera

Yes Yes Pass

Optics

Yes Yes Pass

Are the Instrument Performance Tests results within acceptance criteria?

Resolution

Yes Yes Pass

Sensitivity

Yes Yes Pass

Precision

Yes Yes Pass

## Overall Test Status

Pass Runs: 1

Date: September 13, 2021 5:52:41 PM  
System ID: MY16010005

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## Autosampler Operation

### Purpose

This test verifies that the autosampler operates properly.

### Configuration Details

Model/Serial No: G8410A AU15440784

### Results

Criteria	Observed Result	Expected Result	Status
Does the autosampler successfully move to the specified location(s)?	Yes	Yes	Pass

### Overall Test Status

Pass Runs: 1

Date: September 13, 2021 5:50:41 PM  
System ID: MY16010005

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## Declaration of Change Control

This document is under change control. Revision history is maintained and printed on each document. Access to the master documents is limited to process owners. Documents receive periodic review and cannot be assigned an evergreen status. The qualification performed according to this document refers only to the hardware/software configuration in place at the time of the qualification. Agilent Technologies recommends that instrument configuration change management procedures be in place in order to maintain the validation process. Any changes to the analytical or computer hardware or software must be clearly specified. A change management system provides a means for determining the degree of requalification required according to the extent of the changes made. All details of the changes must be thoroughly recorded and documented, together with details of completed tests and their results. Note: Hardware/software configuration management is the customer's responsibility.

Date: September 13, 2021 5:50:41 PM  
System ID: MY16010005

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## Attachments

Location	Category	Document Name	Page
EQR	General	Certificate of Qualification for ACE	1
EQR	General	Certificate of Qualification for ACE	1
EQR	General	Operator's training certificate and qualifications	1
EQR	Material	Certificate of Analysis Wavelength calibration solution	4
EQR	Comments	General	1
EQR	General	Instrument's Test Report	5
EQR	General	Instrument's Test Report	4

Date: September 13, 2021 5:50:41 PM  
System ID: MY16010005

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### General

Document Name: Certificate of Qualification for ACE



### Agilent Compliance Engine Self Qualification

Date: September 8, 2021 10:10:10 AM  
Drive Serial #: EAFV572 Platform Revision: AGS.01

Individual self-qualification reports for each specific technique installed are also available upon request. They provide additional details on the general report from the concise summary and are structured by the actual algorithms challenged during the process. There is not a one-to-one relationship between algorithms and QC program tests because some algorithms are used by several tests and across multiple similar hardware components of the qualified system.

Technique Type	Tests Completed	Result
UV-Vis Spectrophotometer	13	Conforms
Atomic Absorption	7	Conforms
Capillary Electrophoresis	10	Conforms
Software	6	Conforms
Emission Spectroscopy	3	Conforms
Infrared Spectroscopy	7	Conforms

### Overall Qualification Status

Conforms

Date: September 13, 2021 5:50:41 PM  
System ID: MY16010005

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## General

Document Name: Certificate of Qualification for ACE



## Certificate of Completion

Learner Name: Kanyakorn Sukpatirajorn

Title Of Course: AN-CE-SS-11-050-A1 ACE 3.X User Update Training

Completion Date: June 25, 2020

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations:

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's Safety Alerts, Service Notes, Internal technical updates, update training, course documentation, technical support, course parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

Date: September 13, 2021 5:50:41 PM  
System ID: MY16010005

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## General

Document Name: Operator's training certificate and qualifications



## Certificate of Completion

Learner Name: Kanyakorn Sukpatirajorn

Title Of Course: ANV-CE-ICPOES-3-008-A1 Agilent 5100 ICP-OES Support Neophyte Training

Completion Date: November 2, 2017

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations:

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's Safety Alerts, Service Notes, Internal technical updates, update training, course documentation, technical support, course parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

Date: September 13, 2021 5:50:41 PM  
System ID: MY16010005

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## Materials

Document Name: Certificate of Analysis Wavelength calibration solution



## CERTIFICATE OF ANALYSIS

Agilent Product Name: Wavelength Calibration Solution for ICP-OES & MP-AES 5 µg/L, Multi-  
Agilent Part No: 019060005  
Lot No: 90187841

## Product Specifications

Analysis	Storage Interval	CME	Certified Conc.	Analysis	Storage Interval	CME	Certified Conc.
As	AsHCl	7704272	5.00 ± 0.05 µg/L	Bi	AsHCl	7704272	5.00 ± 0.05 µg/L
Ba	AsHCl	7704272	5.00 ± 0.05 µg/L	Bi	AsHCl	7704272	5.00 ± 0.05 µg/L
Be	AsHCl	7704272	5.00 ± 0.05 µg/L	Bi	AsHCl	7704272	5.00 ± 0.05 µg/L
Ca	AsHCl	7704272	5.00 ± 0.05 µg/L	Bi	AsHCl	7704272	5.00 ± 0.05 µg/L
Co	AsHCl	7704272	5.00 ± 0.05 µg/L	Bi	AsHCl	7704272	5.00 ± 0.05 µg/L
Cd	AsHCl	7704272	5.00 ± 0.05 µg/L	Bi	AsHCl	7704272	5.00 ± 0.05 µg/L
Cu	AsHCl	7704272	5.00 ± 0.05 µg/L	Bi	AsHCl	7704272	5.00 ± 0.05 µg/L
Fe	AsHCl	7704272	5.00 ± 0.05 µg/L	Bi	AsHCl	7704272	5.00 ± 0.05 µg/L
H	AsHCl	7704272	5.00 ± 0.05 µg/L	Bi	AsHCl	7704272	5.00 ± 0.05 µg/L

Matrix: 1% HNO<sub>3</sub>

Intended Use: This solution is intended for use as a certified reference material (CRM) as stated on the label. It is not intended for use as a primary standard or for the determination of analyte concentrations in samples. It is not intended for use as a primary standard or for the determination of analyte concentrations in samples.

Certification & Traceability: This CRM was manufactured under a quality management system that is registered to ISO 9001:2015 and ISO/IEC 17025. The CRM was prepared in the certified concentrations shown above by gravimetric methods using high-purity reagents. The CRM was certified using the "High Performance ICP-OES" method developed by Agilent and is directly traceable to the NIST SRM 863a listed below. This solution was certified using high-purity reagents (99.999%) and stored in 100 mL bottles under nitrogen. The solution used for the preparation of this CRM was calibrated gravimetrically with traceability to NIST. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentrations were determined based upon gravimetric procedures. Secondary verification of the certified concentrations was performed using ICP-OES that was calibrated and the reference against NIST SRM 863a, 863b, 863c, 863d, 863e, 863f, 863g, 863h, 863i, 863j, 863k, 863l, 863m, 863n, 863o, 863p, 863q, 863r, 863s, 863t, 863u, 863v, 863w, 863x, 863y, 863z, 863aa, 863ab, 863ac, 863ad, 863ae, 863af, 863ag, 863ah, 863ai, 863aj, 863ak, 863al, 863am, 863an, 863ao, 863ap, 863aq, 863ar, 863as, 863at, 863au, 863av, 863aw, 863ax, 863ay, 863az, 863ba, 863bb, 863bc, 863bd, 863be, 863bf, 863bg, 863bh, 863bi, 863bj, 863bk, 863bl, 863bm, 863bn, 863bo, 863bp, 863bq, 863br, 863bs, 863bt, 863bu, 863bv, 863bw, 863bx, 863by, 863bz, 863ca, 863cb, 863cc, 863cd, 863ce, 863cf, 863cg, 863ch, 863ci, 863cj, 863ck, 863cl, 863cm, 863cn, 863co, 863cp, 863cq, 863cr, 863cs, 863ct, 863cu, 863cv, 863cw, 863cx, 863cy, 863cz, 863da, 863db, 863dc, 863dd, 863de, 863df, 863dg, 863dh, 863di, 863dj, 863dk, 863dl, 863dm, 863dn, 863do, 863dp, 863dq, 863dr, 863ds, 863dt, 863du, 863dv, 863dw, 863dx, 863dy, 863dz, 863ea, 863eb, 863ec, 863ed, 863ee, 863ef, 863eg, 863eh, 863ei, 863ej, 863ek, 863el, 863em, 863en, 863eo, 863ep, 863eq, 863er, 863es, 863et, 863eu, 863ev, 863ew, 863ex, 863ey, 863ez, 863fa, 863fb, 863fc, 863fd, 863fe, 863ff, 863fg, 863fh, 863fi, 863fj, 863fk, 863fl, 863fm, 863fn, 863fo, 863fp, 863fq, 863fr, 863fs, 863ft, 863fu, 863fv, 863fw, 863fx, 863fy, 863fz, 863ga, 863gb, 863gc, 863gd, 863ge, 863gf, 863gg, 863gh, 863gi, 863gj, 863gk, 863gl, 863gm, 863gn, 863go, 863gp, 863gq, 863gr, 863gs, 863gt, 863gu, 863gv, 863gw, 863gx, 863gy, 863gz, 863ha, 863hb, 863hc, 863hd, 863he, 863hf, 863hg, 863hi, 863hj, 863hk, 863hl, 863hm, 863hn, 863ho, 863hp, 863hq, 863hr, 863hs, 863ht, 863hu, 863hv, 863hw, 863hx, 863hy, 863hz, 863ia, 863ib, 863ic, 863id, 863ie, 863if, 863ig, 863ih, 863ii, 863ij, 863ik, 863il, 863im, 863in, 863io, 863ip, 863iq, 863ir, 863is, 863it, 863iu, 863iv, 863iw, 863ix, 863iy, 863iz, 863ja, 863jb, 863jc, 863jd, 863je, 863jf, 863jg, 863jh, 863ji, 863jj, 863jk, 863jl, 863jm, 863jn, 863jo, 863jp, 863jq, 863jr, 863js, 863jt, 863ju, 863jv, 863jw, 863jx, 863jy, 863jz, 863ka, 863kb, 863kc, 863kd, 863ke, 863kf, 863kg, 863kh, 863ki, 863kj, 863kk, 863kl, 863km, 863kn, 863ko, 863kp, 863kq, 863kr, 863ks, 863kt, 863ku, 863kv, 863kw, 863kx, 863ky, 863kz, 863la, 863lb, 863lc, 863ld, 863le, 863lf, 863lg, 863lh, 863li, 863lj, 863lk, 863ll, 863lm, 863ln, 863lo, 863lp, 863lq, 863lr, 863ls, 863lt, 863lu, 863lv, 863lw, 863lx, 863ly, 863lz, 863ma, 863mb, 863mc, 863md, 863me, 863mf, 863mg, 863mh, 863mi, 863mj, 863mk, 863ml, 863mm, 863mn, 863mo, 863mp, 863mq, 863mr, 863ms, 863mt, 863mu, 863mv, 863mw, 863mx, 863my, 863mz, 863na, 863nb, 863nc, 863nd, 863ne, 863nf, 863ng, 863nh, 863ni, 863nj, 863nk, 863nl, 863nm, 863nn, 863no, 863np, 863nq, 863nr, 863ns, 863nt, 863nu, 863nv, 863nw, 863nx, 863ny, 863nz, 863oa, 863ob, 863oc, 863od, 863oe, 863of, 863og, 863oh, 863oi, 863oj, 863ok, 863ol, 863om, 863on, 863oo, 863op, 863oq, 863or, 863os, 863ot, 863ou, 863ov, 863ow, 863ox, 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863zy, 863zz

Intended Use: This solution is intended for use as a certified reference material (CRM) as stated on the label. It is not intended for use as a primary standard or for the determination of analyte concentrations in samples. It is not intended for use as a primary standard or for the determination of analyte concentrations in samples.

Certification & Traceability: This CRM was manufactured under a quality management system that is registered to ISO 9001:2015 and ISO/IEC 17025. The CRM was prepared in the certified concentrations shown above by gravimetric methods using high-purity reagents. The CRM was certified using the "High Performance ICP-OES" method developed by Agilent and is directly traceable to the NIST SRM 863a listed below. This solution was certified using high-purity reagents (99.999%) and stored in 100 mL bottles under nitrogen. The solution used for the preparation of this CRM was calibrated gravimetrically with traceability to NIST. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentrations were determined based upon gravimetric procedures. Secondary verification of the certified concentrations was performed using ICP-OES that was calibrated and the reference against NIST SRM 863a, 863b, 863c, 863d, 863e, 863f, 863g, 863h, 863i, 863j, 863k, 863l, 863m, 863n, 863o, 863p, 863q, 863r, 863s, 863t, 863u, 863v, 863w, 863x, 863y, 863z, 863aa, 863ab, 863ac, 863ad, 863ae, 863af, 863ag, 863ah, 863ai, 863aj, 863ak, 863al, 863am, 863an, 863ao, 863ap, 863aq, 863ar, 863as, 863at, 863au, 863av, 863aw, 863ax, 863ay, 863az, 863ba, 863bb, 863bc, 863bd, 863be, 863bf, 863bg, 863bh, 863bi, 863bj, 863bk, 863bl, 863bm, 863bn, 863bo, 863bp, 863bq, 863br, 863bs, 863bt, 863bu, 863bv, 863bw, 863bx, 863by, 863bz, 863ca, 863cb, 863cc, 863cd, 863ce, 863cf, 863cg, 863ch, 863ci, 863cj, 863ck, 863cl, 863cm, 863cn, 863co, 863cp, 863cq, 863cr, 863cs, 863ct, 863cu, 863cv, 863cw, 863cx, 863cy, 863cz, 863da, 863db, 863dc, 863dd, 863de, 863df, 863dg, 863dh, 863di, 863dj, 863dk, 863dl, 863dm, 863dn, 863do, 863dp, 863dq, 863dr, 863ds, 863dt, 863du, 863dv, 863dw, 863dx, 863dy, 863dz, 863ea, 863eb, 863ec, 863ed, 863ee, 863ef, 863eg, 863eh, 863ei, 863ej, 863ek, 863el, 863em, 863en, 863eo, 863ep, 863eq, 863er, 863es, 863et, 863eu, 863ev, 863ew, 863ex, 863ey, 863ez, 863fa, 863fb, 863fc, 863fd, 863fe, 863ff, 863fg, 863fh, 863fi, 863fj, 863fk, 863fl, 863fm, 863fn, 863fo, 863fp, 863fq, 863fr, 863fs, 863ft, 863fu, 863fv, 863fw, 863fx, 863fy, 863fz, 863ga, 863gb, 863gc, 863gd, 863ge, 863gf, 863gg, 863gh, 863gi, 863gj, 863gk, 863gl, 863gm, 863gn, 863go, 863gp, 863gq, 863gr, 863gs, 863gt, 863gu, 863gv, 863gw, 863gx, 863gy, 863gz, 863ha, 863hb, 863hc, 863hd, 863he, 863hf, 863hg, 863hi, 863hj, 863hk, 863hl, 863hm, 863hn, 863ho, 863hp, 863hq, 863hr, 863hs, 863ht, 863hu, 863hv, 863hw, 863hx, 863hy, 863hz, 863ia, 863ib, 863ic, 863id, 863ie, 863if, 863ig, 863ih, 863ii, 863ij, 863ik, 863il, 863im, 863in, 863io, 863ip, 863iq, 863ir, 863is, 863it, 863iu, 863iv, 863iw, 863ix, 863iy, 863iz, 863ja, 863jb, 863jc, 863jd, 863je, 863jf, 863jg, 863jh, 863ji, 863jj, 863jk, 863jl, 863jm, 863jn, 863jo, 863jp, 863jq, 863jr, 863js, 863jt, 863ju, 863jv, 863jw, 863jx, 863jy, 863jz, 863ka, 863kb, 863kc, 863kd, 863ke, 863kf, 863kg, 863kh, 863ki, 863kj, 863kk, 863kl, 863km, 863kn, 863ko, 863kp, 863kq, 863kr, 863ks, 863kt, 863ku, 863kv, 863kw, 863kx, 863ky, 863kz, 863la, 863lb, 863lc, 863ld, 863le, 863lf, 863lg, 863lh, 863li, 863lj, 863lk, 863ll, 863lm, 863ln, 863lo, 863lp, 863lq, 863lr, 863ls, 863lt, 863lu, 863lv, 863lw, 863lx, 863ly, 863lz, 863ma, 863mb, 863mc, 863md, 863me, 863mf, 863mg, 863mh, 863mi, 863mj, 863mk, 863ml, 863mm, 863mn, 863mo, 863mp, 863mq, 863mr, 863ms, 863mt, 863mu, 863mv, 863mw, 863mx, 863my, 863mz, 863na, 863nb, 863nc, 863nd, 863ne, 863nf, 863ng, 863nh, 863ni, 863nj, 863nk, 863nl, 863nm, 863nn, 863no, 863np, 863nq, 863nr, 863ns, 863nt, 863nu, 863nv, 863nw, 863nx, 863ny, 863nz, 863oa, 863ob, 863oc, 863od, 863oe, 863of, 863og, 863oh, 863oi, 863oj, 863ok, 863ol, 863om, 863on, 863oo, 863op, 863oq, 863or, 863os, 863ot, 863ou, 863ov, 863ow, 863ox, 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863ul, 863um, 863un, 863uo, 863up, 863uq, 863ur, 863us, 863ut, 863uu, 863uv, 863uw, 863ux, 863uy, 863uz, 863va, 863vb, 863vc, 863vd, 863ve, 863vf, 863vg, 863vh, 863vi, 863vj, 863vk, 863vl, 863vm, 863vn, 863vo, 863vp, 863vq, 863vr, 863vs, 863vt, 863vu, 863vv, 863vw, 863vx, 863vy, 863vz, 863wa, 863wb, 863wc, 863wd, 863we, 863wf, 863wg, 863wh, 863wi, 863wj, 863wk, 863wl, 863wm, 863wn, 863wo, 863wp, 863wq, 863wr, 863ws, 863wt, 863wu, 863wv, 863ww, 863wx, 863wy, 863wz, 863xa, 863xb, 863xc, 863xd, 863xe, 863xf, 863xg, 863xh, 863xi, 863xj, 863xk, 863xl, 863xm, 863xn, 863xo, 863xp, 863xq, 863xr, 863xs, 863xt, 863xu, 863xv, 863xw, 863xx, 863xy, 863xz, 863ya, 863yb, 863yc, 863yd, 863ye, 863yf, 863yg, 863yh, 863yi, 863yj, 863yk, 863yl, 863ym, 863yn, 863yo, 863yp, 863yq, 863yr, 863ys, 863yt, 863yu, 863yv, 863yw, 863yx, 863yy, 863yz, 863za, 863zb, 863zc, 863zd, 863ze, 863zf, 863zg, 863zh, 863zi, 863zj, 863zk, 863zl, 863zm, 863zn, 863zo, 863zp, 863zq, 863zr, 863zs, 863zt, 863zu, 863zv, 863zw, 863zx, 863zy, 863zz

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## Document Name:

Certificate of Analysis Wavelength calibration solution



Period of Validity: Agilent warrants the accuracy of this solution until the expiration date shown below, provided the instructions for use are followed. During the period of validity, the purchase will be refunded if the product is recalled due to a significant change in the quality of the solution.

Date of release: 4 April 2005  
Date of expiration: 4 October 2015

Signature:   
Charles H. Smith, Quality Control

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System ID: MY16010005

Document Name: Certificate of Analysis Wavelength calibration solution



Wasted Information: Inher in the Safety Net The 2002, which can be viewed at [www.safetynet.org](http://www.safetynet.org)

**Biostatistics:** This solution was developed to be language neutral by providing instructions with the requirements of ICD 10CM and ICD 10CM 25. Specific examples of the selected solution were analyzed in relation to human parsing, to support with QIP 8-10.

**Assessment of Human and Biostatistics:** To ensure human parsing, users should not take a smaller sub-sample than specified in the instructions. In fact, as doing so will introduce for medical review and interpretation.

