

ภาคผนวก ค

ใบรับรองผลการวิเคราะห์

ภาคผนวก ค-1

คุณภาพอากาศในบรรยากาศ



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :
Project Name :
Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023
Date Reported : Feb 01, 2023
Report Number : 2540666-1

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Sample Number 233804-1
Sampled Date Jan 12, 2023
Sample Description Air Quality
Location วัดนาเพ็ญพรต (A1) (GPS 47P 0697324, 1615137)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	12/01/23 - 13/01/23	mg/m3	-	0.005	0.053	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	12/01/23 - 13/01/23	mg/m3	-	0.005	0.089	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	12/01/23 - 13/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

Remark :

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

Chanatt L.

Chanattagarn Imchom
Supervisor



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Project Location :

Lot ID: 233804

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Report Number : 2540666-1

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Sample Number 233804-2
Sampled Date Jan 13, 2023
Sample Description Air Quality
Location วัดป่าเพ็ญพรต (A1) (GPS 47P 0697324, 1615137)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	13/01/23 - 14/01/23	mg/m3	-	0.005	0.070	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	13/01/23 - 14/01/23	mg/m3	-	0.005	0.103	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	13/01/23 - 14/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

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Sample Number 233804-3
Sampled Date Jan 14, 2023
Sample Description Air Quality
Location วัดป่าเพ็ญพรต (A1) (GPS 47P 0697324, 1615137)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	14/01/23 - 15/01/23	mg/m3	-	0.005	0.067	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	14/01/23 - 15/01/23	mg/m3	-	0.005	0.102	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	14/01/23 - 15/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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Sampled By : Thananat Anake

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Date Received : Jan 20, 2023
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Sample Number 233804-4
Sampled Date Jan 15, 2023
Sample Description Air Quality
Location วัดบึงเพ็ญพรต (A1) (GPS 47P 0697324, 1615137)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	15/01/23 - 16/01/23	mg/m3	-	0.005	0.058	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	15/01/23 - 16/01/23	mg/m3	-	0.005	0.129	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	15/01/23 - 16/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

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Project Name :

Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023

Date Reported : Feb 01, 2023

Report Number : 2540666-1

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Sample Number 233804-5
Sampled Date Jan 16, 2023
Sample Description Air Quality
Location วัดป่าเพ็ดพรต (A1) (GPS 47P 0697324, 1615137)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	16/01/23 - 17/01/23	mg/m3	-	0.005	0.069	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	16/01/23 - 17/01/23	mg/m3	-	0.005	0.110	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	16/01/23 - 17/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

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P/O :
Project Name :
Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023
Date Reported : Feb 01, 2023
Report Number : 2540666-1

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Sample Number 233804-6
Sampled Date Jan 17, 2023
Sample Description Air Quality
Location วัดบางเพ็ญพรต (A1) (GPS 47P 0697324, 1615137)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 33.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	17/01/23 - 18/01/23	mg/m3	-	0.005	0.089	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	17/01/23 - 18/01/23	mg/m3	-	0.005	0.198	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	17/01/23 - 18/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

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P/O :

Project Name :

Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023

Date Reported : Feb 01, 2023

Report Number : 2540666-1

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Sample Number 233804-7
Sampled Date Jan 18, 2023
Sample Description Air Quality
Location วัดป่าเพ็ญพรต (A1) (GPS 47P 0697324, 1615137)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 33.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	18/01/23 - 19/01/23	mg/m3	-	0.005	0.038	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	18/01/23 - 19/01/23	mg/m3	-	0.005	0.062	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	18/01/23 - 19/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

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9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :
Project Name :
Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023
Date Reported : Feb 01, 2023
Report Number : 2540666-1

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Sample Number 233804-8
Sampled Date Jan 12, 2023
Sample Description Air Quality
Location บ้านแพะ (A2) (GPS 47P 0696687, 1616593)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	12/01/23 - 13/01/23	mg/m3	-	0.005	0.040	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	12/01/23 - 13/01/23	mg/m3	-	0.005	0.066	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	12/01/23 - 13/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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P/O :
Project Name :
Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023
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Report Number : 2540666-1

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Sample Number 233804-9
Sampled Date Jan 13, 2023
Sample Description Air Quality
Location บ้านแพะ (A2) (GPS 47P 0696687, 1616593)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	13/01/23 - 14/01/23	mg/m3	-	0.005	0.064	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	13/01/23 - 14/01/23	mg/m3	-	0.005	0.098	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	13/01/23 - 14/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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Sample Number	233804-10
Sampled Date	Jan 14, 2023
Sample Description	Air Quality
Location	บ้านแพะ (A2) (GPS 47P 0696687, 1616593)
Date Analysis Commenced	Jan 23, 2023
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure	756 mmHg
Atmospheric Temperature	32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	14/01/23 - 15/01/23	mg/m3	-	0.005	0.052	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	14/01/23 - 15/01/23	mg/m3	-	0.005	0.100	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	14/01/23 - 15/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

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Sample Number 233804-11
Sampled Date Jan 15, 2023
Sample Description Air Quality
Location บ้านแพะ (A2) (GPS 47P 0696687, 1616593)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	15/01/23 - 16/01/23	mg/m3	-	0.005	0.080	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	15/01/23 - 16/01/23	mg/m3	-	0.005	0.123	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	15/01/23 - 16/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

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Project Location :

Lot ID: 233804

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Sample Number 233804-12
Sampled Date Jan 16, 2023
Sample Description Air Quality
Location บ้านแพะ (A2) (GPS 47P 0696687, 1616593)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	16/01/23 - 17/01/23	mg/m3	-	0.005	0.067	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	16/01/23 - 17/01/23	mg/m3	-	0.005	0.107	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	16/01/23 - 17/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

Remark :

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Chanattagarn Imchom
Supervisor



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :
Project Name :
Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023
Date Reported : Feb 01, 2023
Report Number : 2540666-1

Page 13 of 21

Sample Number 233804-13
Sampled Date Jan 17, 2023
Sample Description Air Quality
Location บ้านแพะ (A2) (GPS 47P 0696687, 1616593)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 33.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	17/01/23 - 18/01/23	mg/m3	-	0.005	0.048	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	17/01/23 - 18/01/23	mg/m3	-	0.005	0.101	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	17/01/23 - 18/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

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Chanattagarn Imchom
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Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023