**Further information:** These services apply to hotels licensed to accept pets (LHA).

**Revised Exhibit Index:** This Exhibit was prepared for a meeting concerning the proposed rule:

- **Repealed in 1981 (1) – The Management System – Requirements (29 USC 203, Part 164, 169, 223)**
- **Amended in 1982 (1704) – Revised Proposal on the For the Components of Performance of Products (29 USC 203, Part 164, 169, 223)**
- **20 USC 1704 (a) amended and requirements specified in 1982 (1704, 213) and 1982 (1704, 213)**
- **Amended in 1982 (1704) – General Requirements for the Components of Training and Evaluation (29 USC 203, Part 164, 169, 223)**

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### Comments

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Test:	General
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Comment	Start OQ on 08 Sep 21 and found water flow fail. So repair job complete for 13 Sep 21 and OQ continue to complete.
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## General

Document Name: Instrument's Test Report

<b>Report Summary</b>	
Instrument Model	Agilent 51009110 BVDV ICP-OES
Instrument ID	Q821AQN001AA
Instrument Serial Number	MY1010005
Software Version	7.8.3.11953
Firmware Version	8395
Tested By	Kanyasom S.
Test started on	9/8/2021 9:52:21 AM
Test Completed On	9/8/2021 9:56:35 AM

### Result Summary

Subsystem Communications Test	Pass
Air Flow Test	Skipped
Water Flow Test	Skipped
Gas Flow Test	Skipped
HF Generator Test	Skipped
Camera Test	Skipped
Optic Test	Pass
Advanced Valve System Test	Skipped
Resolution Test	Pass
Sensitivity Test	Pass
Precision Test	Pass

### Subsystem Communications Test

\*\*\*\*\*

**Optics Test**

	Radial	Axial	SVDV
Intensity	3382178	3102050	3418203
Wavelength	737.212	737.212	737.212

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Document Name:

Instrument's Test Report

## Resolution Test

Element Wavelength	Specification	Pass
N (174.233 nm)	± 0.42	7.84
As (184.960 nm)	± 0.20	0.43
C (189.027 nm)	± 11.50	0.80
Mo (202.032 nm)	± 0.20	0.50
Cr (206.136 nm)	± 13.40	11.00
Zn (213.857 nm)	± 0.70	7.27
Pb (220.353 nm)	± 0.50	7.53
Cd (226.481 nm)	± 17.20	12.66
Bi (230.424 nm)	± 0.40	7.90
Mn (257.610 nm)	± 13.30	0.99
Mn (280.598 nm)	± 20.30	10.63
Cr (287.716 nm)	± 11.00	0.93
Cu (324.754 nm)	± 25.00	10.14
Cu (327.389 nm)	± 11.20	11.78
Se (358.371 nm)	± 32.50	28.94
Se (465.408 nm)	± 44.00	33.57
Se (465.733 nm)	± 30.00	22.30
Se (493.408 nm)	± 36.00	25.56
Se (514.171 nm)	± 42.00	28.49
As (575.282 nm)	± 74.00	60.58
K (766.491 nm)	± 80.00	66.42

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Document Name:

Instrument's Test Report

## Sensitivity Test

Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (184.960 nm)	± 46.0	SPDR	88.3	260.1	94.9
Se (189.027 nm)	± 41.0	SPDR	55.5	706.4	113.8
Zn (213.857 nm)	± 942.0	SPDR	2705.3	26874.4	187.9
Pb (220.353 nm)	± 46.0	SPDR	106.8	1262.6	152.2
Mn (257.610 nm)	± 3419.0	SPDR	6641.7	127413.8	365.9
Al (306.136 nm)	± 5.4	SPDR	8.8	24237.9	3091.8
Se (493.408 nm)	± 34.0	SPDR	88.1	1015415.8	10563.7
K (766.491 nm)	± 1.8	SPDR	4.4	32043.9	15521.8

## Aval

Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (184.960 nm)	± 208.0	SPDR	292.4	5109.9	273.5
Se (189.027 nm)	± 159.0	SPDR	199.9	3103.2	321.0
Zn (213.857 nm)	± 243.0	SPDR	793.8	12458.9	257.0
Zn (213.857 nm)	± 1743.0	SPDR	4924.8	132552.8	696.4
Cd (226.481 nm)	± 4237.0	SPDR	4006.8	87692.4	374.1
Pb (220.353 nm)	± 320.0	SPDR	327.0	7635.1	1403.3
Mn (257.610 nm)	± 10625.0	SPDR	19008.6	652891.5	1104.7
Cr (287.716 nm)	± 1048.0	SPDR	4116.3	173999.0	1791.8
Cu (324.754 nm)	± 19.0	SPDR	48.8	185353.3	3090.0
Al (306.136 nm)	± 6.0	SPDR	16.7	150452.6	3877.6
Se (493.408 nm)	± 56.0	SPDR	188.0	637407.7	31797.6
K (766.491 nm)	± 24.0	SPDR	84.8	2636127.0	28544.8

## Precision Test

Element Wavelength	Specification	Measured Value % RSD
As (184.960 nm)	± 2.80	1.06
Se (189.027 nm)	± 2.50	1.58
Zn (213.857 nm)	± 1.50	0.62
Pb (220.353 nm)	± 2.40	0.72
Mn (257.610 nm)	± 1.50	0.44

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Document Name:

Instrument's Test Report

N (174.233 nm)	± 1.50	0.45
As (184.960 nm)	± 1.50	0.48
K (766.491 nm)	± 1.50	0.34

Element Wavelength	Specification	Measured Value % RSD
As (184.960 nm)	± 1.50	0.84
Se (189.027 nm)	± 1.50	0.58
Zn (213.857 nm)	± 1.50	0.59
Zn (213.857 nm)	± 1.50	0.38
Cd (226.481 nm)	± 1.50	0.30
Pb (220.353 nm)	± 1.50	0.47
Mn (257.610 nm)	± 1.50	0.78
Cr (287.716 nm)	± 1.50	0.30
Cu (324.754 nm)	± 1.50	0.46
Al (306.136 nm)	± 1.50	0.33
Se (493.408 nm)	± 1.50	0.50
K (766.491 nm)	± 1.50	0.46

## Report Details

Test Run - Operator: Kanyiam B.

Subsystem Communications Test - Started

Subsystem - Status

Main Power Module - Passed

Gas Control Module - Passed

RF Generator - Passed

Photo-diode Module - Passed

Optical Camera Control Module - Passed

Peristaltic Pump - Passed

Subsystem Communications Test Completed - Passed

Optics Test - Started

Test View Mode Interfaces Status

LED Off - Passed

Shutter opened - Passed

Peak Intensity Ratio mode 202176.14 - Passed

Shutter closed - Passed

Peak Intensity (folded shutter) Ratio mode 58.00 - Passed

Shutter opened - Passed

Optical Argon Ratio - Calculated Value = 0.58, Ratio Value = 2.30

Peak Intensity Ratio mode 315526.49 - Passed

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Document Name:

Instrument's Test Report

Radial-Axis Intensity Ratio (Range 0-100) - 1.03 - Passed  
Peak Intensity Simultaneous mode 3418267.63 - Passed  
Shutter closed - Passed  
Optics Test Completed - Passed  
Instrument Performance - Started  
Instrument Performance Completed - Passed

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System ID: MY16010005

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## General

Document Name: Instrument's Test Report

## Report Summary

Instrument Model Agilent 8100S110 SYOV KCP-DES  
Instrument ID 0801DAG001A  
Instrument Serial Number MY16010005  
Software Version 7.5.3.11893  
Firmware Version 0395  
Tested By Kanyashu S.  
Test started on 8/13/2021 8:39:46 PM  
Test Completed On 8/13/2021 8:49:00 PM

## Result Summary

Subsystem Communications Test	Pass
Air Flow Test	Pass
Water Flow Test	Pass
Gas Flow Test	Pass
RF Generator Test	Pass
Camera Test	Pass
Optics Test	Pass
Advanced Valve System Test	Skipped
Resolution Test	Skipped
Sensitivity Test	Skipped
Precision Test	Skipped

Subsystem Communications Test Pass

Air Flow Test Pass

30% Air Flow (relative speed)	50% Air Flow (relative speed)
11.00	15.00

Water Flow Test Pass

RF Water Flow (L/min)	Camera Water Flow (L/min)	Water inlet Temperature (°C)
1.21	1.14	23.01

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Document Name: Instrument's Test Report

## Gas Flow Test Pass

Subsidiary	Actual Flow	Back Pressure	Auxiliary	Actual Flow	Back Pressure
Target Flow	0.71	278.73	Target Flow	2.00	168.21
Actual Flow	0.70	278.73	Actual Flow	2.00	168.21

Makaps	Actual Flow	Back Pressure	Plasma	Actual Flow	Back Pressure
Target Flow	2.00	126.83	Target Flow	17.98	19.78
Actual Flow	2.00	126.83	Actual Flow	17.98	19.78

## RF Generator Test Pass

RF Power Supply Test	Passed
RF Power Supply (V)	130.332
RF Oscillator Test	Passed
RF Oscillator Frequency (MHz)	25.917
Work Coil Current (A)	44.813
RF Power Supply Current (A)	1.998

## Camera Test Pass

Black Level Test	Noise Test	Photo Response Test
Passed	Passed	Passed

## Optics Test Pass

Intensity	Radial	Side	SYOV
285.9633	3009947	3285638	
Wavelength	737.212	737.212	737.212

## Report Detail

Test Run - Operator: Kanyashu S.  
Subsystem Communications Test: Started  
Subsystem Status  
Main Power Module - Passed  
Gas Control Module - Passed  
RF Generator - Passed  
Optical Module - Passed  
Optics/Camera Control Module - Passed

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Document Name: Instrument's Test Report

## Perfusable Pump - Passed

Subsystem Communications Test Completed - Passed

Air Flow - Started

Fan Speed (N/A) Air Flow (relative speed) Status

30% 11 - Passed

50% 18 - Passed

Air Flow Completed - Passed

Water Flow - Started

RF Water Flow (L/min) = 1.21

Camera Water Flow (L/min) = 1.14

Water Inlet Temperature = 23.01

RF Water Flow (L/min) (0.0) = 0.00

Water Flow Completed - Passed

Gas Flow - Started

Channel Target Actual Pressure Failure Status

Auxiliary Gas 0.02 0.02 N/A - Passed

Auxiliary Gas 2.00 2.00 N/A - Passed

Nebulizer Gas 0.00 0.00 N/A - Passed

Nebulizer Gas 0.70 0.71 278.73 N/A - Passed

Plasma Gas 0.00 1.18 N/A - Passed

Plasma Gas 18.00 17.98 N/A - Passed

Makaps Gas 2.00 2.00 N/A - Passed

Makaps Gas 2.00 2.00 N/A - Passed

Purge Gas 0.70 0.78 N/A - Passed

Purge Gas 3.70 3.70 N/A - Passed

All Channel Flow Off - Passed

Gas Flow Completed - Passed

RF Generator - Started

RF generator turned off - Passed

RF generator turned on - Passed

RF Control = 0 V - Passed

RF Power Supply - Set Value = 150V, Actual Value = 130.33V - Passed

RF Oscillator Started - Passed

RF Oscillator Frequency (MHz) = 25.92, Work Coil Current (Amps) = 44.81, RF Power Supply

Current (Amps) = 2.00 - Passed

RF Oscillator stopped - Passed

RF generator turned off - Passed

RF Generator Completed - Passed

Camera Test - Started

Black level test - PASSED

Noise test - PASSED

Photo response test - PASSED

Camera Test Completed - Passed

Optics Test - Started

Test View Mode Intuitive Status

LED Off - Passed

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Document Name: Instrument's Test Report

## Plasma Ignite Started

Waiting 4 min for plasma warm up

Shutter opened - Passed

Peak intensity Radial mode 285932.82 - Passed

Shutter closed - Passed

Peak intensity (corrected shutter) Radial mode 56.48 - Passed

Shutter opened - Passed

Optical Argon Ratio: Calculated Value = 2.53, Factory Value = 2.50

Peak intensity Axial mode 300947.39 - Passed

Radial-Axial Intensity Ratio (Range 0.100) - 1.01 - Passed

Peak intensity Simultaneous mode 328563.85 - Passed

Shutter closed - Passed

Optics Test Completed - Passed

Page 4 of 4

Date: September 13, 2021 8:50:41 PM  
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## Electronic Signature

## Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and login to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

## Details

Full Name of Signer: Kanyakorn Sukprathaisarn  
 Logged On User Name: phlmpaptha.jeeasphong@agilent.com  
 Signature Creation Date: September 13, 2021  
 Reason for Signature: Executed protocol and published this original version of document

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 System ID: MY16010005

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User Name: phlmpaptha.jeeasphong  
 Host Name: ASBX009C328

System ID: MY16010005  
 Print Date: September 13, 2021 6:50:44 PM

## CQHW 8100 ICPOER ALS 08Sep21 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 8, 2021 8:49:36 AM	Auth	SessionCreated	Session	None
September 8, 2021 8:49:58 AM	Start	Configuration	Session	None
September 8, 2021 8:49:56 AM	Auth	Entrance	Logging	User is Field Engineer and does not require an unlock code
September 8, 2021 9:07:08 AM	Auth	ExpLoaded	Session	EQP details for primary lockstep (E1) - File path: [ProtocolData\EU\Configured over02.800a.02.80.wg], EQP File Name: [E1.02.80.wg], EQP Name: [MyFieldAssessment]
September 8, 2021 9:07:11 AM	End	Configuration	Session	None
September 8, 2021 9:07:15 AM	Start	Qualification	Session	QO
September 8, 2021 9:07:10 AM	Start	Execution	Preparation: 8100 SVDV; Qualitative Test - No serpins associated	None
September 8, 2021 9:34:05 AM	End	Execution	Preparation: 8100 SVDV; Qualitative Test - No serpins associated	Run Count: 1
September 8, 2021 9:34:08 AM	Start	Execution	Instrument Tests: 8100 SVDV; Qualitative Test - No serpins associated	None
September 8, 2021 9:31:27 AM	End	Execution	Instrument Tests: 8100 SVDV; Qualitative Test - No serpins associated	Run Count: 1

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Date: September 13, 2021 6:50:41 PM  
 System ID: MY16010005

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User Name: phlmpaptha.jeeasphong  
 Host Name: ASBX009C328

System ID: MY16010005  
 Print Date: September 13, 2021 6:50:44 PM

## CQHW 8100 ICPOER ALS 08Sep21 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 8, 2021 8:51:39 AM	Start	Execution	Autosampler Operation: Autosampler 1 - SP54; Qualitative Test - No serpins associated	None
September 8, 2021 9:31:36 AM	End	Execution	Autosampler Operation: Autosampler 1 - SP54; Qualitative Test - No serpins associated	Run Count: 1
September 8, 2021 9:51:36 AM	End	Qualification	Session	QO
September 8, 2021 9:51:28 AM	Start	Reporting	Session	None
September 8, 2021 10:56:40 AM	Auth	AccClosed	Session	None
September 13, 2021 5:01:28 PM	Auth	AccReopened	Session	None
September 13, 2021 5:01:28 PM	Auth	SessionReloaded	Session	None
September 13, 2021 5:01:28 PM	Start	Qualification	Session	QO
September 13, 2021 5:07:55 PM	Auth	Reporting	Session	Report Generated; Certificate

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Date: September 13, 2021 6:50:41 PM  
 System ID: MY16010005

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User Name: phlmpaptha.jeeasphong  
 Host Name: ASBX009C328

System ID: MY16010005  
 Print Date: September 13, 2021 6:50:44 PM

## CQHW 8100 ICPOER ALS 08Sep21 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 13, 2021 5:49:19 PM	Auth	Reporting	Session	Report Signed; Certificate PDF Name: CQHW 8100 ICPOER ALS 08Sep21_20210913_Certificate.pdf User Name: phlmpaptha.jeeasphong@agilent.com Full Name of Signer: Kanyakorn Sukprathaisarn Reason for Signature: Executed protocol and published this original version of document
September 13, 2021 5:49:25 PM	Auth	Reporting	Session	Report Generated; Report

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Date: September 13, 2021 6:50:41 PM  
 System ID: MY16010005

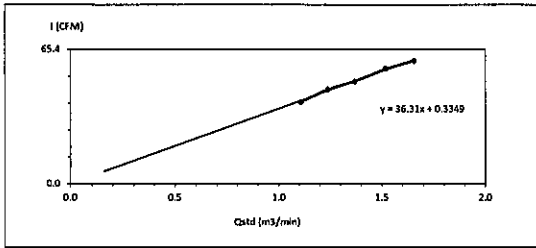
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### High Volume Air Sampler Calibration Worksheet

Project Site: Sumiden Steel Wire (Thailand) Co., Ltd. Barometric Pressure (mm Hg): 758  
 Calibrate Location: สุวิทย์ 3 ไร่ Temperature (°C): 31  
 Calibrate Date: 21-Feb-22 High Volume ID: RYG\_FS0292  
 Calibration Sheet No.: C-210222-RYG\_FS0292 High Volume Model: TE-S170D  
 Calibrator ID: RYG\_FS0205 High Volume S/N: 5497  
 Calibrator Model: TE-S028A Calibrator Slope: 1.53016  
 Calibrator S/N: 1166 Calibrator Intercept: -0.0468

Test No.	Delta H <sub>2</sub> O (inch)	Q <sub>std</sub> (m <sup>3</sup> /min)	I: Chart (CFM)	Linear Regression
1	2.7	1.1086	40	Slope: 36.3099 Intercept: 0.3349 Correlation Coefficient: 0.9975
2	3.4	1.2303	46	
3	4.2	1.3711	50	
4	5.2	1.5203	56	
5	6.2	1.6558	60	



Calibrated by

(Mr. Santi Chalchana)  
Field Scientist(1)

Approved by:

(Mr. Wichan Choonharat)  
Manager

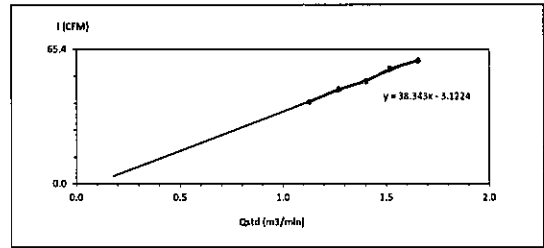
FORM NO: F-06-073 REVISION NO: - ISSUE DATE: 14/03/16



### High Volume Air Sampler Calibration Worksheet

Project Site: Sumiden Steel Wire (Thailand) Co., Ltd. Barometric Pressure (mm Hg): 758  
 Calibrate Location: สุวิทย์ 3 ไร่ Temperature (°C): 31  
 Calibrate Date: 21-Feb-22 High Volume ID: RYG\_FS0395  
 Calibration Sheet No.: C-210222-RYG\_FS0395 High Volume Model: TE-S170D  
 Calibrator ID: RYG\_FS0205 High Volume S/N: 5692  
 Calibrator Model: TE-S028A Calibrator Slope: 1.53016  
 Calibrator S/N: 1166 Calibrator Intercept: -0.0468

Test No.	Delta H <sub>2</sub> O (inch)	Q <sub>std</sub> (m <sup>3</sup> /min)	I: Chart (CFM)	Linear Regression
1	2.8	1.1281	40	Slope: 38.3435 Intercept: -3.1224 Correlation Coefficient: 0.9973
2	3.6	1.2729	46	
3	4.4	1.4023	50	
4	5.2	1.5203	56	
5	6.2	1.6558	60	



Calibrated by

(Mr. Santi Chalchana)  
Field Scientist(1)

Approved by:

(Mr. Wichan Choonharat)  
Manager

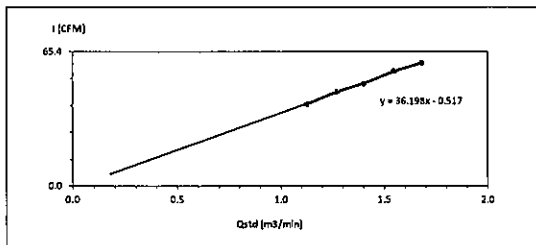
FORM NO: F-06-073 REVISION NO: - ISSUE DATE: 14/03/16



### High Volume Air Sampler Calibration Worksheet

Project Site: Sumiden Steel Wire (Thailand) Co., Ltd. Barometric Pressure (mm Hg): 758  
 Calibrate Location: สุวิทย์ 3 ไร่ Temperature (°C): 31  
 Calibrate Date: 21-Feb-22 High Volume ID: RYG\_FS0393  
 Calibration Sheet No.: C-210222-RYG\_FS0393 High Volume Model: TE-S170D  
 Calibrator ID: RYG\_FS0205 High Volume S/N: 5682  
 Calibrator Model: TE-S028A Calibrator Slope: 1.53016  
 Calibrator S/N: 1166 Calibrator Intercept: -0.0468

Test No.	Delta H <sub>2</sub> O (inch)	Q <sub>std</sub> (m <sup>3</sup> /min)	I: Chart (CFM)	Linear Regression
1	2.8	1.1281	40	Slope: 36.1979 Intercept: -0.5170 Correlation Coefficient: 0.9986
2	3.6	1.2729	46	
3	4.4	1.4023	50	
4	5.4	1.5484	56	
5	6.4	1.6815	60	



Calibrated by

(Mr. Santi Chalchana)  
Field Scientist(1)

Approved by:

(Mr. Wichan Choonharat)  
Manager

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



### ROTA METER CALIBRATION RESULT JANUARY 2022

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R <sup>2</sup> )
BKK_FS0577	05 Jan 22	Y = 0.9899x + 0.9112	0.9999
BKK_FS0579	05 Jan 22	Y = 1.007x - 0.0209	1.0000
BKK_FS0583	05 Jan 22	Y = 1.0513x + 1.869	0.9987
BKK_FS0584	05 Jan 22	Y = 1.0048x + 1.059	1.0000
BKK_FS0585	05 Jan 22	Y = 1.0078x + 1.1036	0.9999
BKK_FS0586	05 Jan 22	Y = 0.9933x + 3.2655	1.0000
BKK_FS0587	05 Jan 22	Y = 1.0401x + 17.457	0.9996
BKK_FS0588	05 Jan 22	Y = 1.0154x + 4.6357	0.9999
BKK_FS0589	05 Jan 22	Y = 0.9918x + 4.8069	0.9999
BKK_FS0590	05 Jan 22	Y = 0.9881x + 10.07	0.9995
BKK_FS0591	05 Jan 22	Y = 1.0117x - 92.415	0.9995
BKK_FS0592	05 Jan 22	Y = 1.0031x - 69.305	0.9996
BKK_FS0593	05 Jan 22	Y = 1.0131x - 98.198	0.9996
BKK_FS0594	05 Jan 22	Y = 1.0075x - 7.0629	0.9999
BKK_FS0595	05 Jan 22	Y = 1.0249x - 98.162	0.9996
BKK_FS0596	05 Jan 22	Y = 0.9843x + 26.806	0.9991
BKK_FS0597	05 Jan 22	Y = 1.0203x - 122.14	0.9999
BKK_FS1004	04 Jan 22	Y = 0.9851x + 19.648	0.9999
BKK_FS1005	04 Jan 22	Y = 1.0096x + 4.6643	0.9997
BKK_FS1008	04 Jan 22	Y = 1.2188x + 7.1214	0.9994
BKK_FS1007	05 Jan 22	Y = 1.0563x - 1.0912	1.0000
BKK_FS1008	05 Jan 22	Y = 0.9689x + 1.0061	1.0000
BKK_FS1009	05 Jan 22	Y = 1.0132x + 1.1833	0.9999
BKK_FS1010	05 Jan 22	Y = 1.0033x + 0.5758	0.9999
BKK_FS1014	05 Jan 22	Y = 1.0021x + 0.3148	0.9998
BKK_FS1015	05 Jan 22	Y = 0.9994x + 1.786	1.0000
BKK_FS1016	05 Jan 22	Y = 1.0105x - 80.258	0.9996
BKK_FS1017	05 Jan 22	Y = 0.9995x + 0.649	1.0000
BKK_FS1018	05 Jan 22	Y = 1.0011x + 1.1788	1.0000
BKK_FS1019	05 Jan 22	Y = 1.0023x - 68.424	0.9996
BKK_FS1020	05 Jan 22	Y = 0.9887x + 2.8644	0.9999
BKK_FS1021	05 Jan 22	Y = 0.9859x + 1.4905	0.9978
BKK_FS1022	05 Jan 22	Y = 1.022x - 17.057	0.9997
BKK_FS1023	05 Jan 22	Y = 1.0094x + 0.0717	0.9999
BKK_FS1024	05 Jan 22	Y = 1.0042x + 0.4086	0.9997
BKK_FS1025	05 Jan 22	Y = 1.0132x - 88.507	0.9996
BKK_FS1026	05 Jan 22	Y = 0.9902x + 0.9554	1.0000
BKK_FS1027	05 Jan 22	Y = 1.0086x - 2.279	1.0000
BKK_FS1028	05 Jan 22	Y = 1.0105x - 81.055	0.9997



## ROTA METER CALIBRATION RESULT JANUARY 2022

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R <sup>2</sup> )
BKK_FS1029	05 Jan 22	$Y = 0.9935x + 0.6234$	1.0000
BKK_FS1030	05 Jan 22	$Y = 1.0039x + 0.515$	0.9999
BKK_FS1031	05 Jan 22	$Y = 1.006x - 79.295$	0.9998
BKK_FS1039	04 Jan 22	$Y = 0.9916x + 6.1524$	0.9998
BKK_FS1040	04 Jan 22	$Y = 1.0133x - 10.177$	0.9995
BKK_FS1041	04 Jan 22	$Y = 1.0085x - 1.7381$	0.9999
BKK_FS1042	04 Jan 22	$Y = 1.0061x + 1.3405$	0.9994
BKK_FS1043	04 Jan 22	$Y = 1.0112x - 10.393$	0.9999
BKK_FS1044	04 Jan 22	$Y = 1.0495x - 1.0136$	0.9996
BKK_FS1161	05 Jan 22	$Y = 0.9612x + 15571$	1.0000
BKK_FS1162	05 Jan 22	$Y = 0.9932x + 5.0014$	0.9997
BKK_FS1163	05 Jan 22	$Y = 1.0082x - 82.062$	0.9998
BKK_FS1164	05 Jan 22	$Y = 0.9914x + 0.8427$	0.9997
BKK_FS1165	05 Jan 22	$Y = 0.9993x + 6.5919$	0.9999
BKK_FS1166	05 Jan 22	$Y = 1.0031x - 77.581$	0.9996
RYG_FS0197	04 Jan 22	$Y = 1.0068x + 1.7152$	0.9998
RYG_FS0198	04 Jan 22	$Y = 0.9888x + 15.198$	0.9995
RYG_FS0199	04 Jan 22	$Y = 1.1202x - 3.5762$	0.9999

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

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

Sartorius (Thailand) Co., Ltd.  
129 Rama 9 Road, Huaywang, Huaywang, Bangkok 10310  
Tel: +66 2643 8361-4 Fax: +66 2643 8367, e-mail: service.thailand@sartorius.com



SARTORIUS

## Certificate of Calibration

REVIEW BY: Thamk  
APPROVED BY: D  
NEXT CAL DATE: 6/5/23

Model Number: MSE125P-100-DU Certificate No.: 218C10164  
Description: Semi-micro Balance Issued Date: Monday, May 10, 2021  
Serial Number: 33108993 (RYG\_EN0004) Reference No.: 501644  
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.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. Chonchal Inthana Calibration Procedure No.: This calibration was conducted by  
Calibration Date: Thursday, May 06, 2021 Using in-house calibration procedure number [WI-003]  
Based on UKAS LAB 14

Metrological data: Capacity: 60/120 g Readability: 0.01/0.1 mg  
Reasons for calibration: ☐ New Installation ☐ Service / Required ☒ Re-calibration/ Maintenance  
Equipment Condition: ☒ Good Operation ☐ Fail

## Measurement Method UKAS Publication Ref: Lab 14

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

## Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 200g E2,YCS011-522-00	Sartorius	119934-0-0-1999-01-00	10-Sep-2021
MHB-3825D	Humidity/Balometer/Temp. Lutron MHB-3825D	SPC-RT	C19203076	1-Sep-2021

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.

ISO 17025-RF-015 26/03/2020 R2

Mr. Chonchal Inthana (Technical Manager)



Sartorius (Thailand) Co., Ltd.  
129 Rama 9 Road, Huaywang, Huaywang, Bangkok 10310  
Tel: +66 2643 8361-4 Fax: +66 2643 8367, e-mail: service.thailand@sartorius.com

SARTORIUS

## Certificate of Calibration

Model Number: MSE125P-100-DU Certificate No.: 218C10164  
Description: Semi-micro Balance Issued Date: Monday, May 10, 2021  
Serial Number: 33108993 (RYG\_EN0004) Reference No.: 501644  
Manufacturer: Sartorius Page No.: 2 of 3

## Calibration Results: Without Adjustment

Repeatability			Eccentricity (Off-center loading error)		
The repeatability is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement range is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.			The off-center loading error is yielded by the difference between the reading 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 R110).		
Nominal Value: (Low Load)	5.00002	50.00004	Nominal value:	50	g
5 g	5.00001	50.00003	Tolerance	0.00015	g
Tolerance	0.000015	0.000005			
	5.00002	50.00004			
	5.00002	50.00003			
Nominal Value: (High Load)	5.00002	50.00003			
50 g	5.00001	50.00003			
Tolerance	0.000015	0.000004			
	5.00003	50.00004			
	5.00001	50.00003			
	5.00002	50.00004			
Standard Deviation	0.000007	0.000007			

## Linearity

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

The tolerance, and the uncertainty error, characterizes the deviation of the characteristic curve of a weighing instrument from the linear slope:				
Tolerance	0.00004 g			
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
0.01	0.00000	0.00000	0.00000	0.000016
0.05	0.00000	0.00000	0.00000	0.000016
0.1	0.10000	0.10000	0.00000	0.000017
0.5	0.50000	0.50000	0.00000	0.000018
1	1.00000	1.00000	0.00000	0.000019
5	5.00002	5.00002	0.00000	0.000024
10	10.00003	10.00003	0.00000	0.000047
20	20.00001	20.00002	0.00001	0.000089
40	40.00005	40.00004	-0.00001	0.000089
50	50.00005	50.00003	-0.00002	0.000089

Sartorius (Thailand) Co., Ltd.  
129 Rama 9 Road, Huaywang, Huaywang, Bangkok 10310  
Tel: +66 2643 8361-4 Fax: +66 2643 8367, e-mail: service.thailand@sartorius.com

SARTORIUS

## Certificate of Calibration

Model Number: MSE125P-100-DU Certificate No.: 218C10164  
Description: Semi-micro Balance Issued Date: Monday, May 10, 2021  
Serial Number: 33108993 (RYG\_EN0004) Reference No.: 501644  
Manufacturer: Sartorius Page No.: 3 of 3

## Calibration Results: Without Adjustment

Repeatability			Eccentricity (Off-center loading error)		
The repeatability is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement range is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.			The off-center loading error is yielded by the difference between the reading 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 R110).		
Nominal Value: (Low Load)	100.00000	100.00000	Nominal value:	50	g
100 g	100.00000	100.00000	Tolerance	0.00015	g
Tolerance	0.000015	0.000005			
	100.00000	100.00000			
	100.00000	100.00000			
Nominal Value: (High Load)	100.00000	100.00000			
100 g	100.00000	100.00000			
Tolerance	0.000015	0.000004			
	100.00000	100.00000			
	100.00000	100.00000			
Standard Deviation	0.000003	0.000003			

## Linearity

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

Tolerance		0.0001 g		
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
65	65.00001	65.00001	0.00000	0.00016
70	70.00001	70.00001	0.00000	0.00016
75	75.00001	75.00001	0.00000	0.00016
80	80.00001	80.00001	0.00000	0.00016
85	85.00001	85.00001	0.00000	0.00016
90	90.00001	90.00000	-0.00001	0.00016
95	95.00001	95.00000	-0.00001	0.00017
100	100.00001	100.00000	-0.00001	0.00017
110	110.00001	110.00000	-0.00001	0.00026
120	120.00001	120.00000	-0.00001	0.00026



# SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY



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

Cert. No. : ACC21009  
Pages : 1 of 3

## Calibration Certificate

Equipment : SOUND CALIBRATOR  
Manufacturer : RION  
Model : NC-74  
Serial No. : 34178123  
ID No. : RYG\_FS0215

Condition As Found : GOOD

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

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

Received Date : 05 AUGUST 2021  
Calibration Date : 09 AUGUST 2021  
Date of Issue : 11 AUGUST 2021

Calibrated by : Nathakorn Pisutpaisan

Approved by :

( Thanakul Petchurai )

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

QF-TS12-04-04-020664

# SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

## Continuation of Calibration Certificate

Cert. No. : ACC21009  
Job No. : VC64AC0058  
Pages : 2 of 3

Calibration Procedure : CP-AC-03

### Calibration Method :

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

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

### Condition of this result of calibration :

#### 1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY52302742	EP-0011-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL-BP. 05/0264	10-Feb-22
Digital Multimeter	8846A	1997025	EEL-BP. 06/0264	05-Feb-22
Digital Multimeter	33461A	MY53220116	EEL-BP. 04/0264	10-Feb-22
Programmable Attenuator	MAT-1070	62100114	1500-07774B	08-Mar-22
Condenser Microphone	4180	2977900	AA-1008-21	05-Feb-22
Measuring Amplifier	NA-42KA1	34560495	AA-3003-21	16-Feb-22
Audio Analyzer	AVR-3360A	V744B6069	EP-0010-21	10-Feb-22

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

~ D.T.A.

# SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

## Continuation of Calibration Certificate

Cert. No. : ACC21009  
Job No. : VC64AC0058  
Pages : 3 of 3

### Result of calibration :

#### 1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit (dB)
94	94.06	0.06	0.14	0.40

#### 2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1001.5	0.1	0.1	1.0

#### 3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
1.67	0.10	3.0

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

End of Calibration Certificate

QF-TS12-04-04-020664

~ D.T.A.

# SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY



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

Cert. No. : ACL21056  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24  
Serial No. : 00296516 / 180412 / 88182  
ID No. : RYG\_FS0433

Condition As Found : GOOD

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

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

Received Date : 14 JANUARY 2022  
Calibration Date : 21-24 JANUARY 2022  
Date of Issue : 25 JANUARY 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by :

( Thanakul Petchurai )

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Continuation of Calibration Certificate

Cert. No. : ACL22056  
Job No. : VC65AC0043  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0012-21	10-Feb-22
Waveform Generator	33511B	MY52302742	EF-0011-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL.BP. 05/0264	10-Feb-22
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0264	08-Feb-22
Digital Multimeter	33461A	MY60024273	1-15180725251-1	15-Sep-22
Programmable Attenuator	MAT-1070	62100114	1500-07774E	08-Mar-22
Condenser Microphone	4180	2977900	AA-1008-21	05-Feb-22
Measuring Amplifier	NA-42KAJ	34560495	AA-3003-21	16-Feb-22

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

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

3.1 National Institute of Metrology (Thailand).

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

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T. P.L.A.

Continuation of Calibration Certificate

Cert. No. : ACL22056  
Job No. : VC65AC0043  
Pages : 3 of 8

Summary of Measurement Result :

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

QF-TS12-04-04-020664

T. P.L.A.

Continuation of Calibration Certificate

Cert. No. : ACL22056  
Job No. : VC65AC0043  
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.96)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.8

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

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

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.1	0.1	0.1	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	0.7	0.7	0.7	± 0.0

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T. P.L.A.

Continuation of Calibration Certificate

Cert. No. : ACL22056  
Job No. : VC65AC0043  
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
1eq	94.0	0.0	± 0.1

6. Long - term stability

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

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T. P.L.A.

Continuation of Calibration Certificate

Cert. No. : ACL22056  
Job No. : VC65AC0843  
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	27.9	-0.1	± 1.1
27.0	27.0	0.0	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	25.0	0.0	± 1.1

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*r pta*

Continuation of Calibration Certificate

Cert. No. : ACL22056  
Job No. : VC65AC0843  
Pages : 7 of 8

8. Level linearity including the level range control

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

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.1	-0.3	± 3.0

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

QI-TS12-04-04-020664

*r pta*

Continuation of Calibration Certificate

Cert. No. : ACL22056  
Job No. : VC65AC0843  
Pages : 8 of 8

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

QI-TS12-04-04-020664

*r pta*

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Cert. No. : ACL22026  
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24  
Serial No. : 00900071 / 188464 / 01733  
ID No. : RYG\_FS0492

Condition As Found : GOOD

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

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

Received Date : 05 JANUARY 2022  
Calibration Date : 10-12 JANUARY 2022  
Date of Issue : 13 JANUARY 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by : *T. Petchurai*  
( Thanakul Petchurai )

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QI-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22026  
Job No. : VC65AC0040  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0012-21	10-Feb-22
Waveform Generator	33511B	MY52302742	EF-0011-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL.BP. 05/0264	10-Feb-22
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0264	08-Feb-22
Digital Multimeter	34461A	MY60024273	1-15180725251-1	15-Sep-22
Programmable Attenuator	MAT-1070	62100114	1500-07774E	08-Mar-22
Condenser Microphone	4180	2977900	AA-1008-21	05-Feb-22
Measuring Amplifier	NA-42KAI	34560495	AA-3003-21	16-Feb-22

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

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

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22026  
Job No. : VC65AC0040  
Pages : 3 of 8

Summary of Measurement Result :

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

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22026  
Job No. : VC65AC0040  
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.96)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.8

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

Frequency Weighting	Measured value (dB)
A - weight	11.6
C - weight	17.8
Flat	23.6

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	0.2	0.3	0.3	±5.0

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22026  
Job No. : VC65AC0040  
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL21026  
Job No. : VC65AC0040  
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	38.9	-0.1	±1.1
34.0	33.9	-0.1	±1.1
30.0	29.9	-0.1	±1.1
29.0	28.9	-0.1	±1.1
28.0	27.9	-0.1	±1.1
27.0	26.8	-0.2	±1.1
26.0	25.9	-0.1	±1.1
25.0	24.9	-0.1	±1.1

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T. Reth.

Continuation of Calibration Certificate

Cert. No. : ACL21026  
Job No. : VC65AC0040  
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	128.0	0.0	±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	-
One	136.4	136.2	-0.2	±3.0

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

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T. Reth.

Continuation of Calibration Certificate

Cert. No. : ACL21026  
Job No. : VC65AC0040  
Pages : 8 of 8

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-04-020664

T. Reth.

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



Cert. No. : ACL21078  
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24  
Serial No. : 00597167 / 157778 / 34375  
ID No. : RYQ\_FS0437

Condition As Found : GOOD

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

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

Received Date : 05 AUGUST 2021  
Calibration Date : 06 - 10 AUGUST 2021  
Date of Issue : 11 AUGUST 2021

Calibrated by : Nathakorn Pisupaisarn

Approved by : T. Reth.  
( Thanskul Petchurui )

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QF-TS12-04-04-020664

## Continuation of Calibration Certificate

Cert. No. : ACL21078  
Job No. : VC64AC0058  
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	MY46017076	EF-0012-21	10-Feb-22
Waveform Generator	33511B	MY53202742	EF-0011-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL.BP.050264	10-Feb-22
Digital Multimeter	8846A	1997025	EEL.BP.060264	05-Feb-22
Digital Multimeter	33461A	MY53220116	EEL.BP.040264	10-Feb-22
Programmable Attenuator	MAT-1070	62100114	1500-07774E	08-Mar-22
Condenser Microphone	4180	2977900	AA-1008-21	05-Feb-22
Measuring Amplifier	NA-42KAL	34560495	AA-3003-21	16-Feb-22

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).

QP-TS12-04-04-020664

## Continuation of Calibration Certificate

Cert. No. : ACL21078  
Job No. : VC64AC0058  
Pages : 3 of 8

## Summary of Measurement Result :

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

QP-TS12-04-04-020664

## Continuation of Calibration Certificate

Cert. No. : ACL21078  
Job No. : VC64AC0058  
Pages : 4 of 8

## Result of calibration :

## 1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.96)	93.9	0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value (dB)
16.5

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

Frequency Weighting	Measured value (dB)
A - weight	12.0
C - weight	18.6
Flat	24.5

## 3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.5	0.6	0.6	± 1.5
1000	-0.1	-0.1	0.0	± 1.0
8000	-1.6	-1.6	-1.6	±5.0

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## Continuation of Calibration Certificate

Cert. No. : ACL21078  
Job No. : VC64AC0058  
Pages : 5 of 8

## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

## 5. Frequency and time weightings at 1 kHz

## 5.1 Frequency weightings at 1 kHz

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

## 5.2 Time weighting at 1 kHz

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

## 6. Long - term stability

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

QP-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL21078  
Job No. : VC64AC0058  
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	104.1	0.1	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL21078  
Job No. : VC64AC0058  
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	108.0	0.0	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
SEL	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

10. Peak C sound level

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

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

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Continuation of Calibration Certificate

Cert. No. : ACL21078  
Job No. : VC64AC0058  
Pages : 8 of 8

11. Overload Indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.6	0.0	±1.5

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-04-020664

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



Cert. No. : ACL22024  
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24  
Serial No.: 00709746 / 187332 / 01297  
ID No.: RYG\_FS0491

Condition As Found : GOOD

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

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

Received Date : 05 JANUARY 2022  
Calibration Date : 10-12 JANUARY 2022  
Date of Issue : 13 JANUARY 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by : *T. Petchurai*  
( Thanakul Petchurai )

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QF-TS12-04-04-020664

## Continuation of Calibration Certificate

Cert. No. : ACL22024  
Job No. : VC65AC0040  
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	EP-0012-21	10-Feb-22
Waveform Generator	33511B	MY52302742	EP-0011-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL.BP. 05/0264	10-Feb-22
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0264	08-Feb-22
Digital Multimeter	34461A	MY60024273	1-15180725251-1	15-Sep-22
Programmable Attenuator	MAT-1070	62100114	1500-07774E	08-Mar-22
Condenser Microphone	4180	2977900	AA-1008-21	05-Feb-22
Measuring Amplifier	NA-42KA1	34560495	AA-3003-21	16-Feb-22

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

## Continuation of Calibration Certificate

Cert. No. : ACL22024  
Job No. : VC65AC0040  
Pages : 3 of 8

## Summary of Measurement Result :

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

QF-TS12-04-04-020664

## Continuation of Calibration Certificate

Cert. No. : ACL22024  
Job No. : VC65AC0040  
Pages : 4 of 8

## Result of calibration :

## 1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.96)	93.9	0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value (dB)
15.1

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

Frequency Weighting	Measured value (dB)
A-weight	13.4
C-weight	19.8
Flat	25.2

## 3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.1	0.1	0.1	±1.5
1000	0.0	0.0	0.0	±1.0
8000	1.1	1.2	1.2	±5.0

QF-TS12-04-04-020664

## Continuation of Calibration Certificate

Cert. No. : ACL22024  
Job No. : VC65AC0040  
Pages : 5 of 8

## 4. Electrical signal tests of frequency weightings

Weighing network response with relative to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	0.0	-0.1	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

## 5. Frequency and time weightings at 1 kHz

## 5.1 Frequency weightings at 1 kHz

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

## 5.2 Time weighting at 1 kHz

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

## 6. Long-term stability

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

QF-TS12-04-04-020664



## Continuation of Calibration Certificate

Cert. No. : ACL22024  
Job No. : VC65AC0040  
Pages : 6 of 8

## 7. Level linearity on the reference level range

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

QF-TS12-04-04-020664

T. Petch.

## Continuation of Calibration Certificate

Cert. No. : ACL22024  
Job No. : VC65AC0040  
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	108.0	0.0	1.5; -5.0
	2	8	117.0	117.0	0.0	1.0; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5; -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	1.5; -5.0
SEL	2	8	108.0	108.0	0.0	1.0; -2.5
	200	800	128.0	128.1	0.1	±1.0

## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.5	-0.9	±3.0

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

QF-TS12-04-04-020664

T. Petch.

## Continuation of Calibration Certificate

Cert. No. : ACL22024  
Job No. : VC65AC0040  
Pages : 8 of 8

## 11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.6	0.0	±1.5

## 12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	136.9	0.1	±0.3

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

End of Calibration Certificate

QF-TS12-04-04-020664

T. Petch.

451-451/1 Sithiporn Rd., Banghumburi, Bangkok 10700 THAILAND.  
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACU22029  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24  
Serial No. : 00900074 / 188467 / 01736  
ID No. : RYG\_FS0495

Condition As Found : GOOD

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

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

Received Date : 05 JANUARY 2022  
Calibration Date : 10-12 JANUARY 2022  
Date of Issue : 13 JANUARY 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by : T. Petch.  
( Thanakul Petchurni )

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QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22029  
Job No. : VC65AC0040  
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0012-21	10-Feb-22
Waveform Generator	33511B	MY52302742	EF-0011-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL.BP. 05/0264	10-Feb-22
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0264	08-Feb-22
Digital Multimeter	34461A	MY60024273	1-15180725251-1	15-Sep-22
Programmable Attenuator	MAT-1070	62100114	1500-07774E	08-Mar-22
Condenser Microphone	4180	2977900	AA-1008-21	05-Feb-22
Measuring Amplifier	NA-42KA1	34560495	AA-3003-21	16-Feb-22

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

T. P. P.

Continuation of Calibration Certificate

Cert. No. : ACL22029  
Job No. : VC65AC0040  
Pages : 3 of 8

Summary of Measurement Result :

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

QF-TS12-04-04-020664

T. P. P.

Continuation of Calibration Certificate

Cert. No. : ACL22029  
Job No. : VC65AC0040  
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.96)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.2

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

Frequency Weighting	Measured value (dB)
A-weight	10.8
C-weight	17.4
Flat	23.3

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	±1.5
1000	0.0	0.0	0.0	±1.0
8000	-0.8	-0.7	-0.7	±5.0

QF-TS12-04-04-020664

T. P. P.

Continuation of Calibration Certificate

Cert. No. : ACL22029  
Job No. : VC65AC0040  
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	-0.2	0.0	±2.0
125	-0.1	0.0	0.0	±1.5
250	0.0	0.0	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long-term stability

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

QF-TS12-04-04-020664

T. P. P.

Continuation of Calibration Certificate

Cert. No. : ACL22029  
Job No. : VC65AC0040  
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	84.1	0.1	±1.1
79.0	79.0	0.0	±1.1
74.0	74.1	0.1	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	29.9	-0.1	±1.1
29.0	28.9	-0.1	±1.1
28.0	28.0	0.0	±1.1
27.0	27.0	0.0	±1.1
26.0	25.9	-0.1	±1.1
25.0	24.9	-0.1	±1.1

QF-TS12-04-04-020664

T. Bha.

Continuation of Calibration Certificate

Cert. No. : ACL22029  
Job No. : VC65AC0040  
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	-
One	136.4	135.8	-0.6	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

QF-TS12-04-04-020664

T. Bha.

Continuation of Calibration Certificate

Cert. No. : ACL22029  
Job No. : VC65AC0040  
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.6	0.0	±1.5

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-04-020664

T. Bha.

451-451/1 Sirinhor Rd, Bangbunru, Bangkok Bangkok 10700 THAILAND.  
Tel: 0-2435-8500 Fax: 0-2433-1679 e-mail: cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL22027  
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24  
Serial No. : 00900072 / 188465 / 01734  
ID No. : RYG\_FS0493

Condition As Found : GOOD

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

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

Received Date : 05 JANUARY 2022  
Calibration Date : 10-12 JANUARY 2022  
Date of Issue : 13 JANUARY 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Bha.  
( Thanakul Petchurai )

REVIEW BY	<i>Nathakorn P.</i>
APPROVED BY	<i>T. Bha.</i>
NEXT CAL. DATE	10/1/23

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QF-TS12-04-04-020664

## Continuation of Calibration Certificate

Cert. No. : ACL22027  
Job No. : VC65AC0040  
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	EP-0012-21	10-Feb-22
Waveform Generator	33511B	MY52302742	EP-0011-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL.BP. 03/0264	10-Feb-22
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0264	08-Feb-22
Digital Multimeter	34461A	MY60024273	I-15180725251-1	15-Sep-22
Programmable Attenuator	MAT-1070	62100114	1500-07774E	08-Mar-22
Condenser Microphone	4180	2977900	AA-1008-21	05-Feb-22
Measuring Amplifier	NA-42KA1	34560495	AA-3003-21	16-Feb-22