Date Reported : Feb 01, 2023

Report Number : 2540666-1

Page 14 of 21

Sample Number	233804-14
Sampled Date	Jan 18, 2023
Sample Description	Air Quality
Location	บ้านแพะ (A2) (GPS 47P 0696687, 1616593)
Date Analysis Commenced	Jan 23, 2023
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure	756 mmHg
Atmospheric Temperature	33.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	18/01/23 - 19/01/23	mg/m3	-	0.005	0.033	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	18/01/23 - 19/01/23	mg/m3	-	0.005	0.084	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	18/01/23 - 19/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

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Chanattagarn Imchom
Supervisor



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
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P/O :

Project Name :

Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023

Date Reported : Feb 01, 2023

Report Number : 2540666-1

Page 15 of 21

Sample Number 233804-15
Sampled Date Jan 12, 2023
Sample Description Air Quality
Location วัดหนองถ่านเหนือ (A3) (GPS 47P 0695360, 1615739)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	12/01/23 - 13/01/23	mg/m3	-	0.005	0.042	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	12/01/23 - 13/01/23	mg/m3	-	0.005	0.072	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	12/01/23 - 13/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

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Chanattagarn Imchom
Supervisor



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :
Project Name :
Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023
Date Reported : Feb 01, 2023
Report Number : 2540666-1

Page 16 of 21

Sample Number 233804-16
Sampled Date Jan 13, 2023
Sample Description Air Quality
Location วัดหนองถ่านหิน (A3) (GPS 47P 0695360, 1615739)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	13/01/23 - 14/01/23	mg/m3	-	0.005	0.061	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	13/01/23 - 14/01/23	mg/m3	-	0.005	0.106	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	13/01/23 - 14/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

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P/O :
Project Name :
Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023
Date Reported : Feb 01, 2023
Report Number : 2540666-1

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Sample Number 233804-17
Sampled Date Jan 14, 2023
Sample Description Air Quality
Location วัดหนองถ่านหิน (A3) (GPS 47P 0695360, 1615739)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	14/01/23 - 15/01/23	mg/m3	-	0.005	0.063	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	14/01/23 - 15/01/23	mg/m3	-	0.005	0.096	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	14/01/23 - 15/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

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Chanattagarn Imchom
Supervisor



Analysis / Test Report

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P/O :
Project Name :
Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023
Date Reported : Feb 01, 2023
Report Number : 2540666-1

Page 18 of 21

Sample Number 233804-18
Sampled Date Jan 15, 2023
Sample Description Air Quality
Location วัดหนองถ่านหิน (A3) (GPS 47P 0695360, 1615739)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	15/01/23 - 16/01/23	mg/m3	-	0.005	0.030	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	15/01/23 - 16/01/23	mg/m3	-	0.005	0.109	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	15/01/23 - 16/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

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Chanattagarn Imchom
Supervisor



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
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P/O :

Project Name :

Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023

Date Reported : Feb 01, 2023

Report Number : 2540666-1

Page 19 of 21

Sample Number 233804-19
Sampled Date Jan 16, 2023
Sample Description Air Quality
Location วัดหนองถ่านหิน (A3) (GPS 47P 0695360, 1615739)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	16/01/23 - 17/01/23	mg/m3	-	0.005	0.051	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	16/01/23 - 17/01/23	mg/m3	-	0.005	0.111	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	16/01/23 - 17/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

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Chanattagarn Imchom
Supervisor



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023

Date Reported : Feb 01, 2023

Report Number : 2540666-1

Page 20 of 21

Sample Number 233804-20
Sampled Date Jan 17, 2023
Sample Description Air Quality
Location วัดหนองถ่านหิน (A3) (GPS 47P 0695360, 1615739)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 33.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	17/01/23 - 18/01/23	mg/m3	-	0.005	0.044	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	17/01/23 - 18/01/23	mg/m3	-	0.005	0.079	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	17/01/23 - 18/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

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Supervisor



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
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P/O :
Project Name :
Project Location :

Lot ID: 233804

Date Received : Jan 20, 2023
Date Reported : Feb 01, 2023
Report Number : 2540666-1

Page 21 of 21

Sample Number 233804-21
Sampled Date Jan 18, 2023
Sample Description Air Quality
Location วัดหนองถ่านหิน (A3) (GPS 47P 0695360, 1615739)
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag and one quartz filter paper (8x10 inch) placed in plastic bag
Barometric Pressure 756 mmHg
Atmospheric Temperature 33.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Particulate matter as PM 10	18/01/23 - 19/01/23	mg/m3	-	0.005	0.033	0.12	US EPA 40 CFR Part 50, Appendix J	NEB No.24 Bangkok	
Total Suspended Particulate	18/01/23 - 19/01/23	mg/m3	-	0.005	0.068	0.33	US EPA 40 CFR Part 50, Appendix B	NEB No.24 Bangkok	
Metals Testing									
Iron as FeO2 *	18/01/23 - 19/01/23	mg/m3	-	0.02	<0.02	No Standard	United States Environmental Protection Agency, EPA IO Compendium Method IO-3.4	-	Bangkok

Guideline :

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

Sampled By : Thananat Anake

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Chanattagarn Imchom
Supervisor



Analysis / Test Report

Client : Magotteaux Co., Ltd.

9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233749

Date Received : Jan 20, 2023

Date Reported : Jan 25, 2023

Report Number: 2540660-1

Page 1 of 1

Sample Description Air Quality
Location วัดป่าเพ็ญพรต (A1) (GPS 47P 0697324, 1615137)
Parameter Nitrogen dioxide (ppm)
Measurement Date Jan 12, 2023 - Jan 19, 2023
Measurement by Thananat Anake

	233749-1	233749-2	233749-3	233749-4	233749-5	233749-6	233749-7
Time	Jan 12, 2023	Jan 13, 2023	Jan 14, 2023	Jan 15, 2023	Jan 16, 2023	Jan 17, 2023	Jan 18, 2023
12:00 PM - 01:00 PM	0.001	<0.001	0.001	0.017	0.002	0.001	0.001
01:00 PM - 02:00 PM	0.002	<0.001	0.001	0.002	0.001	0.001	0.001
02:00 PM - 03:00 PM	<0.001	<0.001	0.001	0.002	0.001	0.001	0.001
03:00 PM - 04:00 PM	<0.001	<0.001	0.001	0.001	0.001	0.001	0.001
04:00 PM - 05:00 PM	<0.001	<0.001	0.001	0.001	0.001	0.001	0.001
05:00 PM - 06:00 PM	<0.001	<0.001	<0.001	0.001	0.001	0.001	0.001
06:00 PM - 07:00 PM	<0.001	<0.001	<0.001	0.001	0.001	0.002	0.001
07:00 PM - 08:00 PM	<0.001	<0.001	0.002	0.001	0.001	0.002	0.001
08:00 PM - 09:00 PM	0.001	0.001	0.002	0.002	0.001	0.002	0.001
09:00 PM - 10:00 PM	0.006	0.002	0.002	0.002	0.002	0.002	0.001
10:00 PM - 11:00 PM	0.001	0.002	0.003	0.003	0.002	0.002	0.001
11:00 PM - 12:00 AM	0.002	0.004	0.006	0.002	0.002	0.001	0.001
12:00 AM - 01:00 AM	0.002	0.002	0.004	0.002	0.002	0.001	0.001
01:00 AM - 02:00 AM	0.002	0.002	0.005	0.002	0.002	0.001	0.001
02:00 AM - 03:00 AM	0.002	0.002	0.004	0.002	0.002	0.001	0.001
03:00 AM - 04:00 AM	<0.001	0.004	0.004	0.003	0.002	0.001	0.001
04:00 AM - 05:00 AM	<0.001	0.003	0.004	0.011	0.002	0.001	0.001
05:00 AM - 06:00 AM	<0.001	0.003	0.002	0.003	0.002	0.001	0.001
06:00 AM - 07:00 AM	0.001	0.003	0.002	0.005	0.002	0.001	0.001
07:00 AM - 08:00 AM	0.002	0.004	0.004	0.005	0.002	0.001	0.001
08:00 AM - 09:00 AM	0.003	0.008	0.007	0.009	0.002	0.001	0.002
09:00 AM - 10:00 AM	0.001	0.004	0.004	0.005	0.002	0.001	0.001
10:00 AM - 11:00 AM	0.001	0.002	0.002	0.002	0.002	0.001	0.002
11:00 AM - 12:00 PM	<0.001	0.002	0.002	0.019	0.002	0.001	0.001
Average	0.001	0.002	0.003	0.004	0.002	0.001	0.001
1hr - Maximum	0.006	0.008	0.007	0.019	0.002	0.002	0.002
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170	0.170	0.170

Standard : Notification of the National Environment Board No. 33, 2009 (B.E. 2552).

Reference Method : US EPA Method Part 50 App. F (Chemiluminescence)

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Saranya C.

Saranya Chalermthamrong

Scientist (4)

ADDRESS 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250 Thailand | PHONE +66 0 2760 3000 | FAX +66 0 2760 3197
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Analysis / Test Report

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P/O :

Project Name :

Project Location :

Lot ID: 233749

Date Received : Jan 20, 2023

Date Reported : Jan 25, 2023

Report Number: 2551519-1

Page 1 of 1

Sample Description Air Quality
Location บ้านแพะ (A2) (GPS 47P 0696687, 1616593)
Parameter Nitrogen dioxide (ppm)
Measurement Date Jan 12, 2023 - Jan 19, 2023
Measurement by Thananat Anake

	233749-8 Jan 12, 2023	233749-9 Jan 13, 2023	233749-10 Jan 14, 2023	233749-11 Jan 15, 2023	233749-12 Jan 16, 2023	233749-13 Jan 17, 2023	233749-14 Jan 18, 2023
Time							
01:00 PM - 02:00 PM	<0.001	0.001	0.001	0.002	<0.001	<0.001	<0.001
02:00 PM - 03:00 PM	<0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001
03:00 PM - 04:00 PM	0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001
04:00 PM - 05:00 PM	0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001
05:00 PM - 06:00 PM	0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
06:00 PM - 07:00 PM	0.002	<0.001	<0.001	0.001	<0.001	<0.001	<0.001
07:00 PM - 08:00 PM	0.002	0.001	0.001	0.001	0.001	0.002	<0.001
08:00 PM - 09:00 PM	0.003	0.005	0.002	0.003	0.001	0.002	<0.001
09:00 PM - 10:00 PM	0.006	0.004	0.005	0.005	0.003	<0.001	<0.001
10:00 PM - 11:00 PM	0.008	0.005	0.004	0.002	0.003	<0.001	<0.001
11:00 PM - 12:00 AM	0.007	0.014	0.019	0.004	0.002	<0.001	<0.001
12:00 AM - 01:00 AM	0.013	0.010	0.020	0.011	0.003	<0.001	<0.001
01:00 AM - 02:00 AM	0.018	0.010	0.014	0.005	0.003	<0.001	<0.001
02:00 AM - 03:00 AM	0.012	0.008	0.021	0.005	0.005	<0.001	<0.001
03:00 AM - 04:00 AM	0.006	0.019	0.008	0.003	0.005	<0.001	<0.001
04:00 AM - 05:00 AM	0.003	0.009	0.006	0.004	0.003	<0.001	<0.001
05:00 AM - 06:00 AM	0.003	0.009	0.008	0.009	0.002	<0.001	<0.001
06:00 AM - 07:00 AM	0.008	0.012	0.009	0.016	0.002	<0.001	<0.001
07:00 AM - 08:00 AM	0.009	0.021	0.022	0.019	0.002	0.001	0.001
08:00 AM - 09:00 AM	0.015	0.020	0.013	0.012	0.004	0.002	0.002
09:00 AM - 10:00 AM	0.008	0.015	0.005	0.003	0.002	0.001	0.001
10:00 AM - 11:00 AM	0.005	0.008	0.002	0.002	0.002	<0.001	<0.001
11:00 AM - 12:00 PM	0.003	0.003	0.004	0.001	0.001	<0.001	<0.001
12:00 PM - 01:00 PM	0.002	0.002	0.002	<0.001	0.001	<0.001	<0.001
Average	0.006	0.008	0.007	0.005	0.002	<0.001	<0.001
1hr - Maximum	0.018	0.021	0.022	0.019	0.005	0.002	0.002
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170	0.170	0.170

Standard : Notification of the National Environment Board No. 33, 2009 (B.E. 2552).

Reference Method : US EPA Method Part 50 App. F (Chemiluminescence)

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Approved by

Saranya C.