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

T. Rth.

## Continuation of Calibration Certificate

Cert. No. : ACL22027  
Job No. : VC65AC0040  
Pages : 3 of 8

## Summary of Measurement Result :

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

QF-TS12-04-04-020664

T. Rth.

## Continuation of Calibration Certificate

Cert. No. : ACL22027  
Job No. : VC65AC0040  
Pages : 4 of 8

## Result of calibration :

## 1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limits (dB)
93.9 (93.96)	93.9	0.0	±0.3

## 2. Self-generated noise

## 2.1 Normal test

Measured Value (dB)
14.8

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

Frequency Weighting	Measured value (dB)
A-weight	9.9
C-weight	16.9
Flat	22.6

## 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)			Acceptance Limits
	Flat	C-weight	A-weight	
125	0.4	0.4	0.4	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	-1.2	-1.1	-1.1	±5.0

QF-TS12-04-04-020664

T. Rth.

## Continuation of Calibration Certificate

Cert. No. : ACL22027  
Job No. : VC65AC0040  
Pages : 5 of 8

## 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

## 5. Frequency and time weightings at 1 kHz

## 5.1 Frequency weightings at 1 kHz

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

## 5.2 Time weighting at 1 kHz

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

## 6. Long-term stability

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

QF-TS12-04-04-020664

T. Rth.

## Continuation of Calibration Certificate

Cert. No. : ACL22027  
Job No. : VC65AC0040  
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	135.1	0.1	±1.1
134.0	134.1	0.1	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.1	0.1	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.1	0.1	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	29.0	0.0	±1.1
28.0	28.0	0.0	±1.1
27.0	27.0	0.0	±1.1
26.0	26.1	0.1	±1.1
25.0	25.1	0.1	±1.1

QF-TS12-04-04-020664

T. Pth.

## Continuation of Calibration Certificate

Cert. No. : ACL22027  
Job No. : VC65AC0040  
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	116.9	-0.1	1.0; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5; -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.8	-0.2	1.5; -5.0
SEL	2	8	108.0	107.9	-0.1	1.0; -2.5
	200	800	128.0	128.0	0.0	±1.0

## 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L <sub>peak</sub> (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.0	-0.4	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

QF-TS12-04-04-020664

T. Pth.

## Continuation of Calibration Certificate

Cert. No. : ACL22027  
Job No. : VC65AC0040  
Pages : 8 of 8

## 11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.6	0.0	±1.5

## 12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-04-020664

T. Pth.

63/14-15,67/35-36, Soi Petchkasem 7,7/1, Petchkasem Rd.  
Wattana, Bangkok, Thailand 10600 Thailand.  
Tel: (66) 02-6680812#13 Fax: (66) 02-6680860 www.jrnatel.com

## CERTIFICATE OF CALIBRATION

Certificate No. : CL-020 65  
Page 1 of 2Equipment Name: Heat Stress Monitor with Sensor  
Manufacturer: DeltaOHM  
Model: HD32.2  
Serial No: 18018312  
ID No: RYO\_FS0357Customer  
Name: ALS laboratory group (thailand) Co.,Ltd.  
Address: 104 Phatthakan 40, Phatthakan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 ThailandReceived date: 10 JAN 2022  
Calibration date: 16 FEB 2022  
Issue date: 17 FEB 2022Reference Used During Calibration  
1. Standard Temperature Probe Model: STS-100 A500, Serial No.: G67682-09, Due date: 25 Mar 2022  
2. Digital Temperature Indicator Model: DTI-1000 A MK II, Serial No.: 671407-00591 Due date: 04 June 2022Calibration Condition  
Temperature: (23±3)°C  
Relative Humidity: (55±15)%Calibration Procedure  
The temperature calibration was done by in-house calibration method as WILO001 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-0036 21. Certificate number: ER 0032-21

REVIEW BY	<i>[Signature]</i>
APPROVED BY	<i>[Signature]</i>
NEXT CAL DATE	16/12/22

Calibrated by  
EJ Mr. Sornwit Thachalad  
□ Miss Chirathai WinitwattayaApproved Signatory: *[Signature]*  
Mr. Parinya Booncharoen  
Calibration Department Manager



Certificate No.: CL 020-05  
Page 2 of 2

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 - 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 16021464.  
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.049	20.0	0.0	0.099
30	25.048	25.0	0.0	0.099
30	30.037	30.0	0.0	0.099
30	35.029	35.0	0.0	0.099
30	40.018	40.0	0.0	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 16021263.  
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.049	20.1	0.1	0.099
70	24.994	25.0	0.0	0.099
70	29.940	29.8	-0.1	0.099
70	34.905	34.7	-0.2	0.099
70	39.860	39.6	-0.3	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 16020495.  
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.046	20.0	0.0	0.099
110	25.046	25.0	0.0	0.099
110	30.036	30.0	0.0	0.099
110	35.029	35.0	0.0	0.099
110	40.016	40.0	0.0	0.099

UUC\*: Unit Under Calibration

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



Certificate No.: CL-073-64  
Page 1 of 2

## CERTIFICATE OF CALIBRATION

Equipment Name: Heat Stress Monitor with Sensor  
Manufacturer: Delta OHM  
Model: HD32.2  
Serial No: 15030244  
ID No: RYG\_FS0236

Customer  
Name: ALS Laboratory Group (Thailand) Co., Ltd.  
Address: 104 Phatthanasak 40, Phatthanasak Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

Received date: 8 SEP 2021  
Calibration date: 30 SEP 2021  
Issue date: 4 OCT 2021

Reference Used During Calibration  
1. Standard Temperature Probe Model: STS-100 A500, Serial No.: 667682 09, Due date: 25 Mar 2022  
2. Digital Temperature Indicator Model: DTI-1000 A MK II, Serial No.: 671407-00591 Due date: 04 June 2022

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 0036-21. Certificate number: ER 0032 21

REVIEW BY	<i>Phanp</i>
APPROVED BY	<i>30/9/22</i>
NEXT CAL DATE	

Calibrated by  
☒ Mr. Soravit Thachalad  
☐ Miss Orathai Wiwatwittaya



Approved Signatory: *Phanp*  
Mr. Parinyal Booncharoen  
Technical Support  
and Calibration Manager

THIS CERTIFICATE REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.



Certificate No.: CL-073-64  
Page 2 of 2

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 °C - 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 20030506.  
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.051	20.1	0.0	0.099
30	25.047	25.1	0.1	0.099
30	30.041	30.1	0.1	0.099
30	35.028	35.1	0.1	0.099
30	40.017	40.1	0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15033223.  
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.053	20.2	0.1	0.099
70	24.872	24.8	0.1	0.111
70	29.826	29.6	-0.2	0.099
70	34.797	34.5	-0.3	0.099
70	39.701	39.3	-0.4	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 17009684.  
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.051	20.0	0.1	0.099
110	25.047	25.0	0.0	0.099
110	30.041	30.0	0.0	0.099
110	35.028	35.0	0.0	0.099
110	40.017	40.0	0.0	0.099

UUC\*: Unit Under Calibration

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

\* End of Certificate \*



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250  
TEL: 0-2717-3000-24 FAX: 0-2718-9494



## Certificate of Calibration

Certificate No.: 21H1023  
Page: 1 of 2

Equipment: Heat Stress Monitor  
Manufacturer: Delta OHM  
Model: HD32.2  
Serial No.: 15030245  
ID No.: RYG\_FS0237  
Condition As-Received: Used Item

Received Date: 06 May 2021

Calibration Date: 10 May 2021 to 12 May 2021

Reference: 2105-0119WSC

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

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

104 Phatthanasak 40, Phatthanasak Rd.,  
Khwaeng Phatthanasak, Khet Suan Luang,  
Bangkok 10250 Thailand

Procedure used: Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with standard temperature probe for temperature measurement function into humidity / temperature chamber.

### Condition of this result of calibration

1. Reference standards instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Handheld Thermometer With Sensor	1521	AS4339	201069	10 Aug 2021
2. The certificate is valid only to the item calibrated on date and piece of calibration.				
3. This Certification is traceable to the International System of Unit maintained at - National Institute of Metrology Thailand (NIMT)				

REVIEW BY	<i>Phanp</i>
APPROVED BY	<i>10/5/22</i>
NEXT CAL DATE	

Calibrated by: Krapop Onrat  
Issue Date: 17 May 2021

Approved Signatory:

(/ ) Chakrit Waiwanjue  
/ Pomsippa Tamayakul  
/ Pitak Srirongtong



Cert. No.: 21H1023  
Page: 2 of 2

#### Result of Calibration:

Without Adjustment

Function: Temperature measurement.  
This instrument was connected with temperature probe.

Measurement Function	Model of Sensor	Serial of Sensor	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (°C)
Tn	HP3201.2	13035026	25.020	25.1	0.080	0.42
			35.024	35.1	0.076	0.42
			45.023	45.1	0.077	0.42
Tg	TP 3276.2	20008278	25.020	25.1	0.080	0.42
			35.024	35.2	0.176	0.42
			45.023	45.2	0.177	0.42
T	TP 3207.2	15031849	25.020	25.2	0.180	0.42
			35.024	35.2	0.176	0.42
			45.023	45.2	0.177	0.42

\* Not NSC-ONSC Accredited

UUC\*: Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor  $k = 2.00$ , providing confidence level approximately 95%.

-000-

*[Signature]*

a 1054462

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Agilent CrossLab Compliance Services



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CrossLab

## EQUIPMENT QUALIFICATION REPORT (EQR)

### Agilent CrossLab Compliance

Qualification Type: ICPMS-OQ

System ID: JP15471169

EQP Name: AgilentRecommended

EQP Revision: ICPMS.02.50

EQP Publish Date: March 2020

Date: September 30, 2021 4:07:18 PM

Report Type: Report

Org. Name: ALS Laboratory Group (Thailand) Co., Ltd.

Org. Location: 104 Phatnakarn 40, Suan Luang, Bangkok 10250.

REVIEW BY *Syhan M.*  
APPROVED BY *Syhan M.*  
NEXT CAL. DATE *29 March 2023*

Date: September 30, 2021 4:07:18 PM  
System ID: JP15471169

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## Test Summary

### Purpose

This section includes a status for each scheduled test and the overall qualification. For each test that is run, (1) the status is automatically determined based on pre-defined limits, and (2) the total number of times the test was run is displayed. For detailed results and specifications for a test, refer to the test results in this EQR.

Details	Status	Runs
Test		
Autosampler Check : SPS4	Pass	1
Integrated Sample Introduction System (ISIS) Check : ISIS3	Pass	1
Autotune : G8403A	Pass	1
Background (No Gas Mode) : G8403A	Pass	1
Background (Gas Modes) : G8403A	Pass	1
20-Minute Stability (No Gas Mode) : G8403A	Pass	1

Overall Qualification Status  
Pass

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## Service Details

### Purpose

This section includes local contact and delivery details for this service.

### General Details

Service Order No./Request: 6004937154  
EQP Name: AgilentRecommended  
EQP Revision: ICMS.02.50  
Report Type: Report

### Organization Details

Name: ALS Laboratory Group (Thailand) Co., Ltd.  
Location: 104 Phatnakarn 40, Suan Luang, Bangkok 10250.

### Local Contact Details

Name: Chatchanal Komerokul  
Job Title: Manager  
Qualification Location: Laboratory

### Operator Details

Name: Petchep Kurasathin  
Job Title: Field Service Engineer.

### Data Acquisition Details

Acquisition Software Name: MassHunter  
Acquisition Software Revision: C.01.04

Customer Data System (CDS): icpM: MassHunter

Date: September 30, 2021 4:07:18 PM  
System ID: JP15471169

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## Instrument Details

### Purpose

This section describes the as found system configuration.

### Details

#### ICP-MS 1

Manufacturer: Agilent Technologies  
Name: 7600  
Model Number: G8403A  
Installed Options: #100H Standard Package with Hydrogen option  
Detector Type: SQ  
Nebulizer: Mista Mat (G3161)  
Spray Chamber: Quartz  
 Torch: Quartz  
Sampling Cone: NI  
Skimmer Cone: NI  
Serial Number: JP15471169  
Firmware Revision: C.01.04

#### ISIS 1

Manufacturer: Agilent Technologies  
Name: ISIS3  
Model Number: G8411A  
Type: Peristaltic pump system  
Serial Number: JP15510227

#### Autosampler 1

Manufacturer: Agilent Technologies  
Name: SPS4  
Model Number: G8410A  
Serial Number: AU15430722

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### Chiller 1

Manufacturer: Agilent Technologies  
Name: Chiller  
Model Number: G3292A  
Serial Number: SU1610713

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## Calculation Formulas

### Purpose

This section includes calculation formulas for all available tests. Depending upon which tests are scheduled, all or some apply to your qualification.

For a description of calculations for ICP-MS tests performed by the MassHunter software, refer to the MassHunter application and documentation.

Date: September 30, 2021 4:07:18 PM  
System ID: JP15471169

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## Protocol Details

## Purpose

This section lists the revisions for all test units used in this report. For complete test-specific and high-level change details, refer to the Revision History document.

Test Revision	Test
ICPMS.02.50	20-Minute Stability (No Gas Mode)
ICPMS.02.50	Autosampler Check
ICPMS.02.50	Autotune
ICPMS.02.50	Background (Gas Modes)
ICPMS.02.50	Background (No Gas Mode)
ICPMS.02.50	Integrated Sample Introduction System (ISIS) Check

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## Autosampler Check

## Purpose

This test demonstrates that the autosampler module is correctly installed and connected. It does not test module performance.

## Setpoint

## Results

Criteria	Observed Result	Expected Result	Status
After the self test, is the probe in the home position?	Yes	Yes	Pass
As commanded, is the probe positioned at vial 2?	Yes	Yes	Pass
Setpoint Status:	Pass		Run: 1

## Overall Autosampler Check Test Status

Pass

Date: September 30, 2021 4:07:18 PM  
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## Integrated Sample Introduction System (ISIS) Check

## Purpose

This test demonstrates that the ISIS module is correctly installed and connected. It does not test module performance.

## Setpoint

## Results

Criteria	Observed Result	Expected Result	Status
As commanded, does the pump rotate?	Yes	Yes	Pass
As commanded, do the valves load and inject?	Yes	Yes	Pass
Setpoint Status:	Pass		Run: 1

## Overall Integrated Sample Introduction System (ISIS) Check Test Status

Pass

Date: September 30, 2021 4:07:18 PM  
System ID: JP15471169

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## Autotune

## Purpose

This test uses traceable checkout standards to run a software-executed autotune in all modes. The tune report provides values for peak width, mass axis, sensitivity, oxide species, and doubly-charged species tests.

## Setpoint

## Results

Peakwidth Mass 7	0.719	AMU
Agilent Recommended:	>= 0.65	
	<= 0.80	
Status:	Pass	
Peakwidth Mass 89	0.750	AMU
Agilent Recommended:	>= 0.65	
	<= 0.80	
Status:	Pass	
Peakwidth Mass 205	0.713	AMU
Agilent Recommended:	>= 0.65	
	<= 0.80	
Status:	Pass	
Mass Axis 7	7.05	AMU
Agilent Recommended:	>= 6.8	
	<= 7.1	
Status:	Pass	
Mass Axis 89	88.85	AMU
Agilent Recommended:	>= 88.0	
	<= 89.1	
Status:	Pass	
Mass Axis 205	205.00	AMU
Agilent Recommended:	>= 204.9	
	<= 205.1	
Status:	Pass	

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## Mass 7 Sensitivity No Gas

Agilent Recommended:

Status:

34.28 Mcps/ppm

Pass

## Mass 89 Sensitivity No Gas

Agilent Recommended:

Status:

307.15 Mcps/ppm

Pass

## Mass 205 Sensitivity No Gas

Agilent Recommended:

Status:

203.77 Mcps/ppm

Pass

## Mass 59 Sensitivity He

Agilent Recommended:

Status:

28.39 Mcps/ppm

Pass

## Mass 89 Sensitivity H2

Agilent Recommended:

Status:

129.27 Mcps/ppm

Pass

## Oxide Ratio 156/140

Agilent Recommended:

Status:

1.047 %

Pass

## Doubly Charged Species Ratio 70/140

Agilent Recommended:

Status:

1.482 %

Pass

Setpoint Status:

Pass

Runs: 1

## Overall Autolone Test Status

Pass

Date: September 30, 2021 4:07:18 PM  
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## Background (No Gas Mode)

Purpose

This test examines the background of the ICP-MS in no gas mode by monitoring ions during a blank run.

Setpoint

Conditions

Masses:

7 AMU  
89 AMU  
205 AMU

Measurements and Results

Masses (AMU):

Measured Value:

Agilent Recommended:

Status:

Masses (AMU)	Measured Value	Agilent Recommended	Status
7	1.200	6.8	Pass
89	3.300	4.6	Pass
205	9.900	11.5	Pass

Setpoint Status:

Pass

Runs: 1

Overall Background (No Gas Mode) Test Status

Pass

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System ID: JP15471169

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## Background (Gas Mode)

Purpose

This test examines the background of the ICP-MS in the various gas modes by monitoring ions during a blank run.

Setpoint Gas Mode: Helium

Conditions

Mass:

Integration Time:

Cycles:

78 AMU

1.0 sec

20

Measurements and Results

Mass (AMU):

Measured Value:

Agilent Recommended:

Status:

Mass (AMU)	Measured Value	Agilent Recommended	Status
78	42.8500	115	Pass

Setpoint Status:

Pass

Runs: 1

Setpoint Gas Mode: Hydrogen

Conditions

Mass:

Integration Time:

Cycles:

78 AMU

1.0 sec

20

Measurements and Results

Mass (AMU):

Measured Value:

Agilent Recommended:

Status:

Mass (AMU)	Measured Value	Agilent Recommended	Status
78	2.1500	4.6	Pass

Setpoint Status:

Pass

Runs: 1

Overall Background (Gas Mode) Test Status

Pass

Date: September 30, 2021 4:07:18 PM  
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## 20-Minute Stability (No Gas Mode)

Purpose

This test monitors the abundance of ions present in the checkout standard over a 20-minute period to verify that the signal is stable. The %RSD of the abundance of given ions is calculated internally by the software and compared to the limit.

Setpoint

Conditions

Mode:

Masses:

Integration Time:

Peak Pattern:

Repetitions:

Sweep/Replicates:

Mode	Masses	Integration Time	Peak Pattern	Repetitions	Sweep/Replicates
Spectrum	7, 8, 56, 89, 140, 205	9.69 sec	3 point/peak	20	100

Measurements and Results

Masses (AMU):

Stability RSD:

Agilent Recommended:

Status:

Masses (AMU)	Stability RSD	Agilent Recommended	Status
7	0.96400	2.3	Pass
89	0.51495	2.3	Pass
205	0.73011	2.3	Pass

Setpoint Status:

Pass

Runs: 1

Overall 20-Minute Stability (No Gas Mode) Test Status

Pass

Date: September 30, 2021 4:07:18 PM  
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## Declaration of Change Control

This document is under change control. Revision history is maintained and printed on each document. Access to the master documents is limited to process owners. Documents receive periodic review and cannot be assigned an evergreen status. The qualification performed according to this document refers only to the hardware/software configuration in place at the time of the qualification. Agilent Technologies recommends that instrument configuration change management procedures be in place in order to maintain the validation process. Any changes to the analytical or computer hardware or software must be clearly specified. A change management system provides a means for determining the degree of requalification required according to the extent of the changes made. All details of the changes must be thoroughly recorded and documented, together with details of completed tests and their results. Note: Hardware/software configuration management is the customer's responsibility.

Date: September 30, 2021 4:07:18 PM  
System ID: JP15471169

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## Attachments

Training requirements note: The delivery engineer attaches an ACE technique-specific training certificate to the Equipment Qualification Report (EQR). Obtaining ACE technique-specific certification includes pre-require training for Data Integrity, General Compliance topics (GMP, GLP, ALCOA, etc.), instrument hardware and software components, and the ACE technique itself. The one certificate encompasses all pre-require trainings as documented in the Agilent Learning Management System called Success Factors.

Location	Category	Document Name	Page
EQR	General	Certificate of System Qualification	18
EQR	General	Operator's training certificate and qualifications	19
EQR	General	Certificate of Qualification for ACE	20
EQR	General	Certificate of Qualification for ACE	21
EQR	General	Tune reports	22
EQR	General	Test Report	25
EQR	General	Test Report	27
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General

Document Name: Certificate of System Qualification



### Agilent Compliance Engine Self Qualification

Date: September 14, 2021 4:09:10 PM  
Drive Serial #: ACA23120 Platform Revision: ACE 3.11

Individual self-qualification reports for each specific technique installed are also available upon request. They provide additional details on the general report from the customer summary and are structured by the actual algorithms changed during the process. There is not a one-to-one relationship between algorithms and CE program tests because some algorithms are used by several tests and across multiple similar hardware components of the installed systems.

Technique Type	Tests Completed	Result
Atomic Absorption	7	Conforms
Capillary Electrophoresis	10	Conforms
Dissolved	6	Conforms
Emission Spectroscopy	3	Conforms
Gas Chromatography - GCMS	17	Conforms
Gas Chromatography	26	Conforms
Gas Permeation Chromatography	9	Conforms
ICP-MS	6	Conforms
Infrared Spectroscopy	7	Conforms
Liquid Chromatography	17	Conforms
Liquid Chromatography - LCMS	5	Conforms
Microfluidics	18	Conforms
Sample Preparation - Gas Chromatography	6	Conforms
Sample Preparation - Liquid Chromatography	6	Conforms
Supercritical Fluid Chromatography	15	Conforms
Software	6	Conforms
UV-Vis Spectrophotometer	13	Conforms

Overall Qualification Status  
Conforms

Date: September 30, 2021 4:07:18 PM  
System ID: JP15471169

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General

Document Name: Operator's training certificate and qualifications



### Certificate of Completion

Learner Name: Pandey, Kurnashin  
Title Of Course: AN-CE-ICPMS-2-018-Agilent 7900 ICPMS PSE update training  
Completion Date: June 9, 2014  
Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

Date: September 30, 2021 4:07:18 PM  
System ID: JP15471169

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General

Document Name: Certificate of Qualification for ACE

Agilent Technologies

## Certificate of Completion

Learner Name: Parthiv Kumbhakar

Title Of Course: AN-CE-SS-15-030-A: ACE 3.X User Update Training

Completion Date: July 7, 2020

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations.