Saranya Chalermthamrong

Scientist (4)

ADDRESS 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250 Thailand | PHONE +66 0 2760 3000 | FAX +66 0 2760 3197
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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233749

Date Received : Jan 20, 2023

Date Reported : Jan 25, 2023

Report Number: 2551520-1

Page 1 of 1

Sample Description Air Quality
Location วัดหนองถ่านหิน (A3) (GPS 47P 0695360, 1615739)
Parameter Nitrogen dioxide (ppm)
Measurement Date Jan 12, 2023 - Jan 19, 2023
Measurement by Thananat Anake

	233749-15 Jan 12, 2023	233749-16 Jan 13, 2023	233749-17 Jan 14, 2023	233749-18 Jan 15, 2023	233749-19 Jan 16, 2023	233749-20 Jan 17, 2023	233749-21 Jan 18, 2023
Time							
11:00 AM - 12:00 PM	0.006	0.001	0.001	0.002	<0.001	<0.001	0.011
12:00 PM - 01:00 PM	0.002	<0.001	<0.001	0.002	<0.001	<0.001	<0.001
01:00 PM - 02:00 PM	0.006	<0.001	<0.001	<0.001	0.001	0.001	<0.001
02:00 PM - 03:00 PM	0.008	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
03:00 PM - 04:00 PM	<0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001
04:00 PM - 05:00 PM	<0.001	<0.001	<0.001	<0.001	0.002	0.002	<0.001
05:00 PM - 06:00 PM	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001
06:00 PM - 07:00 PM	<0.001	<0.001	<0.001	0.010	<0.001	<0.001	0.002
07:00 PM - 08:00 PM	0.002	<0.001	<0.001	<0.001	0.002	<0.001	<0.001
08:00 PM - 09:00 PM	0.002	0.001	0.002	<0.001	0.004	<0.001	0.002
09:00 PM - 10:00 PM	0.004	0.001	0.002	0.001	0.001	<0.001	<0.001
10:00 PM - 11:00 PM	0.002	0.004	0.017	0.001	0.002	<0.001	0.001
11:00 PM - 12:00 AM	0.003	0.007	0.015	0.001	0.002	<0.001	0.002
12:00 AM - 01:00 AM	0.003	0.003	0.012	0.002	0.003	0.001	0.001
01:00 AM - 02:00 AM	0.003	0.003	0.010	0.002	0.002	0.001	<0.001
02:00 AM - 03:00 AM	0.003	0.003	0.008	0.002	0.002	0.003	0.001
03:00 AM - 04:00 AM	0.002	0.004	0.006	0.002	0.002	<0.001	0.001
04:00 AM - 05:00 AM	0.002	0.005	0.002	0.002	0.003	<0.001	<0.001
05:00 AM - 06:00 AM	0.002	0.003	0.003	0.007	0.004	0.002	<0.001
06:00 AM - 07:00 AM	0.003	0.008	0.006	0.005	0.001	0.001	0.001
07:00 AM - 08:00 AM	0.013	0.014	0.018	0.008	0.001	0.001	0.001
08:00 AM - 09:00 AM	0.008	0.016	0.012	0.006	0.003	<0.001	<0.001
09:00 AM - 10:00 AM	0.003	0.005	0.004	0.002	0.001	0.001	0.001
10:00 AM - 11:00 AM	0.002	0.002	0.002	0.001	<0.001	0.003	0.001
Average	0.003	0.004	0.005	0.003	0.002	<0.001	0.001
1hr - Maximum	0.013	0.016	0.018	0.010	0.004	0.003	0.011
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170	0.170	0.170

Standard : Notification of the National Environment Board No. 33, 2009 (B.E. 2552).

Reference Method : US EPA Method Part 50 App. F (Chemiluminescence)

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Approved by

Saranya C.

Saranya Chalermthamrong
Scientist (4)

ADDRESS 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250 Thailand | PHONE +66 0 2760 3000 | FAX +66 0 2760 3197
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Analysis / Test Report

Client : Magotteaux Co., Ltd.
 9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160
 P/O :
 Project Name :
 Project Location :

Lot ID : 233805
 Date Received : Jan 20, 2023
 Date Reported : Jan 30, 2023
 Report Number : 2540669-1

Page 1 of 2

Sample Number 233805-1 to 7
 Parameter Wind Speed / Wind Direction
 Location วัดป่าเพ็ญพรต (A1) (GPS 47P 0697324, 1615137)
 Sampling Date Jan 12 - Jan 19, 2023
 Sampling by Thananat Anake

Time	Jan 12 - Jan 13, 2023			Jan 13 - Jan 14, 2023			Jan 14 - Jan 15, 2023			Jan 15 - Jan 16, 2023			Jan 16 - Jan 17, 2023			Jan 17 - Jan 18, 2023			Jan 18 - Jan 19, 2023		
	WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)	
12:00 PM - 01:00 PM	0.8	301.0	WNW	1.2	234.0	SW	0.3	284.0	WNW	0.6	292.0	WNW	0.4	191.0	S	0.7	167.0	SSE	0.5	53.0	NE
01:00 PM - 02:00 PM	1.3	286.0	WNW	1.4	198.0	SSW	0.0	-	-	0.9	315.0	NW	0.6	343.0	NNW	1.1	222.0	SW	0.5	117.0	ESE
02:00 PM - 03:00 PM	1.2	210.0	SSW	0.6	195.0	SSW	0.0	-	-	1.1	230.0	SW	0.5	198.0	SSW	0.4	148.0	SSE	0.9	11.0	N
03:00 PM - 04:00 PM	1.1	359.0	N	1.3	308.0	NW	0.8	220.0	SW	1.0	286.0	WNW	1.1	177.0	S	0.1	-	-	1.0	21.0	NNE
04:00 PM - 05:00 PM	1.1	332.0	NNW	0.7	286.0	WNW	0.7	276.0	W	1.1	345.0	NNW	0.2	-	-	0.2	-	-	0.8	66.0	ENE
05:00 PM - 06:00 PM	0.0	-	-	0.2	-	-	0.3	283.0	WNW	0.3	259.0	W	0.6	197.0	SSW	0.0	-	-	0.2	-	-
06:00 PM - 07:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
07:00 PM - 08:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
08:00 PM - 09:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
09:00 PM - 10:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
10:00 PM - 11:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
11:00 PM - 12:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
12:00 AM - 01:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.1	-	-
01:00 AM - 02:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
02:00 AM - 03:00 AM	0.3	226.0	SW	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
03:00 AM - 04:00 AM	0.2	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.6	56.0	NE
04:00 AM - 05:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.2	-	-
05:00 AM - 06:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.6	282.0	WNW
06:00 AM - 07:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.0	8.0	N
07:00 AM - 08:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.3	102.0	ESE	0.3	36.0	NE
08:00 AM - 09:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.2	-	-	1.1	88.0	E	0.2	-	-
09:00 AM - 10:00 AM	0.4	77.0	ENE	0.8	158.0	SSE	0.9	246.0	WSW	0.6	172.0	S	0.0	-	-	1.3	106.0	ESE	0.8	39.0	NE
10:00 AM - 11:00 AM	0.6	277.0	W	0.0	-	-	0.0	-	-	0.3	195.0	SSW	0.3	119.0	ESE	0.2	-	-	1.7	102.0	ESE
11:00 AM - 12:00 PM	1.7	234.0	SW	0.0	-	-	0.5	298.0	WNW	0.5	358.0	N	0.0	-	-	0.8	77.0	ENE	1.2	98.0	E