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Date: September 30, 2021 4:57:18 PM  
System ID: JP15471169

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General

Document Name: Certificate of Qualification for ACE

Agilent Technologies

## Certificate of Completion

Learner Name: Parthiv Kumbhakar

Title Of Course: AN-CE-ACPM-2-035-B: CrossLab Compliance Hardware Specific Delivery for Agilent ICP-AES Systems

Completion Date: October 21, 2020

Certified By Company: Learning at Agilent

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Date: September 30, 2021 4:57:18 PM  
System ID: JP15471169

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General

Document Name: Tune reports

## Tune Report

Operator Name: Supriya Kulkarni

App/Code Book: C:\Agilent\CPM\750\Tune\_75003

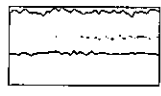
App Code Title: 2021-08-30 14:44:59

Report Document: 00 30 849 2021

Instrument Name: G4343A JP15471169

No Gas

Sensitivity



Item	Range	Count	%CV	Integration
7	1000	1423	2.29	3.220
48	30000	28219	1.89	3.220
128	30000	28219	1.21	3.220

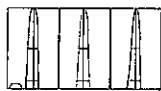
Sampling Period (sec): 0.211  
Integration Time (sec): 6.1

Outer/Ready Charged Ratio

Outer: 100/140 1.407 %

Ready Charged: 70/140 1.428 %

Penetration/State



Item	Penetration	Area	%Area	%CV
7	3474.83	2.25	5.43	2.79
48	20774.4	18.26	1.89	3.791
128	22046.12	198.88	1.12	12.73

Integration Time (sec): 0.1  
Acquisition Time (sec): 10.34

Tune Parameters

Plasma Parameters

RF Power	1600 W	Inductance Gas	1.00 L/min	Neon Gas	0.10 L/min
RF Matching	1.18 V	Optical Gas	—	Auxiliary Gas	0.80 L/min
Sample Depth	5.0 mm	Inductance Pump	0.16 psi	Plasma Gas	15.0 L/min
		RF Torque	2.7		

Lens Parameters

Electrode 1	8.0 V	Orange Lens	5.1 V	Orifice	15.8 V
Electrode 2	-305.0 V	Cell Entrance	-30 V	Flow Blank	-30 V
Orange Box	-90 V	Cell Exit	-40 V		

Gas Parameters

Use Gas	No	3rd Gas Flow	—	Energy Distribution	5.0 V
In Flow	0.0 mL/min	OCF Bias	-8.0 V		

1 of 3

2021-08-30 2:44 PM

Date: September 30, 2021 4:57:18 PM  
System ID: JP15471169

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Document Name: Tune reports

Tune reports

## Tune Report

RF Power: 0.8 mL/min

OCF Bias: 190 V

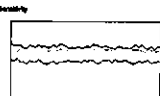
OCF Parameters

Sample Gas	124	Aux Gas	8.860	OCF Bias	-3.0 V
Sample Depth	128	Aux Offset	0.21		

Hardware Settings

Torch	0.1 mm	Torch V	0.1 mm		
Electrode	4.0 mm	Analysis HV	2347 V	Pulse HV	1218 V

Sensitivity



Item	Range	Count	%CV	Integration
7	1000	1423	2.29	3.220
48	30000	28219	1.89	3.220
128	30000	28219	1.21	3.220

Sampling Period (sec): 0.211  
Integration Time (sec): 6.1

Outer/Ready Charged Ratio

Outer: 100/140 1.407 %

Ready Charged: 70/140 1.428 %

Tune Parameters

Plasma Parameters

RF Power	1600 W	Inductance Gas	1.00 L/min	Neon Gas	0.10 L/min
RF Matching	1.18 V	Optical Gas	—	Auxiliary Gas	0.80 L/min
Sample Depth	5.0 mm	Inductance Pump	0.16 psi	Plasma Gas	15.0 L/min
		RF Torque	2.7		

Lens Parameters

Electrode 1	8.0 V	Orange Lens	5.1 V	Orifice	15.8 V
Electrode 2	-305.0 V	Cell Entrance	-30 V	Flow Blank	-30 V
Orange Box	-90 V	Cell Exit	-40 V		

Gas Parameters

Use Gas	No	3rd Gas Flow	—	Energy Distribution	5.0 V
In Flow	0.0 mL/min	OCF Bias	-8.0 V		

2 of 3

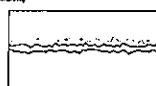
2021-08-30 2:44 PM

Date: September 30, 2021 4:57:18 PM  
System ID: JP15471169

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## Tune reports

ED					
Detector	4.8 mV	Amplifier	2247 V	Pulse Ht	1216 V



Mile	Range	Count	ACC%	Background
90	8000	2630	3.360	1.000
99	8000	2148	3.300	1.200
104	90000	1473	2.845	4.100

Sampling Period (sec)	0.25
Integration Time (sec)	0.1

#### Editorial Board

Onix	158/140 0.458 %
Deeply Charged	70/140 0.718 %

**Total Remittance**

### Third-Party Providers

**Plasma Purification**

Plasma Ionize	—	Hydrogen Gas	1.00 L/min	Neonup Gas	0.10 L/min
Rf Power	1360 W	Oxygen Gas	—	Auxiliary Gas	0.80 L/min
RF Matching	1.1 V	Hydrogen Pump	5.10 psi	Plasma Gas	15.0 L/min
Source Voltage	5.00 psi	DC Temp	—		
<b>Lamp Parameters</b>					
Exposure 1	0.3 V	Orange Lens	5.2 V	Discharge	12.4 V
Exposure 2	0.25 V	Red Exposure	-21 V	Photo Bias	-100 V
Orange to IR	-102 V	Ext Lens	-30 V		
<b>Gas Parameters</b>					
Gas Flow	—	3rd Gas Flow	—	Energy Distribution	3.3 V
1st Flow	2.8 s/L/min	Out Bld	-0.3 V		
2nd Flow	0.5 s/L/min	Out P	2.6 V		
<b>QF Parameters</b>					
Main Gals	134	Air Gals	0.930	QF Bias	-1.8 V
Mass Offset	138	Chk Offset	8.75		
<b>Hardware Settings</b>					
Temp	—	Temp V	5.1 psi		
Temp H	-0.2 psi				
<b>EM</b>					
Discriminator	4.8 mV	Analog HV	220 V	Pulse HV	1310 V

343

2021-05-20 2:41 PM

Date: September 30, 2021 4:07:18 PM  
System ID: JP15471169

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Document Name: Test Report

### Batch Summary Report

Match Folder: C:\Arch201\F06 H&M  
Analysis File: B0 H&March.m/a  
Tune State: 0.1 Hz

	Set	Acc Date/Time	Data File	Sample Name	Type	Level	DR/Don
1		2021-08-30 16:27:47	8016.ms	8016	Sample		1.0000

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2021-09-30 14:23:39

Date: September 30, 2021 4:07:15 PM  
System ID: JP15471189

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iTest Report

### Batch Summary Report

Analyte Table		Tr. Time
	Sample Name	CPS
1	ACI 100	423000

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2021-08-30 14:23:45

Date: September 30, 2021 4:07:18 PM  
System ID: JP16471189

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Document Name: Test Report

### Batch Summary Report

Batch Folder: D:\Agilent\Service\0030 Sep 2023\BQ H2 new batch  
Analysis File: BQ H2 new batch.bin  
Data Source: 8.1.10

	Site	Acc Data Type	Data File	Sample Name	Time	Level	Duration
1		2021-09-30 11:00:50	80_H2.6	80_H2	Sample		1.000

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2021-08-30 15:10:11

Date: September 30, 2021 4:07:16 PM  
System ID: JP15471169

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Document Name: Test Report

## Batch Summary Report

Analysis Table	
Sample Name	CPS
1 80.92	3.1500

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2021-09-30 15:10:31

Date: September 30, 2021 4:07:18 PM  
System ID: JP15471160

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General

Document Name: Test Report

## Batch Summary Report

Batch Folder: 0:\Agilent Servers\J20 Sep 2021\20 Min  
Analysis File: 20 Min Batch Run  
Time Stamp: 4:10:00 PM

Seq	Anl Date/Time	Batch File	Sample Name	Time	Level	Religion
1	2021-09-30 15:10:31	20 Min Batch	CPS	3.1500		1.0000

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2021-09-30 15:04:42

Date: September 30, 2021 4:07:18 PM  
System ID: JP15471160

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Document Name: Test Report

## Batch Summary Report

Analysis Table	
Sample Name	CPS
1 80.92	3.1500

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2021-09-30 15:04:42

Date: September 30, 2021 4:07:18 PM  
System ID: JP15471160

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## Electronic Signature

## Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and login to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

## Details

Full Name of Signer: Panthep Kurasthain  
Logged On User Name: panthep\_kurasthain@agilent.com  
Signature Creation Date: September 30, 2021  
Reason for Signature: Executed protocol and published this original version of document

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Date: September 30, 2021 4:07:18 PM  
System ID: JP15471160

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User Name: panthap\_jurassitah  
Hostname: ASB00W0215  
System ID: JP15471168  
Print Date: September 30, 2021 4:07:23 PM

## ALS QGMW 7500 30Sep21 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 30, 2021 3:50:07 PM	Audit	Session Created	Session	None
September 30, 2021 3:50:07 PM	Start	Configuration	Session	None
September 30, 2021 3:50:07 PM	Audit	End Session	Session	User is Field Engineer and does not receive an unlock code
September 30, 2021 3:52:23 PM	Audit	Explained	Session	EQP details for primary technique (GC/MS): File path: (Protocol Paths/CPL/MS/Config/urionline02/30Sep21/02 MS-AQS-EQP File Name: (GC/MS/02/02/02) EQP Name: (Agilent Recommended)
September 30, 2021 3:52:24 PM	End	Configuration	Session	None
September 30, 2021 3:52:57 PM	Start	Qualification	Session	OQ
September 30, 2021 3:52:57 PM	Start	Execution	Autosampler Check: SPSS: Autosampler Check	None
September 30, 2021 3:53:03 PM	End	Execution	Autosampler Check: SPSS: Autosampler Check	Run Count: 1
September 30, 2021 3:53:04 PM	Start	Execution	Integrated Sample Introduction System (ISIS) Check: ISIS: Integrated Sample Introduction System (ISIS) Check	None
September 30, 2021 3:53:08 PM	End	Execution	Integrated Sample Introduction System (ISIS) Check: ISIS: Integrated Sample Introduction System (ISIS) Check	Run Count: 1

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Date: September 30, 2021 4:07:18 PM  
System ID: JP15471168

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User Name: panthap\_jurassitah  
Hostname: ASB00W0215  
System ID: JP15471168  
Print Date: September 30, 2021 4:07:23 PM

## ALS QGMW 7500 30Sep21 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 30, 2021 3:53:10 PM	Start	Execution	Audit: G0403A: Autosampler 1	None
September 30, 2021 3:53:58 PM	End	Execution	Audit: G0403A: Autosampler 1	Run Count: 1
September 30, 2021 3:55:12 PM	Start	Execution	Background (No Gas Mode): G0403A: No Gas Mode Background 1	None
September 30, 2021 3:56:45 PM	End	Execution	Background (No Gas Mode): G0403A: No Gas Mode Background 1	Run Count: 1
September 30, 2021 3:56:45 PM	Start	Execution	Background (Gas Mode): G0403A: Gas Mode Background 1	None
September 30, 2021 3:58:17 PM	End	Execution	Background (Gas Mode): G0403A: Gas Mode Background 1	Run Count: 1
September 30, 2021 3:58:18 PM	Start	Execution	Background (Gas Mode): G0403A: Gas Mode Background 1	None
September 30, 2021 3:58:26 PM	End	Execution	Background (Gas Mode): G0403A: Gas Mode Background 1	Run Count: 1
September 30, 2021 3:58:41 PM	Start	Execution	20-Minute Stability (No Gas Mode): G0403A: 20-Minute Stability (No Gas Mode) 1	None
September 30, 2021 3:57:22 PM	End	Execution	20-Minute Stability (No Gas Mode): G0403A: 20-Minute Stability (No Gas Mode) 1	Run Count: 1
September 30, 2021 3:57:24 PM	End	Qualification	Session	OQ
September 30, 2021 3:57:24 PM	Start	Reporting	Session	None

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Date: September 30, 2021 4:07:18 PM  
System ID: JP15471168

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User Name: panthap\_jurassitah  
Hostname: ASB00W0215  
System ID: JP15471168  
Print Date: September 30, 2021 4:07:23 PM

## ALS QGMW 7500 30Sep21 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 30, 2021 4:03:07 PM	Audit	Reporting	Session	Report Generated: Certificate
September 30, 2021 4:03:17 PM	Audit	Reporting	Session	Report Generated: Report
September 30, 2021 4:03:58 PM	Start	Qualification	Session	OQ
September 30, 2021 4:04:08 PM	End	Qualification	Session	OQ
September 30, 2021 4:04:08 PM	Start	Reporting	Session	None
September 30, 2021 4:04:26 PM	Audit	Reporting	Session	Report Generated: Certificate
September 30, 2021 4:04:26 PM	Audit	Reporting	Session	Report Generated: Report

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Date: September 30, 2021 4:07:18 PM  
System ID: JP15471168

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## Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, 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. T220730

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 Phothanankan 40, Phatthanakan Rd., Khwaeng Phatthanakan,  
Khet Suan Luang, Bangkok 10250

Customer Location : Acid Digestion Lab

Date of Receipt : 30 March 2022

Calibrated By : Watcharapon Sangtong (Technician)

Approved By :  / Sujar Naknakred (Site Calibration Manager)

Date of Issue : 12 APR 2022

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.



Certificate No. T220730

Page 2 of 6

### Calibration Report

Equipment : HEATING BLOCK  
Date of Calibration : 7 April 2022  
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 nine standard thermocouples type T into its chamber, the other one standard thermocouples type T use for ambient temperature measurement. The calibration was done in according to WI-T20.

All data show below were final values and the initial data from customer request. The temperature scale used was based on ITS - 90.

#### 2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN231-TN230	T210008	08 June 2022
TC	TYPE T	TN231-TN240	T210008	08 June 2022
DATA LOGGER	34970A	T149	T210008	08 June 2022

#### 3. This certificate is traceable to :

National Institute of Metrology ( Thailand ) through Metrological Center ( NSC-TISI-TIS 17025 CALIBRATION 0244 )

#### 4. Condition of calibrated item : good

##### Equipment Description :

Time Constant : 2 Hour 25 Minute At 95 °C  
Fresh Air Damper : ☐ Open ☐ Min ☐ Medium ☐ Max  
☐ Close  
☒ Not Available

#### 5. Adjustment :

( ) without adjustment ( X ) after adjustment

Approved By: \_\_\_\_\_

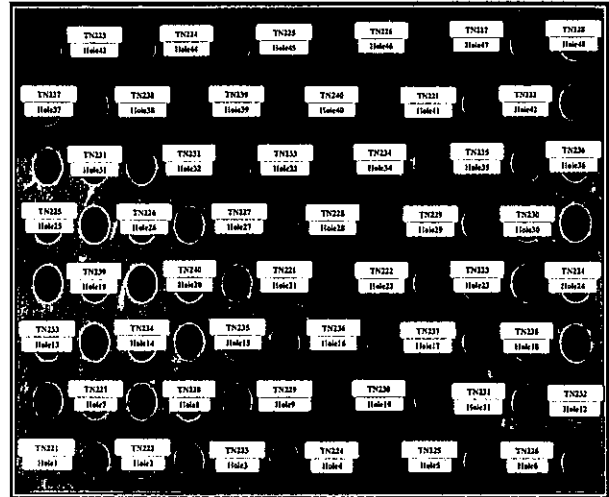
FM-L13 108/30-05-57



Certificate No. T220730

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### Calibration Report



FRONT CONTROL

Approved By: \_\_\_\_\_

FM-L13 108/30-05-57



Certificate No. T220730

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### Calibration Report

#### Measurement Results

Calibration Point		Average Standard Reading at each position (°C)					
R1 Hole1-Hole6		TN221	TN222	TN223	TN224	TN225	TN226
CAL POINT	Max	93.60	93.82	94.05	94.20	94.36	94.26
	Min	93.07	93.26	93.51	93.66	93.82	93.71
	Average	93.33	93.54	93.78	93.93	94.09	93.98
R2 Hole7-Hole12		TN227	TN228	TN229	TN230	TN231	TN232
Max		94.59	94.79	94.63	94.55	94.82	95.00
		94.05	94.25	94.08	93.97	94.26	94.44
		94.32	94.52	94.36	94.26	94.54	94.72
R3 Hole13-Hole18		TN233	TN234	TN235	TN236	TN237	TN238
Max		95.01	94.54	94.78	94.84	95.06	94.77
		94.46	93.98	94.20	94.28	94.49	94.18
		94.74	94.26	94.49	94.56	94.78	94.45
R4 Hole19-Hole24		TN239	TN240	TN221	TN222	TN223	TN224
Max		94.89	94.82	95.73	95.85	95.73	96.10
		94.33	94.26	95.51	95.62	95.51	95.83
		94.61	94.54	95.62	95.73	95.62	95.97
R5 Hole25-Hole30		TN225	TN226	TN227	TN228	TN229	TN230
Max		96.28	96.39	96.37	96.54	96.19	96.64
		96.01	96.10	96.02	96.20	95.89	95.71
		96.15	96.24	96.20	96.37	96.04	95.88
R6 Hole31-Hole36		TN231	TN232	TN233	TN234	TN235	TN236
Max		96.84	96.97	97.03	96.48	96.33	95.76
		96.53	96.65	96.71	96.08	95.96	95.43
		96.68	96.81	96.87	96.28	96.16	95.60
R7 Hole37-Hole42		TN237	TN238	TN239	TN240	TN221	TN222
Max		96.46	96.13	96.19	96.06	96.95	97.09
		96.13	95.84	95.83	95.72	96.64	96.78
		96.30	95.99	96.02	95.89	96.80	96.93
R8 Hole43-Hole48		TN223	TN224	TN225	TN226	TN227	TN228
Max		96.91	96.58	96.13	96.19	96.34	96.19
		96.55	96.21	95.80	95.87	96.03	95.88
		96.73	96.40	95.96	96.03	96.18	96.03

Approved By: \_\_\_\_\_

FM-L13 108/30-05-57



Certificate No. T220730

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### Calibration Report

#### Measurement Results

Calibration Point		Average Standard Reading at each position (°C)					
R1 Hole1-Hole6		TN221	TN222	TN223	TN224	TN225	TN226
CAL POINT	Max	104.47	104.63	104.79	105.31	105.47	105.46
	Min	104.15	104.27	104.45	104.98	105.14	105.20
	Average	104.31	104.46	104.62	105.15	105.31	105.33
R2 Hole7-Hole12		TN227	TN228	TN229	TN230	TN231	TN232
Max		105.55	105.73	105.65	105.84	105.97	106.07
		105.28	105.43	105.35	105.52	105.68	105.83
		105.43	105.58	105.50	105.68	105.82	105.95
R3 Hole13-Hole18		TN233	TN234	TN235	TN236	TN237	TN238
Max		106.14	106.06	105.81	106.05	105.81	105.87
		105.85	105.81	105.55	105.80	105.53	105.64
		106.00	105.94	105.68	105.92	105.67	105.75
R4 Hole19-Hole24		TN239	TN240	TN221	TN222	TN223	TN224
Max		105.86	105.60	104.44	104.51	104.28	104.78
		105.61	105.37	104.27	104.35	104.12	104.61
		105.74	105.48	104.33	104.43	104.20	104.69
R5 Hole25-Hole30		TN225	TN226	TN227	TN228	TN229	TN230
Max		104.94	104.93	104.97	105.08	104.68	104.69
		104.77	104.75	104.76	104.90	104.51	104.49
		104.85	104.84	104.86	104.99	104.60	104.59
R6 Hole31-Hole36		TN231	TN232	TN233	TN234	TN235	TN236
Max		105.44	105.45	105.61	104.95	104.84	104.42
		105.27	105.27	105.44	104.76	104.66	104.25
		105.36	105.36	105.53	104.86	104.75	104.33
R7 Hole37-Hole42		TN237	TN238	TN239	TN240	TN221	TN222
Max		105.17	104.70	104.59	104.51	105.22	105.53
		105.00	104.53	104.41	104.35	105.04	105.37
		105.08	104.62	104.50	104.43	105.13	105.45
R8 Hole43-Hole48		TN223	TN224	TN225	TN226	TN227	TN228
Max		105.61	105.45	105.10	104.77	104.87	105.02
		105.44	105.28	104.92	104.60	104.70	104.85
		105.53	105.37	105.01	104.69	104.79	104.93

Approved By: \_\_\_\_\_

FM-L13 108/30-05-57





Certificate No. T220730

Page 5 of 6

## Calibration Report

### Measurement Results:

Setting (°C)	HEATING BLOCK		Temperature Distribution	
	Reading (°C)		Stability (°C)	Uncertainty (°C)
	Min, Max	Average		
100.0	100.0, 100.4	100.1	0.29	0.83
105.0	105.0, 105.4	105.1	0.20	0.79

\* The quoted uncertainty exclude " uniformity "

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By: \_\_\_\_\_

FM-L13 106/30-05-57



Certificate No. T211009

Page 1 of 4

## Certificate of Calibration

Equipment : Chamber (Cold Room)

Manufacturer : KOLDTECH

Model : KM 320

Serial No. : TBN-1012061/05

Customer Code : BKK\_EN0167

ID No. : T2463A3

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,  
Khet Suan Luang, Bangkok 10250

Customer Location : Laboratory

Date of Receipt : 6 May 2021

Calibrated By : Watcharapon Songthong (Technician)

Approved By : Sam Loo / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 20 MAY 2021

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-L14 117/01-02-64



Certificate No. T211009

Page 2 of 4

## Calibration Report

Equipment : Chamber (Cold Room)

Date of Calibration : 18 May 2021

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	T210009	8 January 2022
TC	TYPE T	TN171-TN180	T210009	8 January 2022
DATA LOGGER	34970A	T149	T210009	8 January 2022

### 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 - Minute At 3 °C

Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max

☐ Close

☒ Not Available

### 5. Adjustment :

( X ) without adjustment

( ) after adjustment

Approved By: Sam Loo

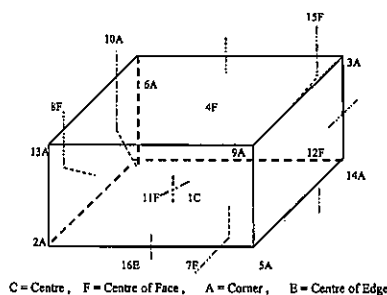
FM-L15 117/15-05-63



Certificate No. T211009

Page 3 of 4

## 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: Sam Loo

FM-L15 117/15-05-63



Certificate No. T211009

Page 4 of 4

## Calibration Report

### Measurement Results

Calibration Point	Average Standard Reading at each position (°C)									
	TN161	TN162	TN163	TN164	TN165	TN166	TN167	TN168	TN169	TN170
3	3.23	3.18	3.23	3.41	3.36	3.52	3.51	3.11	3.29	3.50
	TN171	TN172	TN173	TN174	TN175	TN176				
	3.36	3.18	3.52	3.22	3.28	3.31				

Chamber (Cold Room)			Temperature Distribution					
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage Factor k	
	Min	Max						
3.0	2.7	3.4	3.0	3.34	1.00	1.10	1.46	2.00

\* The Assorted 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-L1511/15-05-63



Cert.No.: 21TW20  
Page.: 1 of 2

## Certificate of Testing

Equipment : DO Meter  
Manufacturer : YSI  
Model : 5100  
Serial No. : 15L102139  
ID No. : RYG\_EN0140  
Received Date : 29 January 2021  
Test Date : 02 February 2021  
Reference : 2101-0817DSC-1  
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.  
Rayong Branch  
Eastern Seaboard Industrial Estate (Rayong)  
64/77 Moo 4,Building No.81, Highway 331,  
Km91.5, T.Pluakdaeng, A.Pluakdaeng,  
Rayong 21140 Thailand

Laboratory Condition : Temperature (25 ± 5) °C  
Humidity (50 ± 20) %  
Test Procedure : In-house method : CP-CH9  
by Comparison Technique with Azide Modification Method

Calibrated by : Welelek Srihean

Approved by :   
Approved Signatory

( / ) Malee Butkruea  
( / ) Sathip Meangmai  
( / ) Warakorn Lemagabrakul

Issue Date : 3 February 2021

REVIEW BY	
APPROVED BY	
NEXT CAL. DATE	3/8/22

B 0252485



Cert.No.: 21TW20  
Page.: 2 of 2

Result : Dissolved Oxygen Meter Adjustment With Air 100 %  
Dissolved Oxygen Probe No.: 16C100647

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.02	8.02	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

-000-

a 1038971



Cert. No.: 21TM271  
Page.: 1 of 2

## Certificate of Calibration

Equipment : DO Meter with Sensor  
Manufacturer : YSI  
Model : 5100  
Serial No. : 15L102139  
ID No. : RYG\_EN0140  
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch  
Eastern Seaboard Industrial Estate (Rayong)  
64/77 Moo 4 Building No.81, Highway 331 km. 91.5,  
T. Pluakdaeng, A. Pluakdaeng, Rayong 21140 Thailand  
Location : TPA On Site Calibration Laboratory

Received Order : 29 January 2021  
Calibrated Date : 3 February 2021  
Ambient Temperature : (26 ± 10) °C  
Relative Humidity : (50 ± 30) %  
AC Line Voltage : (220 ± 22) V

Calibrated by : Malee Butkruea

Approved by :   
Approved Signatory

( / ) Pornthippa Tameyayakul  
( / ) Suwit Imjai

Issue Date : 4 February 2021

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0024028



Equipment : DO Meter with Sensor  
Condition As-Received : Used Item  
Reference : 2101-0617DSC-2

Cert. No.: 21TM271  
Page: 2 of 2

#### Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.  
The temperature scale used was based on ITS-90.

#### Condition of this result of calibration

##### 1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Digital Thermometer	1523	2188080	201389	20 Nov 2021

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 maintained at:-

- National Institute of Metrology Thailand (NIMT)

Result of Calibration :- ( \* ) Without Adjustment

Function : Temperature measurement.

This instrument was connected with temperature sensor, S/N: 18C100647

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (±°C)	Coverage Factor k
20.00	60	20.008	19.96	-0.048	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 %.

-o-o-

a 1038626



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
5544 PATTANAKARN ROAD SOE 16, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3018-21 FAX. 0-2719-9484



## Certificate of Calibration

Cert. No.: 22TM317  
Page: 1 of 3

Equipment : Low Temp. Incubator

Manufacturer : Memmert

Model : IPP750

Serial No. : V818.0084

ID No. : RYG\_EN0154

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

Location :

Received Order : 22 April 2022  
Calibration Date : 22 April 2022  
Ambient Temperature : ( 26 ± 10 ) °C  
Relative Humidity : ( 50 ± 30 ) %

Calibrated by : Man Pattanapongpalboon

Approved by :

( ) Pornthipps Tameyakul  
( / ) Malee Burkrua  
( ) Suwit Injai

Issue Date : 3 May 2022

The Uncertainties are for a confidence probability of approximately 95 %

This certificate may not be reproduced other than in full, except with the prior written  
Approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.

A 0040735



Equipment : Low Temp. Incubator  
Condition As-Received : Used Item  
Reference : 2204-0146OC-1

Cert. No.: 22TM317  
Page: 2 of 3

#### Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement.  
The temperature scale used was based on ITS-90.

#### Condition of this result of calibration

##### 1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY44031769	21LM12	02 Sep 2022

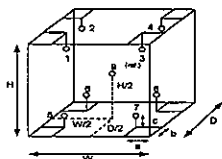
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- ( \* ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close



Probe Installation Details : Dimension of Chamber :  
a = 10 cm D = 0.80 m  
b = 10 cm W = 1.0 m  
c = 10 cm H = 1.2 m  
Capacity = 0.75 m<sup>3</sup>

Environment during calibration		
	Beginning	Finished
Temp. (°C)	25	25
REL.Humid. ( % )	54	58
AC Supply ( Volt )	221	223

Position :	Ref. Std. ID No.:
1	9RTD-21
2	9RTD-22
3	9RTD-23
4	9RTD-24
5	9RTD-25
6	9RTD-26
7	9RTD-27
8	9RTD-28
9 (ref.)	9RTD-29

a 1106485



Equipment : Low Temp. Incubator  
Condition As-Received : Used Item  
Reference : 2204-0146OC-1

Cert. No.: 22TM317  
Page: 3 of 3

Result of Calibration :- ( \* ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (±°C)	Coverage Factor k
20.0	20.0	20.0	0.022	0.20	0.22	0.30	2

Measured Temperature (°C)									
Calibration Point (°C)	1	2	3	4	5	6	7	8	9 (ref.)
20.0	20.209	20.174	20.199	20.110	20.075	20.062	20.027	20.069	20.030

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 %.

-o-o-

a 1106484



RYG\_EN0002

**PENTA CALIBRATION CO., LTD.**  
66/124 The Connect 33 Village Kanchanaphisek Road  
Dokmai Prawn Bangkok 10250  
Tel: +66 (0) 2089-9773  
www.pentalcal.com

## Certificate of Calibration

Represent to Certificate of Calibration : PTC07/22103

Certificate No.: PTC07/22103 Page: 1 of 2  
Equipment: Digital Balance Condition: Normal  
Manufacturer: Sartorius Serial No: 26207038  
Model: MSE224S-100-DU ID No: RYG\_EN0002  
Type of Balance: Single interval



Customer: ALS Laboratory Group (Thailand) Co., Ltd.  
616/10 Moo 5 T. Maenamkoo, A. Pluekdaeng,  
Rayong 21140, Thailand

REVIEW BY: *Thantale*  
APPROVED BY: *D. K.*  
NEXT CAL. DATE: 23/05/24

Environment Condition: Temperature 23.0 °C ± 0.3 °C  
Humidity 58.1 %RH ± 4.4 %RH  
Air density 1.17 kg/m<sup>3</sup>

Calibration Place: ALS Laboratory Group (Thailand) Co., Ltd.  
616/10 Moo 5 T. Maenamkoo, A. Pluekdaeng,  
Rayong 21140, Thailand

The Method used: In house method, PTC-WH-07, base on Euramet cg. 18

Traceability: This certificate is traceable to the SI Units through Thai Calibration Service Co., Ltd.  
NSC-ONS Accreditation No.: Calibration 0189

Date Received: March 23, 2022

Calibration Date: March 23, 2022

Issued Date: March 25, 2022

Calibration By: Mr. Rungroj Motakul



*Mr. Kiangsak Kalasri*  
(Mr. Kiangsak Kalasri)  
Reviewed by

Approved By: *Mr. Keattisak Kerdlo*  
(Mr. Keattisak Kerdlo)  
Laboratory Manager

The 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). The effect that the results relate only to the items calibrated.

This calibration certificate shall not be reproduced except in full only, without written approval from penta calibration co., ltd

PTC-FAC-02 2 Feb 2023



**PENTA CALIBRATION CO., LTD.**  
66/124 The Connect 33 Village Kanchanaphisek Road  
Dokmai Prawn Bangkok 10250  
Tel: +66 (0) 2089-9773  
www.pentalcal.com

Represent to Certificate of Calibration : PTC07/22103

Certificate No.: PTC07/22103

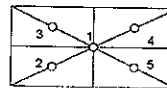
Page: 2 of 2

## Measurement Results:

Without Adjustment :

Function Calibration: Non Adjustment

Eccentric Error: Weight to be 1/3, 1/2 or of Maximum capacity



Eccentricity test 100 (g)				
Position (g)				
1	2	3	4	5
0.0000	0.0000	-0.0002	0.0002	0.0002
Maximum deviation: 0.0002				

Repeatability Test : Weight to be 1/2 ≤ L<sub>1</sub> ≤ Maximum capacity

Determination of the standard deviation of weighing balance., Readability 0.0001 (g)

Nominal test value (g)	Standard Deviation
200	0.00003

Error of Indication : from nominal value., Readability 0.0001 (g)

Nominal Value (g)	Conventional Mass (g)	Indication (g)	Correction of Balance (g)	Uncertainty (g)	k
0	0.00000	0.0000	0.0000	0.000085	2.16
0.01	0.01000	0.0100	0.0000	0.00010	2.06
0.1	0.10000	0.1000	0.0000	0.00010	2.06
1	1.00000	1.0000	0.0000	0.00010	2.06
2	2.00000	1.9999	0.0001	0.00010	2.06
5	5.00001	5.0000	0.0000	0.00010	2.06
10	10.00000	10.0000	0.0000	0.00010	2.06
20	20.00003	19.9999	0.0001	0.00011	2.05
50	50.00004	49.9999	0.0001	0.00012	2.00
100	100.00004	100.0001	-0.0001	0.00017	2.00
200	200.00011	200.0000	0.0001	0.00027	2.00

Note: Weight of adjust (g)

The End of Certificate

PTC-FAC-02 2 Feb 2023



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
154/1 PATTANAKARN ROAD 501 B. SUAN LUANG, SUAN LUANG BANGKOK 10250  
TEL: 0-2717-3000-27 FAX: 0-2719-9484



Cert. No.: 21TM829

Page: 1 of 3

## Certificate of Calibration

Equipment: Hot Air Oven  
Manufacturer: Memmert  
Model: UM 400  
Serial No.: 0485.0899  
ID No.: RYG\_EN0006

REVIEW BY: *Thantale*  
APPROVED BY: *D. K.*  
NEXT CAL. DATE: 23/05/24

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)  
616/10 Moo 5 T. Maenam Khu,  
A. Pluekdaeng,  
Rayong 21140 Thailand  
Oven Room

Location: Oven Room  
Received Order: 5 May 2021  
Calibration Date: 5 - 6 May 2021  
Ambient Temperature: (20 ± 10) °C  
Relative Humidity: (50 ± 30) %

Calibrated by: Khit Rullanaprapachai

Approved by: *Mr. K.*  
Approved Signatory

( ) Pornthippa Tamayakul  
( ) Malee Butkruea  
( ) Suwit Imjai

Issue Date: 14 May 2021

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the head of Corporate Services & Equipment Calibration and Testing Services

A 0028096



Equipment: Hot Air Oven  
Condition As-Received: Used Item  
Reference: 2105-00050C-1  
Procedure Used :-

Cert. No.: 21TM829

Page: 2 of 3

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).

The temperature scale used was based on ITS-90.

### Condition of this result of calibration

1. Reference standard instrument-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY57013823	21LM3	26 Feb 2022

2. This certificate is valid only to the item calibrated on date and place of calibration.

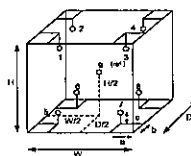
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (\*) Without Adjustment

Function of UUC\*: Temperature Source

Fresh air setting: Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	29	30
REL.Humid. (%)	56	58
AC Supply (Volt)	221	222



Probe Installation Details: Dimension of Chamber:  
a = 5.0 cm D = 0.33 m  
b = 5.0 cm W = 0.40 m  
c = 5.0 cm H = 0.40 m  
Capacity = 0.063 m<sup>3</sup>

Position	Ref. Std. ID No.
1	21-17RTD-01
2	21-17RTD-02
3	17RTD-03
4	17RTD-04
5	17RTD-05
6	17RTD-06
7	17RTD-07
8	17RTD-08
9 (ref.)	17RTD-09

a 1054310



Equipment : Hot Air Oven  
 Condition As-Received : Used Item  
 Reference : 2105-0005OC-1  
 Result of Calibration : ( \* ) Without Adjustment  
 Function of UUC\* : Temperature Source

Cert. No.: 21TM829  
 Page: 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
70.0	70.0	70.0	0.21	1.8	2.0	0.55	2

Calibration Point (°C)	Measured Temperature (°C)								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
70.0	70.404	70.277	70.607	70.307	68.789	69.257	68.846	69.331	70.495

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-

a 1054309

RYG\_EN0061



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
 CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
 53/4 PATTANAKARN ROAD 501 15, SUANLUANG, SUANLANG BANGKOK 10250  
 TEL. 0 2717-3000-27 FAX. 0 2719-9144



Cert. No.: 21TM873  
 Page: 1 of 3

## Certificate of Calibration

Equipment : Water Bath

Manufacturer : Memmert

Model : WNB22

Serial No. : L513.0848

ID No. : RYG\_EN0061

Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)  
 616/10 Moo 5 T. Maenam Khu.  
 A. Phrakdaeng.  
 Rayong 21140 Thailand  
 Location : Wet Chemistry Lab

Received Order : 5 May 2021

Calibration Date : 5 May 2021

Ambient Temperature : ( 26 ± 10 ) °C

Relative Humidity : ( 50 ± 30 ) %

Calibrated by : Tawatchai Pama

Approved by :   
 Approved Signatory

( ) Pongthipha Temeyakul  
 ( / ) Malee Buikrua  
 ( ) Suwit Imjai

Issue Date : 14 May 2021

\*The Uncertainties are for a confidence probability of approximately 95%.

This certificate may not be reproduced other than in full, except with the prior written approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.

A 0028098



Equipment : Water Bath  
 Condition As-Received : Used Item  
 Reference : 2105-0005OC-3  
 Procedure Used :-

Cert. No.: 21TM673  
 Page: 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT04 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer ( IPRT ).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY44060450	21LM4	06 Mar 2022

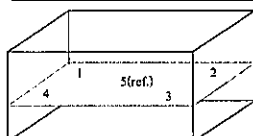
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- ( \* ) Without Adjustment

Function of UUC\* : Temperature Source

	Environmental		AC Voltage Supply ( Volt )
	( °C )	( %R.H. )	
Beginning of Calibration	22	69	230
Finished of Calibration	20	64	231



Front

Position :	Ref. Std. S/N:
1	4803988-001
2	4803988-002
3	4803988-003
4	4803988-004
5(ref.)	4803988-005

a 1054289



Equipment : Water Bath  
 Condition As-Received : Used Item  
 Reference : 2105-0005OC-3  
 Result of Calibration : ( \* ) Without Adjustment  
 Function of UUC\* : Temperature Source

Cert. No.: 21TM673  
 Page: 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)				
			1	2	3	4	5 (ref.)
85.0	85.0	85.0	84.891	84.893	84.880	84.892	84.917

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor k
85.0	0.089	0.052	0.22	2

Average\* : The average of 30 values in each position.

Uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC\* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k$ , providing a level of confidence of approximately 95 %.

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a 1054288



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
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Cert.No.: 22CH405  
Page: 1 of 3

## Certificate of Calibration

Equipment: pH Meter  
Manufacturer: Mettler Toledo  
Model: Seven Compact S220  
Serial No.: C104059460  
ID No.: RYG\_EN0183  
Condition As-Received: Used Item  
Received Date: 16 March 2022  
Calibration Date: 17 March 2022  
Reference: 2203-0611DSC-4  
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.  
Rayong Branch  
618/10 Moo 5 T.Maenam Khu,  
A.Pluksaeng, Rayong 21140, Thailand  
Ambient Temperature: (25 ± 2.5) °C  
Relative Humidity: (50 ± 15) %  
Calibration Procedure:  
- In-house method:  
- CP-CH5 by direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM)  
- CP-CH6 by comparison with standard thermometer

REVIEW BY: *N. Banerji*  
APPROVED BY: *D. K.*  
NEXT CAL. DATE: 17/13/23

Calibrated by: Warakorn Lemgagrakul

Approved by: *Malu*  
Approved Signatory

(☒) Malee Butkrua  
(☐) Sathip Meangmai  
(☐) Warakorn Lemgagrakul

Issue Date: 22 March 2022

The Uncertainties are for a confidence probability of approximately 95%

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A 0037307



Cert.No.: 22CH405  
Page: 2 of 3

### Condition of this calibration result

#### 1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC110	21E2682	25 Aug 2022
2) Ref. Standard Thermometer	4962054	110RC044	21I1201	26 Oct 2022

This certification is traceable to the International System of Unit maintained at:  
- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials: The measurement results are traceable to SI through CPA Chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	788995	01 Jan 2024
pH 6.862	CPA chem	781017	02 Aug 2022
pH 10.015	CPA chem	786824	04 Sep 2022

3. This certificate is valid only to the item calibrated on date and place of calibration.

### Calibration Results

#### Function: mV Measurement

#### Performing standard curve by Fluke at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input		Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
		pH	mV	mV	pH		
pH Meter S/N.: C104059460	4.000		177.48	177.4	4.000	0.058	2.00
	7.000		0.00	-0.1	7.000	0.058	2.00
	10.000		-177.48	-177.5	10.000	0.058	2.00

*Malu*

a 1100955



Cert.No.: 22CH405  
Page: 3 of 3

### Calibration Results

#### Function: pH Measurement

#### Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (±)	Coverage factor k
pH Electrode S/N.: 1453404	4.008	4.010	177.7	0.0046	2.00
	6.862	6.988	3.6	0.0084	2.00
	10.015	10.010	-172.9	0.0073	2.05

#### Function: Temperature Measurement

##### (\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model: InLab Expert Pro-ISM

- Serial No.: 1453404

- Dimension of probe;

- Length: 120 mm.

- Diameter: 12 mm.

- Immersion Depth: 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (±°C)	Coverage factor k
25.0	25.002	24.9	-0.102	0.13	2.00

Remark: - UUC\* = Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

-60-

*Malu*

a 1100954



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
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## Certificate of Calibration

Certificate No.: 22E988  
Page: 1 of 2

Equipment: pH Meter  
Manufacturer: Mettler Toledo  
Model: SevenCompact S220  
Serial No.: C104059460  
ID No.: RYG\_EN0183  
Condition As-Received: Used Item  
Received Date: 16 March 2022  
Calibration Date: 21 March 2022

Reference: 2203-0611DSC  
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd. Rayong Branch  
Ambient Temperature: (23 ± 2) °C  
Relative Humidity: (50 ± 10) %  
618/10 Moo 5 T.Maenam Khu, A.Pluksaeng, Rayong 21140, Thailand

Procedure used: Calibration were conducted using In-house calibration Procedure CP-E17 According to direct measurement method with Multi-Product Calibrator.

### Condition of this result of calibration

#### 1. Reference standards Instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Multi-Product Calibrator	5500A	6440007	21E1444	07 May 2022

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 at:  
- National Institute of Metrology (Thailand) (NIMT)

REVIEW BY: *N. Banerji*  
APPROVED BY: *D. K.*  
NEXT CAL. DATE: 21/13/23

Calibrated by: Pongsagorn Boonyaporn  
Issue Date: 22 March 2022

Approved Signatory: *9 v*  
(☒) Phalinee Prabpairol  
(☐) Nuntawat Khanchai  
(☐) Pornthipha Taneyayakul

B 0284414



Cert. No.: 22E986  
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)	(± µV)	
-200.0000	-200.0	0.0	72	
-150.0000	-150.0	0.0	69	
-100.0000	-100.0	0.0	65	
-50.0000	-50.0	0.0	62	
0.0000	0.0	0.0	58	
50.0000	50.0	0.0	62	
100.0000	100.0	0.0	65	
150.0000	150.0	0.0	69	
200.0000	200.0	0.0	72	

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level of confidence of approximately 95 %

\*UUC= Unit Under Calibration.

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a 1101070



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**Certificate of Calibration**

Certificate No.: 21T1200  
Page: 1 of 2

Equipment : Digital Thermometer With Sensor  
Manufacturer: Testo  
Model : 106  
Serial No.: 31281454/504  
ID No.: RYG\_FS0487  
Condition As-Received: Used Item  
Received Date: 02 July 2021  
Calibration Date: 07 July 2021  
Reference: 2107-0069DSC  
Ambient Temperature: ( 25 ± 3 ) °C  
Relative Humidity: ( 50 ± 20 ) %  
Submitted by: ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch  
818/10 Moo 5 T.Masnam Khu, A.Pluakdaeng, Rayong  
21140, Thailand

Procedure used: Calibration was conducted using in-house calibration procedure CP-T01 according to comparison with Platinum Resistance Thermometer (PRT) into liquid bath temperature controller.  
The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

**1.Reference standards instruments :**

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Digital Thermometer	1528-R	B18520	211680	26 Jun 2022
2) Platinum Resistance Thermometer	935-14-55	261589/1	211680	26 Jun 2022

2.The 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 maintained at:-  
National Institute of Metrology Thailand (NIMT)

REVIEW BY	Tanont
APPROVED BY	Sutis
NEXT CAL DATE	7/19/22

Calibrated by: Yossapon Poljorn  
Issue Date: 09 July 2021

Approved Signatory :  
[ ] Phallinee Pratsapail  
[ ] Chatchawan Khunpluek  
[x] Wanlop Larpkum

B 0265214



Cert. No.: 21T1200  
Page: 2 of 2

**Result of Calibration:-**

Without Adjustment

Function: Temperature measurement  
Dimension of probe : Diameter 3 mm., Length 55 mm. Sheath material : Stainless Steel

Immersion Depth	Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement
(mm.)	(°C)	(°C)	(°C)	(±°C)
50	25.0029	24.9	-0.1029	0.12
50	30.0018	29.9	-0.1018	0.12
50	40.0035	40.0	-0.0035	0.12

UUC\* : Unit Under Calibration

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

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a 1063351



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
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RYG\_EN0010

**Certificate of Calibration**

Cert. No.: 21TM827  
Page: 1 of 3

Equipment : Hot Air Oven  
Manufacturer: Memmert  
Model : UFE 500  
Serial No.: G511.1572  
ID No.: RYG\_EN0010  
Submitted by: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)  
818/10 Moo 5 T. Masnam Khu,  
A. Pluakdaeng,  
Rayong 21140 Thailand  
Location : Oven Room  
Received Order : 5 May 2021  
Calibration Date : 5 May 2021  
Ambient Temperature : ( 26 ± 10 ) °C  
Relative Humidity : ( 50 ± 30 ) %

Calibrated by: Khit Rulianaprapachai

Approved by :  
[ ] Pomsitippa Taneyakul  
[x] Malco Buikrua  
[ ] Suwit Imjai

Issue Date : 14 May 2021

REVIEW BY	Thamkai
APPROVED BY	D. K.
NEXT CAL DATE	5/19/22

The Uncertainties are for a confidence probability of approximately 95%

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A 0028099



Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2105-0005OC-4

Cert. No.: 21TM827  
Page: 2 of 3

**Procedure Used :-**

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

**1. Reference standard instrument:-**

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY57013823	21LM3	26 Feb 2022

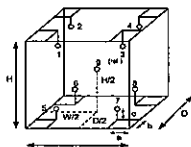
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certificate is traceable to the International System of Unit.