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by

Sarayuth Jittranont
 Assistant General Manager



Analysis / Test Report

Client : Magotteaux Co., Ltd.

9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID : 233805

Date Received : Jan 20, 2023

Date Reported : Jan 30, 2023

Report Number : 2540669-1

Page 2 of 2

Wind Rose



Date : Jan 12-13, 2023



Date : Jan 13-14, 2023



Date : Jan 14-15, 2023



Date : Jan 15-16, 2023



Date : Jan 16-17, 2023



Date : Jan 17-18, 2023



Date : Jan 18-19, 2023



Date : Jan 12-19, 2023

WS(m/s)	%
≥ 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	0.00
1.7-3.3	1.19
0.3-1.7	31.55
Calms	67.26

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Approved by

Sarayuth Jitranont
Assistant General Manager



Analysis / Test Report

Client : Magotteaux Co., Ltd.
 9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160
 P/O :
 Project Name :
 Project Location :

Lot ID : 233805
 Date Received : Jan 20, 2023
 Date Reported : Jan 30, 2023
 Report Number : 2540669-1

Page 1 of 2

Sample Number 233805-8 to 14
 Parameter Wind Speed / Wind Direction
 Location บ้านแพะ (A2) (GPS 47P 0696687, 1616593)
 Sampling Date Jan 12 - Jan 19, 2023
 Sampling by Thananat Anake

Time	Jan 12 - Jan 13, 2023			Jan 13 - Jan 14, 2023			Jan 14 - Jan 15, 2023			Jan 15 - Jan 16, 2023			Jan 16 - Jan 17, 2023			Jan 17 - Jan 18, 2023			Jan 18 - Jan 19, 2023		
	WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)	
01:00 PM - 02:00 PM	3.0	251.0	WSW	4.6	226.0	SW	0.7	196.0	SSW	0.5	172.0	S	0.0	-	-	1.7	203.0	SSW	4.0	81.0	E
02:00 PM - 03:00 PM	0.8	285.0	WNW	1.2	151.0	SSE	0.7	220.0	SW	1.3	242.0	WSW	1.5	182.0	S	0.0	-	-	2.4	335.0	NNW
03:00 PM - 04:00 PM	2.2	245.0	WSW	1.0	261.0	W	0.0	-	-	1.1	247.0	WSW	2.2	201.0	SSW	0.7	222.0	SW	3.1	20.0	NNE
04:00 PM - 05:00 PM	0.0	-	-	0.0	-	-	0.7	276.0	W	1.1	221.0	SW	1.7	172.0	S	0.0	-	-	1.2	44.0	NE
05:00 PM - 06:00 PM	0.5	264.0	W	0.0	-	-	1.4	239.0	WSW	0.7	270.0	W	0.9	213.0	SSW	0.0	-	-	3.8	67.0	ENE
06:00 PM - 07:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.2	69.0	ENE
07:00 PM - 08:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
08:00 PM - 09:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
09:00 PM - 10:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.2	34.0	NE
10:00 PM - 11:00 PM	0.5	270.0	W	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
11:00 PM - 12:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
12:00 AM - 01:00 AM	0.1	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
01:00 AM - 02:00 AM	0.3	279.0	W	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
02:00 AM - 03:00 AM	0.7	282.0	WNW	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
03:00 AM - 04:00 AM	0.3	221.0	SW	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.6	53.0	NE	0.0	-	-
04:00 AM - 05:00 AM	1.1	167.0	SSE	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.9	40.0	NE	0.0	-	-
05:00 AM - 06:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.7	76.0	ENE	0.0	-	-
06:00 AM - 07:00 AM	0.0	-	-	0.3	256.0	WSW	0.0	-	-	0.0	-	-	0.0	-	-	1.0	53.0	NE	0.0	-	-
07:00 AM - 08:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	2.4	24.0	NNE
08:00 AM - 09:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.6	69.0	ENE	4.6	27.0	NNE
09:00 AM - 10:00 AM	1.3	73.0	ENE	1.4	195.0	SSW	0.0	-	-	0.0	-	-	0.8	74.0	ENE	3.2	34.0	NE	2.6	19.0	NNE
10:00 AM - 11:00 AM	1.5	187.0	S	3.3	222.0	SW	0.0	-	-	0.0	-	-	0.0	-	-	4.6	35.0	NE	5.7	33.0	NNE
11:00 AM - 12:00 PM	2.8	232.0	SW	2.8	215.0	SW	2.2	10.0	N	0.0	-	-	0.0	-	-	2.6	68.0	ENE	2.1	45.0	NE
12:00 PM - 01:00 PM	1.9	250.0	WSW	1.5	168.0	SSE	1.8	281.0	W	0.9	209.0	SSW	0.2	-	-	2.4	74.0	ENE	1.8	38.0	NE

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

The above results are valid only for the analyzed/tested sample(s) as indicated in this report. No part of this report or certificate may be reproduced in any form without written consent from the Laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by

Sarayuth Jittrantont
 Assistant General Manager



Analysis / Test Report

Client : Magotteaux Co., Ltd.

9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID : 233805

Date Received : Jan 20, 2023

Date Reported : Jan 30, 2023

Report Number : 2540669-1

Page 2 of 2

Wind Rose



Date : Jan 12-13, 2023



Date : Jan 13-14, 2023



Date : Jan 14-15, 2023



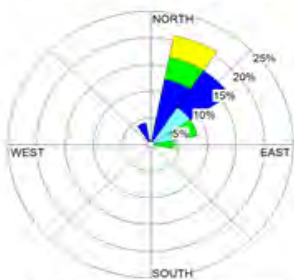
Date : Jan 15-16, 2023



Date : Jan 16-17, 2023



Date : Jan 17-18, 2023



Date : Jan 18-19, 2023



Date : Jan 12-19, 2023

	WS(m/s)	%
	≥ 10.0	0.00
	8.0-10.0	0.00
	5.5-8.0	0.60
	3.3-5.5	3.56
	1.7-3.3	11.91
	0.3-1.7	20.83
	Calms	63.10

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Approved by

Sarayuth Jitranont
Assistant General Manager



Analysis / Test Report

Client : Magotteaux Co., Ltd.

9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID : 233805

Date Received : Jan 20, 2023

Date Reported : Jan 30, 2023

Report Number : 2540669-1

Page 1 of 2

Sample Number 233805-15 to 21
Parameter Wind Speed / Wind Direction
Location วัดหนองถ่านเหิน (A3) (GPS 47P 0695360, 1615739)
Sampling Date Jan 12 - Jan 19, 2023
Sampling by Thananat Anake

Time	Jan 12 - Jan 13, 2023			Jan 13 - Jan 14, 2023			Jan 14 - Jan 15, 2023			Jan 15 - Jan 16, 2023			Jan 16 - Jan 17, 2023			Jan 17 - Jan 18, 2023			Jan 18 - Jan 19, 2023		
	WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)	
11:00 AM - 12:00 PM	0.0	-	-	0.0	-	-	1.2	129.0	SE	0.0	-	-	0.0	-	-	0.0	-	-	1.7	104.0	ESE
12:00 PM - 01:00 PM	2.5	169.0	S	0.0	-	-	0.9	186.0	S	0.0	-	-	0.0	-	-	0.0	-	-	2.2	56.0	NE
01:00 PM - 02:00 PM	1.1	330.0	NNW	0.9	176.0	S	1.0	193.0	SSW	0.0	-	-	0.0	-	-	0.9	153.0	SSE	1.9	248.0	WSW
02:00 PM - 03:00 PM	0.7	267.0	W	0.0	-	-	1.0	206.0	SSW	1.5	326.0	NW	0.0	-	-	0.0	-	-	1.8	244.0	WSW
03:00 PM - 04:00 PM	0.8	237.0	WSW	0.0	-	-	2.1	277.0	W	1.3	287.0	WNW	0.0	-	-	0.7	96.0	E	1.5	85.0	E
04:00 PM - 05:00 PM	0.3	207.0	SSW	0.0	-	-	0.7	255.0	WSW	0.0	-	-	0.3	166.0	SSE	0.0	-	-	0.5	125.0	SE
05:00 PM - 06:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.1	121.0	ESE
06:00 PM - 07:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
07:00 PM - 08:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.8	79.0	E
08:00 PM - 09:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.6	92.0	E
09:00 PM - 10:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
10:00 PM - 11:00 PM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.5	161.0	SSE	0.0	-	-
11:00 PM - 12:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
12:00 AM - 01:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
01:00 AM - 02:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
02:00 AM - 03:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-
03:00 AM - 04:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.3	125.0	SE	0.0	-	-
04:00 AM - 05:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.7	107.0	ESE	0.0	-	-
05:00 AM - 06:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.6	225.0	SW	1.0	221.0	SW
06:00 AM - 07:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.1	81.0	E	1.3	98.0	E
07:00 AM - 08:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	1.3	170.0	S	2.5	172.0	S	2.1	222.0	SW
08:00 AM - 09:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	-	2.2	149.0	SSE	1.1	319.0	NW
09:00 AM - 10:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	1.6	102.0	ESE	1.8	66.0	ENE	0.8	296.0	WNW	2.0	226.0	SW
10:00 AM - 11:00 AM	0.8	283.0	WNW	2.0	168.0	SSE	0.0	-	-	0.0	-	-	0.3	67.0	ENE	1.1	291.0	WNW	0.8	236.0	SW

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by

Sarayuth Jittrantont
Assistant General Manager



Analysis / Test Report

Client : Magotteaux Co., Ltd.

9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID : 233805

Date Received : Jan 20, 2023

Date Reported : Jan 30, 2023

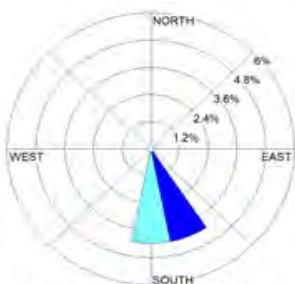
Report Number : 2540669-1

Page 2 of 2

Wind Rose



Date : Jan 12-13, 2023



Date : Jan 13-14, 2023



Date : Jan 14-15, 2023



Date : Jan 15-16, 2023



Date : Jan 16-17, 2023



Date : Jan 17-18, 2023



Date : Jan 18-19, 2023



Date : Jan 12-19, 2023

WS(m/s)	%
≥ 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	0.00
1.7-3.3	8.34
0.3-1.7	19.64
Calms	72.02

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Approved by

Sarayuth Jitranont
Assistant General Manager

ภาคผนวก ค-2

คุณภาพอากาศจากปล่องระบาย



Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 234044

Date Received : Jan 18, 2023

Date Reported : Jan 25, 2023

Report Number: 2541278-1

Page 1 of 1

Sample Number	234044-1
Sampled Date	Jan 17, 2023
Sample Description	Emission from Stationary Source
Location	เดาหลอม (BH-1)
Date Analysis Commenced	Jan 19, 2023
Condition of Sample	Extracted into two 2-L collection flasks and one filter paper placed in plastic petri dish

Stack Description

Ambient Pressure	759	mmHg	Diameter	1.25	m	Oxygen	20.2	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	0.5	%
Type of Process	Combustion (Open System)		Stack Temperature	54.0	°C	Gas Velocity	5.7	m/s
Type of Fuel	LPG		Moisture	3.55	%	Flow Rate (Actual O2)	22049	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Oxides of Nitrogen	10:50 AM - 11:00 AM	ppm	-	1.06	<1.06	-	180	United States Environmental Protection Agency, EPA Method 7	Bangkok
Total Suspended Particulate	10:45 AM - 11:33 AM	mg/m3	-	0.5	7.3	40	120	United States Environmental Protection Agency, EPA Method 5	Bangkok