**Result of Calibration :-** (") Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close



**Probe Installation Details : Dimension of Chamber :**

a = 5.0 cm	b = 0.40 m
b = 5.0 cm	W = 0.56 m
c = 5.0 cm	H = 0.48 m
Capacity = 0.11 m <sup>3</sup>	

Environment during calibration		
	Beginning	Finished
Temp. (°C)	28	29
REL.Humid. (%)	59	56
AC Supply (Volt)	220	221

Ref. Std. ID No.: @ Calibration Point		
Position :	(104) °C	(180) °C
1	21-17RTD-01	19-17TC-01
2	21-17RTD-02	19-17TC-02
3	17RTD-03	19-17TC-03
4	17RTD-04	19-17TC-04
5	17RTD-05	19-17TC-05
6	17RTD-06	19-17TC-06
7	17RTD-07	19-17TC-07
8	17RTD-08	19-17TC-08
9 (ref.)	17RTD-09	19-17TC-09

a 1054287



Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2105-0005OC-4

Cert. No.: 21TM827  
Page: 3 of 3

**Result of Calibration :-**

Function of UUC\* : Temperature Source

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
104.0	104.0	104.0	0.053	0.54	0.70	0.42	2
180.0	180.0	180.0	0.15	0.89	1.3	1.1	2

Calibration Point (°C)	Measured Temperature (°C)								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
104.0	104.243	103.732	103.760	103.742	103.863	103.743	104.311	103.689	103.815
180.0	180.101	180.481	179.401	179.692	179.990	179.943	180.127	179.915	179.709

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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a 1054286



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TEL. 0 2717-5000-24 FAX. 0 2719 5484



Cert.No.: 18CG4595  
Page: 1 of 2

**Certificate of Calibration**

Equipment : Burette

Capacity : 50 mL

Serial No. :

ID. No. : 243007

Manufacturer : Wilog

Made in : Germany

Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.  
Eastern Seaboard Industrial Estate (Rayong)  
64/77 Moo 4, Building No.B1, Highway 331, km 91.5  
T.Pluakdaeng, A.Pluakdaeng, Rayong 21140

Ambient Temperature : (22 ± 2.5) °C

Relative Humidity : (50 ± 10) %

Barometric Pressure : 757 mmHg

Calibration Procedure : ASTM E 542 - 01

Calibrated by : Natcha Chayyingchaiw

Approved by :

Approved Signatory

( ) Pornthippa Tameyakul  
( ) Malee Bulkras  
( ) Ponpan Palpin  
( ) Srisuda Khamtha

Issue Date : 27 September 2018

The Uncertainties are for a confidence probability of approximately 95%.

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A 0087224



Equipment : Burette  
Capacity : 50 mL  
Serial No. :  
ID. No. : 243007  
Manufacturer : Wilog  
Received Date : 10 September 2018  
Condition As-Received : Used Item  
Calibration Date : 21 September 2018  
Reference : 1809-0411DPC

Cert.No.: 18CG4595  
Page: 2 of 2

**Condition of this result of calibration**

**1. Reference Standard Instruments :**

Instruments	Model	Serial No.	ID. No.	Certificate No.	Traceability	Due date
1) Balance	XP205DR	1128143784	140RC004	18MM1	NIMT	2 Jan 2019

This calibration is traceable to SI Unit

2. This certificate was certified only for the measuring instrument we calibrated.

3. This result of calibration was found accurate as shown on date and place of calibration only.

4. True value is converted to true volume at the standard temperature of 20 °C

**Calibration result :**

Nominal capacity (mL)	Reading (mL)	Uncertainty (± mL)	k Factor
50	49.9901	0.010	2.00

Remark mL = cm<sup>3</sup>

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

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a 0901034



## ภาคผนวก จ

สำเนาหนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน



ที่ อก ๐๓๓๐(๑)/ ๑๐๖๕

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ เขตราชเทวี  
กรุงเทพมหานคร ๑๐๕๐๐

๒๘ มกราคม ๒๕๖๕

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๓๐ กรกฎาคม ๒๕๖๓

- สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น  
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ แผ่น  
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุ  
หนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔  
ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร  
ต่อกรมโรงงานอุตสาหกรรม นั้น

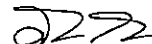
กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย)  
จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

- ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย ตามสิ่งที่ส่งมาด้วย ๑  
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๖๒ ราย ตามสิ่งที่ส่งมาด้วย ๒  
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๕๔ รายการ น้ำได้ดิน  
จำนวน ๑๒๖ รายการ อากาศเสีย ๑๖ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช่แล้ว จำนวน ๓๕ รายการ และดิน  
จำนวน ๑๒๕ รายการ รวมทั้งสิ้นจำนวน ๓๖๑ รายการ ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กันยายน ๒๕๖๖ หากประสงค์จะต่ออายุหนังสือ  
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอ  
ต่อกรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์  
เอกชน ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



(นายศิระ จันทระ)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน  
ผู้อำนวยการกองวิจัยและเฝ้าระวังมลพิษโรงงาน  
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเฝ้าระวังมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๒๐๒ ๔๑๔๖ ๐ ๒๒๐๒ ๔๐๐๒

โทรสาร ๐ ๒๓๕๔ ๓๒๐๘ ๐ ๒๓๕๔ ๓๔๑๕

เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ๖-๒๐๔

ที่ อก ๐๓๓๐(๑)/

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย

- |                                |                            |
|--------------------------------|----------------------------|
| ๑) นางสาวยุพาพร จันทระเปล่ง    | ทะเบียนเลขที่ ๖-๒๐๔-ค-๕๗๐๐ |
| ๒) นางสาวชัชชัย โกมารกุล ณ นคร | ทะเบียนเลขที่ ๖-๒๐๔-ค-๕๗๐๑ |
| ๓) นายศรายุทธ จิตราภรณ์        | ทะเบียนเลขที่ ๖-๒๐๔-ค-๕๗๐๒ |
| ๔) นางสาวกนกกร เอนก            | ทะเบียนเลขที่ ๖-๒๐๔-ค-๖๑๑๑ |
| ๕) นายสุริยา สอนแก้ว           | ทะเบียนเลขที่ ๖-๒๐๔-ค-๖๑๑๒ |
| ๖) นายวิชาญ ชุนหวัธ            | ทะเบียนเลขที่ ๖-๒๐๔-ค-๖๑๑๓ |



(นายศิระ จันทระ)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน  
ผู้อำนวยการกองวิจัยและเฝ้าระวังมลพิษโรงงาน  
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

เอกสารแนบท้ายหนังสือรับคํออวยุ้ขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบลอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ว-๒๐๔

ที่ อก ๐๓๑๐(๑)/๑๐๖๕

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๖๒ ราย

๑) นางสาวจินดา โชกุลธรรม	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๐๘
๒) นางสาวสาวิตรี น้อยเสงี่ยม	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๐๙
๓) นางสาวชนัญญาญจน์ อัมมขม	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๐
๔) นางสาวนรินทร์ สายเส่ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๕
๕) นางสาวนันทวดี สมบูรณ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๖
๖) นางสาวศรียา เฉลิมอึ้งรังค์	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๗
๗) นางสาวสรารักษ์ มงคลจิรวุฒิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๙
๘) นางสาวศิริลักษณ์ พึ่งแพง	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๒๐
๙) นายณพพงศ์ จันทุพันธ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๐๘
๑๐) นายนรเศรษฐ โกมลย	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๑
๑๑) นายธนาภา จริยา	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๔
๑๒) นางสาวเกศรินทร์ แก้วมัน	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๖
๑๓) นางสาวสุวิมล ชัยเรืองวุฒิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๗
๑๔) นางสาวสุชาดา ธรรมถาวร	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๘
๑๕) นางสาวเปรมิกา ชัยเดชธนกุล	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๙
๑๖) นางสาวศศิธร หมุสวีสดี	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๔
๑๗) นางสาวเสาวลักษณ์ ภูณภาอำพร	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๕
๑๘) นายอภิสิทธิ์ สิงหา	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๖
๑๙) นายศักดิ์สิทธิ์ ไพศาลพิสุทธิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๗
๒๐) ว่าที่ร้อยตรีหญิง พรรณีภา จำเจริญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๘
๒๑) นางจิตตา คำภูแก้ว	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๓๑
๒๒) นางสาวอรรวรรณ รักยง	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๑๕
๒๓) นางสาวนพรัตน์ แยมกรานต์	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๑๙
๒๔) นายจุลเดช วารินทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๐
๒๕) นางสาวดาญรัตน์ รื่องคำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๑
๒๖) นายนคร สุขเจริญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๒
๒๗) นายบัญชา นามเขตต์	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๓
๒๘) นายพรมมี ศรีปัตเนตร	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๕
๒๙) นายอุทิศ อุ่นลิ้ม	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๖
๓๐) ว่าที่ร้อยตรี เฉลิมเกียรติ อมรศรีเสริม	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๘
๓๑) นางสาววริยา สว่างนา	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๙
๓๒) นายอนุพงศ์ รัตนศรีประเสริฐ	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๓๐
๓๓) นางสาวจุฑารัตน์ โอนสันเทียะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๔๒
๓๔) นางสาวจางวรรณ พิมพ์อภิกฤตยา	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๗๖

(นายศิระ จันทร์เลิศ)

๓๕) นางสาวปรางค์ทิพย์...

นักวิทยาศาสตร์ชำนาญการพิเศษ วิชาการการแพทย์

ผู้อำนวยการกองวิจัยและเชื่อมกับเขตคลังโรงงาน

ปลัดฝ่ายวิชาการและเชื่อมกับเขตคลังโรงงาน

- ๒ -

๓๕) นางสาวปรางค์ทิพย์ กิจไพศาลศักดิ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๗๙
๓๖) นางสาวเตือนใจ ทางกลาง	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๐
๓๗) นางสาวจิราพร ศิริเวช	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๒
๓๘) นายวรการ ผูกรักษ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๓
๓๙) นายทง วิริยะสทกิจ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๔
๔๐) นายธนิศ เจนจบ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๕
๔๑) นายคณิศร จำเพชร	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๖
๔๒) นายอรรคพล นิยมวิทย์พันธ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๗
๔๓) นายภูวิช พรหมสะอาด	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๘
๔๔) นายณเดช โภคาพิพัฒน์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๙
๔๕) นายชวลิต วังจันทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๐
๔๖) นายอาทิตย์ ศรีเสน	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๑
๔๗) นายเจดตินทร์ คงศักดิ์ไทย	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๒
๔๘) นายจรัส บุญยั้ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๕
๔๙) นายธนาบดี อนก	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๖
๕๐) นายอภิวัฒน์ ทุมหนู	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๗
๕๑) นางสาวสุภาขวัญ มาก	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๘
๕๒) นางสาวพัทธพร ขวาลสมบูรณ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๐
๕๓) นางสาวธิดา บุญเพ็ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๑
๕๔) นางสาวกนกพร เข้มเพ็ชร	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๒
๕๕) นางสาวพัชรียา หงษ์สมบัติ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๓
๕๖) นางสาวกานดา สุรวงศ์ตระกูล	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๔
๕๗) นางสาวภาณุมาศ นามวัฒน์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๕
๕๘) นางสาวอุไรรัตน์ ทิสรังแป้น	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๖
๕๙) นายธีรวัฒน์ ปวงสุข	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๗
๖๐) นายอิทธิพล ยะโส	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๘
๖๑) นายประพจน์ วรรณชัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๙
๖๒) นายชยธร พวงทิพย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๐
๖๓) นางสาวกนกวรรณ จันทบาล	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๑
๖๔) นางสาวเกษร หลีกบุญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๒
๖๕) นายสิทธิโชค ธงเงิน	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๓
๖๖) นางศิวารณ ใจบุญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๕
๖๗) นางสาวพรมธิดา ทุมคง	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๘
๖๘) นางสาวพรณีย์ ยิงดี	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๙
๖๙) นายณภัทร ศรีวิริยะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๐
๗๐) นายสุวิชา ทองอ่อน	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๑
๗๑) นายวิญญู บุญตะนัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๓

(นายศิระ จันทร์เลิศ)

๗๒) นายสมบูรณ์...

นักวิทยาศาสตร์ชำนาญการพิเศษ วิชาการการแพทย์

ผู้อำนวยการกองวิจัยและเชื่อมกับเขตคลังโรงงาน

ปลัดฝ่ายวิชาการและเชื่อมกับเขตคลังโรงงาน

๗๒) นายสมบุญ บุตรจันทร์  
๗๓) นายวิรัตน์ ไชยชนะ  
๗๔) นายอนุพันธ์ เพิ่มพูน  
๗๕) นายจิรณัฐ ขาวละออ  
๗๖) นายสมโภช วันสา  
๗๗) นายอัคริ นามบุรี  
๗๘) นายณัฐนันท์ ปานประเสริฐ  
๗๙) นายอัคริ จ่อสาว  
๘๐) นายประเสริฐ สุระขันธิ  
๘๑) นายบุญกุล จันทน์นิยม  
๘๒) นายพิรพงษ์ ทองคุณปรีดา  
๘๓) นายอนุพล ทองนุช  
๘๔) นายอนุวัฒน์ ม่วงแพร่  
๘๕) นายเจตศราวุฒิ ปัตตะมะ  
๘๖) นายกฤษณะ สายวรรณ  
๘๗) นายพิชัย บุญยงค์  
๘๘) นายภาณุพงศ์ โอเมวงศ์  
๘๙) นายสามารถ คู่มปลิ  
๙๐) นายสัณชัย โภศรีนาม  
๙๑) นายณัฐวุฒิ ศรีประเสริฐ  
๙๒) นายชวลิตชัย นาคพนม  
๙๓) นายพงษ์ศรี ชัยทิพย์  
๙๔) ว่าที่ร้อยตรี ภาณุพงศ์ แสนศรี  
๙๕) นายสิทธิโชค ทาสีดา  
๙๖) นายอนาการ อินสุตา  
๙๗) นางสาววรรณิษา ขาดวันชัย  
๙๘) นางสาวพิมพ์ตะวัน มินากุล  
๙๙) นางสาวเพชรรัตน์ สิงห์สมบูรณ์  
๑๐๐) นางสาวชญาณีน พรหมจันทร์  
๑๐๑) นายกริณี ทวีราช  
๑๐๒) นายจักริน หมั่นวิชา  
๑๐๓) นายจักรชัย สุขเปี้ย  
๑๐๔) นายณรรนหิ ต๊ะทองคำ  
๑๐๕) นายศุภพล สมนอก  
๑๐๖) นายทักษิณชัย อุบลศรี  
๑๐๗) นายธนศร นามะกุลณา  
๑๐๘) นายอติพงษ์ บัวแดง

ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๑๔  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๑๕  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๑๖  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๑๗  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๑๘  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๑๙  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๒๐  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๒๑  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๒๒  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๒๓  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๒๔  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๒๕  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๒๖  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๒๗  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๒๘  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๒๙  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๓๐  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๓๑  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๓๒  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๓๓  
ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๓๔  
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ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๔๙

(นายศิระ จันทรเจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ วิชาการเกษตร  
ผู้อำนวยการกองวิจัยและเตือนภัยพืชไร่  
ปศุสัตว์กรมการเกษตรและปศุสัตว์

๑๐๙) นายณนทชัย...

๑๐๙) นายณนทชัย อุบลรัตน์  
๑๑๐) นายปฐพล คุณสุทธิ  
๑๑๑) นายณนทชัย สุวริน  
๑๑๒) นายปิยะนัฐ พลมะศรี  
๑๑๓) นายพงศ์สิริ โสมเขียว  
๑๑๔) นายพิรพัฒน์ กำคำ  
๑๑๕) นายภาณุพงศ์ มานิตย์  
๑๑๖) นายมงคล ผลาทิพย์  
๑๑๗) นายณนทชัย พูลศิริ  
๑๑๘) นายสิรินันท์ ทองอิน  
๑๑๙) นายอนเนชา หันสมัย  
๑๒๐) นายอติศักดิ์ สมไผ  
๑๒๑) นายอนันตชัย วิสุม  
๑๒๒) นายณัฐดนัย เจือละออง  
๑๒๓) นายวราวุธ คีนิก  
๑๒๔) นายแสงตะวัน นะตะลัด  
๑๒๕) นายยุทธพงศ์ รัตนะ  
๑๒๖) นายชัยณัฐไชย ไซยะนิจ  
๑๒๗) นายวิศรุต ศรีธรรมมา  
๑๒๘) นายณนทชัย เลือกล่อง  
๑๒๙) นายกำชัย สุทธะ  
๑๓๐) นางสาวณัฐกรณิ รักทะเล  
๑๓๑) นางสาวประภาภรณ์ บุตรพรหม  
๑๓๒) นางสาวนิลาวัลย์ นามพรหม  
๑๓๓) นางสาวพัชรินทร์ แสนสร้อย  
๑๓๔) นายไพรัชย์ เปี่ยมทิพย์  
๑๓๕) นางสาวศุภมาศ ทองมาก  
๑๓๖) นางสาวลลิตา จิตรสว่าง  
๑๓๗) นางสาวไข่มพร เล็กภูเขียว  
๑๓๘) นางสาวกฤติมาพร คำมีแก่น  
๑๓๙) นางสาวสกุลรัตน์ ภาณุภูมิ  
๑๔๐) นางสาวกาญจนา คงคุณ  
๑๔๑) นางสาวไพรินทร์ ศรีรูปี  
๑๔๒) นางสาวทิพนทร พยปัญญา  
๑๔๓) นางสาวสาธิตา ปานทอง  
๑๔๔) นางสาวอริสา ทองนวล  
๑๔๕) นางสาวอรยา คำคล่อง

ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๕๔๔  
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ทะเบียนเลขที่ ๖-๒๐๔-จ-๗๖๓๔

(นายศิระ จันทรเจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ วิชาการเกษตร  
ผู้อำนวยการกองวิจัยและเตือนภัยพืชไร่  
ปศุสัตว์กรมการเกษตรและปศุสัตว์

๑๔๖) นางสาวชฎาภรณ์...

๑๔๖) นางสาวชุตารณ สุนทรสนวน	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๔
๑๔๗) นางสาวสุภารัตน์ นนทประสาธ	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๖
๑๔๘) นางสาวรัชนิกร เนียมกลาง	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๗
๑๔๙) นางสาวกัญญารัตน์ ศรีนิลทา	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๘
๑๕๐) นางสาวอัญชลี คำจันทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๙
๑๕๑) นายบุญฤทธิ์ เอี่ยมเทศ	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๐
๑๕๒) นายศิริวัฒน์ พานิชย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๑
๑๕๓) นางสาวศุภรดา ปันมยุรา	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๒
๑๕๔) นางสาวพาดิ์ คุณนาน	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๓
๑๕๕) นางสาวจิราเจต พองดา	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๔
๑๕๖) นางสาวกนกภรณ์ อูระ	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๕
๑๕๗) นางสาวอารยา มีชัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๖
๑๕๘) นางสาวจิตสุภา ประเทืองสุข	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๗
๑๕๙) นางสาวอริสา วิริยขันติธรรม	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๘
๑๖๐) นางสาววิษุตา นาคผจญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๙
๑๖๑) นางสาวพนิดา ยอดอินทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๕๐
๑๖๒) นางสาวนันทิยา จันทะสุน	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๕๑



(นายศิริระ จันทะสุน)

นักวิทยาศาสตร์ชำนาญการพิเศษ วิชาการสาธารณสุข  
ผู้อำนวยการกองวิจัยและเฝ้าระวังมลพิษในโรงงาน  
ปฏิบัติราชการแบบอินทรีย์กรมโรงงานอุตสาหกรรม

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบลอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ว-๒๐๔

ที่ อก ๐๓๑๐(๑) ๑๐ ๖๔

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๖๑ รายการ

แนบรายชื่อ จำนวน 59 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldicarb	High-Performance Liquid Chromatographic Method <sup>(๑)</sup>
2	Aldicarb Sulfone	High-Performance Liquid Chromatographic Method <sup>(๑)</sup>
3	Aldicarb Sulfoxide	High-Performance Liquid Chromatographic Method <sup>(๑)</sup>
4	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(๑)</sup>
5	Arsenic	1) Digestion, Inductively Coupled Plasma Method <sup>(๑)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(๑)</sup>
6	Barium	1) Digestion, Inductively Coupled Plasma Method <sup>(๑)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(๑)</sup>
7	α-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(๑)</sup>
8	β-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(๑)</sup>
9	δ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(๑)</sup>
10	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(๑)</sup>
11	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method <sup>(๑)</sup> 2) 5-Day BOD Test, Membrane Electrode Method <sup>(๑)</sup>
12	Carbaryl	High-Performance Liquid Chromatographic Method <sup>(๑)</sup>
13	Carbofuran	High-Performance Liquid Chromatographic Method <sup>(๑)</sup>
14	Cadmium	1) Digestion, Inductively Coupled Plasma Method <sup>(๑)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(๑)</sup>
15	Chemical Oxygen Demand	1) Closed Reflux, Colorimetric Method <sup>(๑)</sup> 2) Closed Reflux, Titrmetric Method <sup>(๑)</sup>
16	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(๑)</sup>
17	Chromium	1) Digestion, Inductively Coupled Plasma Method <sup>(๑)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(๑)</sup>
18	Color	ADMI Weighted-Ordinate Spectrophotometric Method

(นางริกาญจน์ จิตรสกุลวิไล)

ผู้อำนวยการศูนย์มาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ  
และทะเบียนห้องปฏิบัติการ

19 Copper...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Copper	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
20	Cyanide	Distillation, Colorimetric Method <sup>(4)</sup>
21	2,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
22	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
23	2,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
24	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
25	2,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
26	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
27	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
28	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
29	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
30	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
31	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
32	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
33	Formaldehyde	Distillation, Colorimetric Method <sup>(3)</sup>
34	Free Chlorine	1) DPD Ferrous Titrimetric Method <sup>(4)</sup> 2) Iodometric Method <sup>(4)</sup>
35	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
36	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
37	Hexavalent Chromium	Filtration, Colorimetric Method <sup>(4)</sup>
38	3-Hydroxycarbofuran	High-Performance Liquid Chromatographic Method <sup>(4)</sup>
39	Lead	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
40	Manganese	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
41	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/Mass spectrometric Method <sup>(4)</sup>
42	Methiocarb	High-Performance Liquid Chromatographic Method <sup>(4)</sup>
43	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>