Guideline : Guideline (1) : Environmental Impact Assessment Report of Magotteaux Co., Ltd. (B.E.2556)

Guideline (2) : Notification of the Ministry of Science, Technology and Environment (B.E.2544) : New Source

Sampled By : Prasert Surakhan

Remark :

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

Technical Management

Saranya C.
Saranya Chalermthamrong
Scientist (4)
ทะเบียนเลขที่ ว-204-จ-4717

Approved by

Kanok Korn Anek
Kanok Korn Anek
Senior Manager
ทะเบียนเลขที่ ว-204-ค-6111

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Life Sciences

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 234077

Date Received : Jan 18, 2023

Date Reported : Jan 25, 2023

Report Number: 2541302-1

Page 1 of 1

Sample Number 234077-1
Sampled Date Jan 17, 2023
Sample Description Emission from Stationary Source
Location หน่วยปรับปรุงทราย 2 (BH-3)
Date Analysis Commenced Jan 19, 2023
Condition of Sample Extracted into one filter paper placed in plastic petri dish

Stack Description

Ambient Pressure	759	mmHg	Diameter	1.65	m	Oxygen	20.6	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	72.2	°C	Gas Velocity	10.4	m/s
Type of Fuel	-		Moisture	4.23	%	Flow Rate (Actual O2)	66303	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	09:25 AM - 10:07 AM	mg/m3	-	0.5	0.7	40	120	United States Environmental Protection Agency, EPA Method 5	Bangkok

Guideline : Guideline (1) : Environmental Impact Assessment Report of Magotteaux Co., Ltd. (B.E.2556)
Guideline (2) : Notification of the Ministry of Science, Technology and Environment (B.E.2544) : New Source

Sampled By : Apisit Singha

Remark :

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

Technical Management

Saranya C.
Saranya Chalermthamrong
Scientist (4)
ทะเบียนเลขที่ ว-204-จ-4717

Approved by

Kanok Korn Anek
Kanok Korn Anek
Senior Manager
ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 234078

Date Received : Jan 18, 2023

Date Reported : Jan 25, 2023

Report Number: 2541306-1

Page 1 of 1

Sample Number 234078-1
Sampled Date Jan 17, 2023
Sample Description Emission from Stationary Source
Location หน่วยรื้อชิ้นงานและระบายความร้อน (BH-4)
Date Analysis Commenced Jan 19, 2023
Condition of Sample Extracted into one filter paper placed in plastic petri dish

Stack Description

Ambient Pressure	759	mmHg	Diameter	1.0	m	Oxygen	20.9	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	34.5	°C	Gas Velocity	21.1	m/s
Type of Fuel	-		Moisture	2.99	%	Flow Rate (Actual O2)	56239	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	10:35 AM - 11:23 AM	mg/m3	-	0.5	8.5	40	120	United States Environmental Protection Agency, EPA Method 5	Bangkok

Guideline : Guideline (1) : Environmental Impact Assessment Report of Magotteaux Co., Ltd. (B.E.2556)
Guideline (2) : Notification of the Ministry of Science, Technology and Environment (B.E.2544) : New Source

Sampled By : Apisit Singha

Remark :

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

Technical Management

Saranya C.
Saranya Chalermthamrong
Scientist (4)
ทะเบียนเลขที่ ว-204-จ-4717

Approved by

Kanok Korn Anek
Kanok Korn Anek
Senior Manager
ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :
Project Name :
Project Location :

Lot ID: 234079

Date Received : Jan 18, 2023
Date Reported : Feb 06, 2023
Report Number: 2541308-1

Page 1 of 1

Sample Number 234079-1
Sampled Date Jan 17, 2023
Sample Description Emission from Stationary Source
Location หน่วยเตรียมแบบไส้ทราย (WS-1)
Date Analysis Commenced Jan 19, 2023
Condition of Sample Extracted into two filter papers placed in each cassette

Stack Description

Ambient Pressure	759	mmHg	Diameter	0.60	m	Oxygen	20.9	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	33.0	°C	Gas Velocity	10.8	m/s
Type of Fuel	-		Moisture	2.69	%	Flow Rate (Actual O2)	10384	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Testing Location
Air Testing								
Total Suspended Particulate	09:20 AM - 10:14 AM	mg/m3	-	0.5	<0.5	400	United States Environmental Protection Agency, EPA Method 5	Bangkok

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

Sampled By : Prasert Surakhan

Remark :

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

Technical Management

Saranya C.
Saranya Chalermthamrong
Scientist (4)
ทะเบียนเลขที่ ว-204-จ-4717

Approved by

Kanokkorn Anek
Kanokkorn Anek
Senior Manager
ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 234079

Date Received : Jan 18, 2023

Date Reported : Feb 06, 2023

Report Number: 2541308-2

Page 1 of 1

Sample Number 234079-1
Sampled Date Jan 17, 2023
Sample Description Emission from Stationary Source
Location หน่วยเตรียมแบบไส้ทราย (WS-1)
Date Analysis Commenced Jan 19, 2023
Condition of Sample Extracted into two filter papers placed in each cassette

Stack Description

Ambient Pressure	759	mmHg	Diameter	0.60	m	Oxygen	20.9	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	33.0	°C	Gas Velocity	10.8	m/s
Type of Fuel	-		Moisture	2.69	%	Flow Rate (Actual O2)	10384	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Air Testing							
Triethanolamine	09:20 AM - 10:10 AM	ppm	-	0.002	<0.002	Based on OSHA, PV2141	Bangkok

Sampled By : Prasert Surakhan

Remark :

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

Approved by

Saranya C.