วิมล  
(นางริกาญจน์ ฉัตรสกุลวิไล)  
ผู้อำนวยการศูนย์มาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ  
.....เป็นต้นฉบับปิดการ

44 Methomyl...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
44	Methomyl	High-Performance Liquid Chromatographic Method <sup>(4)</sup>
45	Nickel	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
46	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method <sup>(4)</sup> 2) Soxhlet Extraction Method <sup>(4)</sup>
47	Oxamyl	High-Performance Liquid Chromatographic Method <sup>(4)</sup>
48	Propoxur	High-Performance Liquid Chromatographic Method <sup>(4)</sup>
49	pH	Electrometric Method <sup>(4)</sup>
50	Phenols	1) Distillation, Chloroform Extraction Method <sup>(4)</sup> 2) Distillation, Direct Photometric Method <sup>(4)</sup>
51	Selenium	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
52	Sulfide	Iodometric Method <sup>(4)</sup>
53	Temperature	Laboratory and Field Methods <sup>(4)</sup>
54	Total Dissolved Solids	Dried at 180 °C <sup>(4)</sup>
55	Total Kjeldahl Nitrogen	Semi-Micro Kjeldahl Method <sup>(4)</sup>
56	Total Suspended Solids	Dried at 103-105 °C <sup>(4)</sup>
57	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(4)</sup>
58	Trivalent Chromium	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation <sup>(4)</sup>
59	Zinc	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(4)</sup>

น้ำใต้ดิน จำนวน 126 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>

วิมล  
(นางริกาญจน์ ฉัตรสกุลวิไล)  
ผู้อำนวยการศูนย์มาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ  
.....เป็นต้นฉบับปิดการ

3 Aldrin...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
5	Antimony	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
8	Barium	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
9	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
13	Benzoic Acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
15	Benzo[g,h,i]perylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>

วิธีตรวจ

18 Bis(2-ethylhexyl)phthalate...

(นางวิภาณูจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิชาการและการตรวจวิเคราะห์  
กรมควบคุมมลพิษ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup> Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
22	Butyl Benzyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
27	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
33	Chromium	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>

วิธีตรวจ


34 Chromium (III)...

(นางวิภาณูจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิชาการและการตรวจวิเคราะห์  
กรมควบคุมมลพิษ




ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation <sup>(4)</sup>
35	Chromium (VI)	Colorimetric Method <sup>(4)</sup>
36	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
37	Cyanide	Distillation, Colorimetric Method <sup>(4)</sup>
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
39	DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
40	DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
41	DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
42	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
43	Di-n-Butyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
47	3,3-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>

  
 (นางริกาญจน์ ชิตรสกุลชาติ)  
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 กรมควบคุมมลพิษ

51 cis-1,2-Dichloroethylene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
57	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
58	Diethyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
63	Di-n-Octyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
64	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
65	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
67	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>

  
 (นางริกาญจน์ ชิตรสกุลชาติ)  
 ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ  
 กรมควบคุมมลพิษ

68 Fluorene...



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
68	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
69	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
70	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
74	$\alpha$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
75	$\beta$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
76	$\gamma$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
81	Lead	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
82	Manganese	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
83	Mercury	1) Cold Vapor Atomic Absorption Spectrometric Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>

วิมล  
(นางริกาญจน์ อัครสกุลวิไล)  
ผู้อำนวยการศูนย์มาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ  
กรมส่งเสริมการค้าระหว่างประเทศ

84 Methanol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup> 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
89	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
91	Naphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
92	Nickel	1) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[4]</sup>
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
95	N-Nitrosodi-n-Propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[4]</sup>
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 <sup>[4]</sup>

วิมล  
(นางริกาญจน์ อัครสกุลวิไล)  
ผู้อำนวยการศูนย์มาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ  
กรมส่งเสริมการค้าระหว่างประเทศ

97 Pentachlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
98	pH	Electrometric Method <sup>(4)</sup>
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
100	Phenol	1) Distillation, Direct Photometric Method <sup>(4)</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
102	Selenium	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
103	Silver	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
104	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
105	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
106	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
107	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
108	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
109	TPH (C <sub>5</sub> -C <sub>9</sub> )	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(13,24)</sup>
110	TPH (C <sub>8</sub> -C <sub>16</sub> )	Solvent Extraction, Gas Chromatographic Method <sup>(9,21)</sup>
111	TPH (C <sub>16</sub> -C <sub>35</sub> )	Solvent Extraction, Gas Chromatographic Method <sup>(9,21)</sup>
112	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
113	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>

วิธีตรวจ

114 1,1,2-Trichloroethane...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการศูนย์มาตรฐานวิธีการวิเคราะห์มลพิษ  
และทะเบียนห้องปฏิบัติการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
114	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
115	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
118	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
119	Vanadium	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>
120	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
121	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
122	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
123	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
124	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
125	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(4)</sup>
126	Zinc	1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(4)</sup>

#### อากาศเสีย (ปล่องระบาย) จำนวน 16 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic, Digestion, Inductively Coupled Plasma Method <sup>(5)</sup>
2	Arsenic	Isokinetic, Digestion, Inductively Coupled Plasma Method <sup>(5)</sup>


วิธีตรวจ

3 Carbon Monoxide...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการศูนย์มาตรฐานวิธีการวิเคราะห์มลพิษ  
และทะเบียนห้องปฏิบัติการ


ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Carbon Monoxide	1) Sampling Bag Non-Dispersive Infrared Method <sup>[5]</sup> 2) Non-Dispersive Infrared Method <sup>[5]</sup> 3) Instrumental Analyzer Method <sup>[5]</sup>
4	Chlorine	1) Absorption Sampling, Ion Chromatographic Method <sup>[5]</sup> 2) Isokinetic Sampling, Ion Chromatographic Method <sup>[5]</sup>
5	Copper	Isokinetic, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
6	Dioxins	Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory or Analysis by Department of Industrial Works Registered Laboratory (Dioxins/Furans Analysis Approved) <sup>[5]</sup>
7	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method <sup>[5]</sup> 2) Isokinetic Sampling, Ion Chromatographic Method <sup>[5]</sup>
8	Hydrogen Sulfide	Absorption Sampling, Iodometric Method <sup>[5]</sup>
9	Lead	Isokinetic, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
10	Mercury	1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[5]</sup> 2) Isokinetic, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
11	Opacity	Ringelmann's Method <sup>[2]</sup>
12	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method <sup>[5]</sup> 2) Chemiluminescence Method <sup>[5]</sup> 3) Instrumental Analyzer Method <sup>[5]</sup>
13	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method <sup>[5]</sup> 2) UV Fluorescence Method <sup>[5]</sup> 3) Instrumental Analyzer Method <sup>[5]</sup>
14	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method <sup>[5]</sup>
15	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method <sup>[5]</sup>
16	Xylene	Adsorption Sampling, Gas Chromatographic Method <sup>[5]</sup>

  
 (นางวิภาญจน์ นัครกุลวิไล)  
 ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบและ  
 ควบคุมมลพิษ

สิ่งปฏิกูล...


สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[1,9,25]</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>[22,31]</sup>
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>

  
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 ควบคุมมลพิษ


6 Cadmium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,15)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,16)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,16)</sup>
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,19,25)</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup>
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,15)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,16)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,16)</sup>
9	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method <sup>(1,6,15,17)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method <sup>(1,6,16,17)</sup> 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(7,8,15,17)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(7,8,16,17)</sup>
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method <sup>(1,6,17)</sup> 2) Alkaline Digestion, Colorimetric Method <sup>(8,17)</sup>

  
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11 Cobalt...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,15)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,16)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,16)</sup>
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,15)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,16)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,16)</sup>
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,25)</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup>
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,25)</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup>
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,25)</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup>
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,25)</sup>

  
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2) Soxhlet...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Dieldrin	2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup> 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,25)</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup>
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,25)</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup>
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,25)</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup>
20	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,15)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,16)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,16)</sup>
21	Lindane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,25)</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup>
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(1,6,18)</sup>

วิธีวิเคราะห์

2) Waste Extraction...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
23	Methoxychlor	2) Waste Extraction, Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method <sup>(1,6,19)</sup> 3) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method <sup>(1,6,20)</sup> 4) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(18)</sup> 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method <sup>(19)</sup> 6) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method <sup>(20)</sup> 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,25)</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup>
24	Mirex	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,25)</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup>
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,15)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,16)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,16)</sup>
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,15)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,16)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,16)</sup>


วิธีวิเคราะห์

27 Polychlorinated...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5'-Trichlorobiphenyl - 2,4',5'-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3,3',4',6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5,6-Heptachlorobiphenyl - 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,6-Nonachlorobiphenyl	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(1,9,23)</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,23)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup>

  
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28 Pentachlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,25)</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup>
29	pH	Electrometric Method <sup>(29,30)</sup>
30	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,15)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,16)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,16)</sup>
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,15)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,16)</sup>
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,15)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,16)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,16)</sup>
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,25)</sup> 2) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 3) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(22,31)</sup>
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,15)</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,16)</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup>

  
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4) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
35	Zinc	4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup> 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[1,6,16]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>

ดิน จำนวน 125 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
4	Anthracene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
5	Antimony	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
8	Barium	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>

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9 Benz(a)anthracene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Benz(a)anthracene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
11	Benzo(b)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
12	Benzo(k)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
13	Benzoic acid	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
14	Benzo(a)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
15	Benzo(g,h,i)perylene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>
17	Bis(2-chloroethyl)ether	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
18	Bis(2-ethylhexyl)phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>
21	Butanol	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method <sup>[12,24]</sup>
22	Butyl Benzyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>[7,16]</sup>
24	Carbazole	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>[25,31]</sup>
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>[14,24]</sup>

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26 Carbon tetrachloride...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
28	p-Chloroaniline	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
32	2-Chlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
33	Chromium	1) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,16)</sup>
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(7,8,15,17)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(7,8,16,17)</sup>
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method <sup>(8,17)</sup>
36	Chrysene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
37	Cyanide	Extraction, Distillation, Colorimetric Method <sup>(26,27,28)</sup>
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
39	DDD	1) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>

วิมล  
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40 DDE...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
40	DDE	1) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
41	DDT	1) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
42	Dibenz(a,h)anthracene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
43	Di-n-Butyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
47	3,3-Dichlorobenzidine	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
53	2,4-Dichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>

วิมล  
(นางวิภาณูจน์ อัครสกุลวิไล)  
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57 Dieldrin...



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
58	Diethyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
59	2,4-Dimethylphenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
60	2,4-Dinitrophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
61	2,4-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
62	2,6-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
63	Di-n-Octyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
67	Fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
68	Fluorene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
70	Heptachlor Epoxide	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>

71 Hexachlorobenzene...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
73	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,24]</sup>
74	α-HCH	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
75	β-HCH	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
76	γ-HCH	1) Soxhlet Extraction, Gas Chromatographic Method <sup>[10,22]</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
77	Hexachlorocyclopentadiene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
78	Hexachloroethane	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
79	Indeno(1,2,3-cd)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
80	Isophorone	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[25,31]</sup>
81	Lead	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
82	Manganese	1) Digestion, Inductively Coupled Plasma Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>[7,16]</sup>
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[18]</sup>


2) Thermal...

(นางริกาญจน์ จักรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ภาคพิษ


คณะกรรมการป้องกันและปราบปรามการทุจริตแห่งชาติ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry <sup>(19)</sup> 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method <sup>(20)</sup> Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method <sup>(12,24)</sup>
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
88	2-methylphenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
89	2-Methylnaphthalene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
91	Naphthalene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
92	Nickel	1) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,16)</sup>
93	Nitrobenzene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
94	N-Nitrosodiphenylamine	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
95	N-Nitrosodi-n-propylamine	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232	1) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,23)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(23,32)</sup>

  
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
- Aroclor 1242...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
	- Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3,3',4',6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5,6-Heptachlorobiphenyl - 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	
97	Pentachlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
98	Phenanthrene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
99	Phenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
100	Pyrene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>

  
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 และคณะนิเทศน์ปฏิบัติกร

101 Selenium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
101	Selenium	1) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,16)</sup>
102	Silver	1) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,16)</sup>
103	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
106	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic Method <sup>(10,22)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
108	TPH (C <sub>5</sub> -C <sub>8</sub> )	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
109	TPH (C <sub>9</sub> -C <sub>16</sub> )	1) Solvent Extraction, Gas Chromatographic Method <sup>(11,21)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(21,31)</sup>
110	TPH (C <sub>16</sub> - C <sub>35</sub> )	1) Solvent Extraction, Gas Chromatographic Method <sup>(11,21)</sup> 2) Automated Soxhlet Extraction, Gas Chromatographic Method <sup>(21,31)</sup>
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
115	2,4,5-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>


  
 (นางกรกฎณ์ นันตกุลวิไล)  
 ผู้อำนวยการศูนย์วิชาการเฝ้าระวังและเฝ้าติดตามมลพิษ

116 2,4,6-TrichlorophenoL..

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
116	2,4,6-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method <sup>(25,31)</sup>
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
118	Vanadium	1) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,16)</sup>
119	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
120	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
121	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
122	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
123	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method <sup>(14,24)</sup>
125	Zinc	1) Digestion, Inductively Coupled Plasma Method <sup>(7,15)</sup> 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method <sup>(7,16)</sup>

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 ผู้อำนวยการศูนย์วิชาการเฝ้าระวังและเฝ้าติดตามมลพิษ

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
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 ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ  
 กรมโรงงานอุตสาหกรรม

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
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 กรมโรงงานอุตสาหกรรม

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ กองวิจัยและเตือนภัยมลพิษโรงงาน กรมโรงงานอุตสาหกรรม โทร. ๐ ๒๒๐๒ ๔๐๐๒, ๔๑๔๖



ที่ ออก ๐๓๑๐(๓)/ ๖๔ ๗๐

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๔ มิถุนายน ๒๕๖๕

เรื่อง ขันทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขณิฉนสรณลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๒๔ เมษายน ๒๕๖๔

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด จำนวน ๒ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอขึ้นทะเบียน  
ห้องปฏิบัติการวิเคราะห์เอกชน พร้อมรายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ เจ้าหน้าที่ประจำ  
ห้องปฏิบัติการวิเคราะห์ และรายการสารมลพิษที่จะทำการวิเคราะห์ ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป  
(ประเทศไทย) จำกัด ขันทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน มีเลขทะเบียน ๖-๓๒๓๓ สถานที่ตั้งเลขที่  
๖๒๖/๑๐ หมู่ที่ ๕ ตำบลแม่น้ำคู้ อำเภอบางพลี จังหวัดระยอง โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

๑) นายเดช ช้างชน	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๔๒
๒) นางวิลาวณีย์ บริรักษ์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๔๓
๓) นายสุพจน์ สลามเต๊ะ	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๔๔

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์

๑) นางสาวณมล บรรจงกิจ	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๔๕
๒) นางพจมา สิดา	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๔๖
๓) นางสาวอนิศา กุลสุริวงค์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๔๗
๔) นายพิทยา ทองแดง	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๔๘
๕) นางชลธิชา สุนทข	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๔๙
๖) ว่าที่ ร.ต.รณชัย ม่วงมา	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๕๐
๗) นายวราวุฒิ หับพา	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๕๑
๘) นายศักดิ์รินทร์ จรัสกาย	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๕๒
๙) นายสุรศักดิ์ สาชิน	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๕๓
๑๐) นางสาวเพชรคุณ ภาฏตานนท์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๕๔
๑๑) นายสกลพร ถาแก้ว	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๕๕
๑๒) นายสุทธิดำรงค์ ไชคิตินันท์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๕๖

๑๓) นายวัลลภ...

-๒-

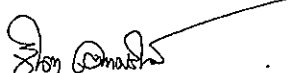
๑๓) นายวัลลภ หันไชยเนาว์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๕๗
๑๔) นางสาวนาถิ์ เจริญบุตรกุล	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๕๘
๑๕) นางสาวนิตา ผดุงจิตต์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๕๙
๑๖) นายอนะสิทธิ์ วงศ์ไชย	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๖๐
๑๗) นายชัยยุทธ เลิศนันทกุลชัย	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๖๑
๑๘) นายสังจา เพ็ชรแสวง	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๖๒
๑๙) นายกันตภณ มณีสัมพันธ์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๖๓
๒๐) นางสาวจันทิพย์ โกเมนชนะ	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๖๔
๒๑) นายธารินทร์ อ็อกจินดา	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๖๕
๒๒) นายศุภณัฐ พิสัยพันธ์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๖๖
๒๓) นายศุภชัย วงศ์วิชัย	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๖๗
๒๔) นายปฐมพงศ์ กรสวัสดิ์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๖๘
๒๕) นายไสว ตันโพธิ์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๖๙
๒๖) นางสาวกิตติยา สันญาอริยาภรณ์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๗๐
๒๗) นางสาวเจษฎาพร ศรีบุญเรือง	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๗๑
๒๘) นางสาวอรุณรัตน์ สิงห์เงา	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๗๒
๒๙) นางสาวธิดารัตน์ ศิริมงคลโร	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๗๓
๓๐) นายพิพัฒน์ นิภัทร์เศรษฐ์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๗๔
๓๑) นายศิริวิทย์ เรืองสม	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๗๕
๓๒) นายปารเมศ สัตยาคุณ	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๗๖
๓๓) นายณนุท ธรรมสโร	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๗๗
๓๔) นางสาวศุภรัตน์ ไสจันทร์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๗๘
๓๕) นายพชรกร อินทรเสนา	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๗๙
๓๖) นายทิวากร เชื้อมาก	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๘๐
๓๗) นายอนุรักษ์ ทองขจรศักดิ์	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๘๑
๓๘) นายอภิชาติ วิลาศ	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๘๒
๓๙) นายจรัสระวี ศรีรักษา	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๘๓
๔๐) นายประสาธมิตร เชื้อนเพชร	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๘๔
๔๑) นายภาณุวัฒน์ วังบง	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๘๕
๔๒) นายสันติ ชัยชนะ	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๘๖
๔๓) นายสิทธิชัย แก้วเกตุ	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๘๗
๔๔) นายทินกร กุลชาติ	ทะเบียนเลขที่ ๖-๓๒๓-๖-๔๔๘๘

ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๑๔ รายการ  
อากาศเสีย (ปล่องระบาย) จำนวน ๗ รายการ และน้ำใต้ดิน จำนวน ๓ รายการ รวมทั้งสิ้นจำนวน ๒๔ รายการ  
ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้มีอายุ ๓ ปี นับจากวันที่กรมโรงงานอุตสาหกรรมออกหนังสือ หากประสงค์  
จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบ  
คำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ  
วิเคราะห์เอกชน ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



(นางจินดา เทษะรินทร์)

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน  
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

๒๘ มิ.ย. ๒๕๖๔

กองวิจัยและเตือนภัยมลพิษโรงงาน  
ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก  
โทร. ๐ ๓๘๐๕ ๗๖๑๑-๓  
ไปรษณีย์อิเล็กทรอนิกส์ einw@diw.mail.go.th

เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
บริษัท เอนแอลเอส แลบลอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ว-๓๒๓  
ที่ อก ๐๓๑๐(๓)/ ๒๔๗๐ ลงวันที่ ๒๘ มิถุนายน ๒๕๖๔

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๔ รายการ  
น้ำเสีย จำนวน 14 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Biochemical Oxygen Demand	1) 5-Day BOD Test, Membrane Electrode Method <sup>[2]</sup> 2) 5-Day BOD Test, Azide Modification Method <sup>[2]</sup>
2	Chemical Oxygen Demand	1) Open Reflux, Titrimetric Method <sup>[2]</sup> 2) Closed Reflux, Colorimetric Method <sup>[2]</sup> 3) Closed Reflux, Titrimetric Method <sup>[2]</sup>
3	Color	ADMI Weighted – Ordinate Spectrophotometric Method <sup>[2]</sup>
4	Cyanide	Distillation, Colorimetric Method <sup>[2]</sup>
5	Formaldehyde	Distillation, Colorimetric Method <sup>[1]</sup>
6	Free Chlorine	DPD-Ferrous Titrimetric Method <sup>[2]</sup>
7	Oil and Grease	Liquid-Liquid Partition-Gravimetric Method <sup>[2]</sup>
8	pH	Electrometric Method <sup>[2]</sup>
9	Phenols	1) Distillation, Chloroform Extraction Method <sup>[2]</sup> 2) Distillation, Direct Photometric Method <sup>[2]</sup>
10	Sulfide	ZnS Precipitation, Iodometric Method <sup>[2]</sup>
11	Temperature	Laboratory and Field Method <sup>[2]</sup>
12	Total Dissolved Solids	Dried at 180 °C <sup>[2]</sup>
13	Total Kjeldahl Nitrogen	Semi-Micro Kjeldahl Method <sup>[2]</sup>
14	Total Suspended Solids	Dried at 103-105 °C <sup>[2]</sup>

อากาศเสีย (ปล่องระบาย) จำนวน 7 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Carbon Monoxide	1) Sampling Bag, Non-Dispersive Infrared Method <sup>[5]</sup> 2) Instrumental Analyzer Method <sup>[6]</sup>
2	Hydrogen Sulfide	Absorption Sampling, Iodometric Method <sup>[5]</sup>
3	Opacity	Ringelmann's Method <sup>[3,4]</sup>
4	Oxide of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method <sup>[6]</sup> 2) Instrumental Analyzer Method <sup>[9]</sup>
5	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method <sup>[5]</sup> 2) Instrumental Analyzer Method <sup>[10]</sup>

วิภา สัมฤทธิ์

(นางสาววิชุดา สัมฤทธิ์ผล)

ผู้อำนวยการ

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

Sulfuric Acid...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
6	Sulfuric Acid	Isokinetic Sampling, Barium – Thorin Titrimetric Method <sup>[6]</sup>
7	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method <sup>[7]</sup>

**น้ำใต้ดิน จำนวน 3 รายการ**

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Cyanide	Distillation, Colorimetric Method <sup>[2]</sup>
2	pH	Electrometric Method <sup>[2]</sup>
3	Phenols	Distillation, Direct Photometric Method <sup>[2]</sup>

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วิภา สัมฤทธิ์

(นางสาววิชุดา สัมฤทธิ์ผล)

ผู้อำนวยการ

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก กองวิจัยและเตือนภัยมลพิษโรงงาน กรมโรงงานอุตสาหกรรม โทร ๐ ๒๘๐๕ ๗๐๖๒-๓๓