Saranya Chalermthamrong
Scientist (4)

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :
Project Name :
Project Location :

Lot ID: 234055

Date Received : Jan 18, 2023
Date Reported : Jan 25, 2023
Report Number: 2541284-1

Page 1 of 1

Sample Number 234055-1
Sampled Date Jan 16, 2023
Sample Description Emission from Stationary Source
Location เตาอบซบและล้างน้ำมัน 1 (HT6)
Date Analysis Commenced Jan 19, 2023
Condition of Sample Extracted into two 2-L collection flasks and one filter paper placed in plastic petri dish

Stack Description

Ambient Pressure	759	mmHg	Diameter	0.6	m	Oxygen	20.8	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	41.5	°C	Gas Velocity	9.4	m/s
Type of Fuel	-		Moisture	2.74	%	Flow Rate (Actual O2)	8788	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Oxides of Nitrogen	10:45 AM - 10:53 AM	ppm	-	1.06	<1.06	60	180	United States Environmental Protection Agency, EPA Method 7	Bangkok
Total Suspended Particulate	10:25 AM - 11:07 AM	mg/m3	-	0.5	7.3	60	120	United States Environmental Protection Agency, EPA Method 5	Bangkok

Guideline : Guideline (1) : Environmental Impact Assessment Report of Magotteaux Co., Ltd. (B.E.2556)
Guideline (2) : Notification of the Ministry of Science, Technology and Environment (B.E.2544) : New Source

Sampled By : Apisit Singha

Remark :

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

Technical Management

Saranya C.
Saranya Chalermthamrong
Scientist (4)
ทะเบียนเลขที่ ว-204-จ-4717

Approved by

Kanok Korn Anek
Kanok Korn Anek
Senior Manager
ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :
Project Name :
Project Location :

Lot ID: 234056

Date Received : Jan 18, 2023
Date Reported : Jan 25, 2023
Report Number: 2541287-1

Page 1 of 1

Sample Number 234056-1
Sampled Date Jan 16, 2023
Sample Description Emission from Stationary Source
Location เตาอบชุมชนและล้างน้ำมัน 2 (HT7)
Date Analysis Commenced Jan 19, 2023
Condition of Sample Extracted into two 2-L collection flasks and one filter paper placed in plastic petri dish

Stack Description

Ambient Pressure	759	mmHg	Diameter	0.6	m	Oxygen	20.7	%
Ambient Temperature	30.0	°C	Shape	Circle		Carbon Dioxide	0.0	%
Type of Process	Process		Stack Temperature	40.5	°C	Gas Velocity	7.5	m/s
Type of Fuel	-		Moisture	3.27	%	Flow Rate (Actual O2)	6974	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Oxides of Nitrogen	11:30 AM - 11:38 AM	ppm	-	1.06	<1.06	60	180	United States Environmental Protection Agency, EPA Method 7	Bangkok
Total Suspended Particulate	11:25 AM - 12:13 PM	mg/m3	-	0.5	1.6	60	120	United States Environmental Protection Agency, EPA Method 5	Bangkok

Guideline : Guideline (1) : Environmental Impact Assessment Report of Magotteaux Co., Ltd. (B.E.2556)
Guideline (2) : Notification of the Ministry of Science, Technology and Environment (B.E.2544) : New Source

Sampled By : Apisit Singha

Remark :

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

Technical Management

Saranya C.
Saranya Chalermthamrong
Scientist (4)
ทะเบียนเลขที่ ว-204-จ-4717

Approved by

Kanok Korn Anek
Kanok Korn Anek
Senior Manager
ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 234140

Date Received : Jan 18, 2023

Date Reported : Jan 25, 2023

Report Number: 2541531-1

Page 1 of 1

Sample Number 234140-1
Sampled Date Jan 16, 2023
Sample Description Emission from Stationary Source
Location เตาอบ 1 (HT-6)
Date Analysis Commenced Jan 19, 2023
Condition of Sample Extracted into one amber plastic bottle, refrigerated

Stack Description

Ambient Pressure	759	mmHg	Diameter	0.51	m	Oxygen	15.4	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	3.2	%
Type of Process	Combustion (Open System)		Stack Temperature	119	°C	Gas Velocity	7.8	m/s
Type of Fuel	LPG		Moisture	6.92	%	Flow Rate (Actual O2)	4058	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Sulfur dioxide	10:30 AM - 11:00 AM	ppm	-	2.0	<2.00	-	800	United States Environmental Protection Agency, EPA Method 6	Bangkok

Guideline : Guideline (1) : Environmental Impact Assessment Report of Magotteaux Co., Ltd. (B.E.2556)
Guideline (2) : Notification of the Ministry of Science, Technology and Environment (B.E.2544) : New Source

Sampled By : Prasert Surakhan

Remark :

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

Technical Management

Saranya C.
Saranya Chalermthamrong
Scientist (4)
ทะเบียนเลขที่ ว-204-จ-4717

Approved by

Kanok Korn Anek
Kanok Korn Anek
Senior Manager
ทะเบียนเลขที่ ว-204-ค-6111

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11966-21

S:\Reports_Air Stack_2GL.rpt (11:12AM)



Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :
Project Name :
Project Location :

Lot ID: 234141

Date Received : Jan 18, 2023
Date Reported : Jan 25, 2023
Report Number: 2541534-1

Page 1 of 1

Sample Number 234141-1
Sampled Date Jan 16, 2023
Sample Description Emission from Stationary Source
Location เตาอบ 2 (HT-7)
Date Analysis Commenced Jan 19, 2023
Condition of Sample Extracted into one amber plastic bottle, refrigerated

Stack Description

Ambient Pressure	759	mmHg	Diameter	0.51	m	Oxygen	12.0	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	5.0	%
Type of Process	Combustion (Open System)		Stack Temperature	108	°C	Gas Velocity	4.3	m/s
Type of Fuel	LPG		Moisture	6.12	%	Flow Rate (Actual O2)	2333	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Sulfur dioxide	11:40 AM - 12:10 PM	ppm	-	2.0	<2.00	-	800	United States Environmental Protection Agency, EPA Method 6	Bangkok

Guideline : Guideline (1) : Environmental Impact Assessment Report of Magotteaux Co., Ltd. (B.E.2556)
Guideline (2) : Notification of the Ministry of Science, Technology and Environment (B.E.2544) : New Source

Sampled By : Prasert Surakhan

Remark :

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

Technical Management

Saranya C.
Saranya Chalermthamrong
Scientist (4)
ทะเบียนเลขที่ ว-204-จ-4717

Approved by

Kanok Korn Anek
Kanok Korn Anek
Senior Manager
ทะเบียนเลขที่ ว-204-ค-6111

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11966-21

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ภาคผนวก ค-3

คุณภาพน้ำ



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location:

Lot ID: 232827

Date Received : Jan 10, 2023

Date Reported : Jan 17, 2023

Report Number : 2545348-1

Page 1 of 2

Sample Number	232827-1						
Sampled Date	Jan 10, 2023 10:50 AM						
Sample Description	Wastewater						
Location	บ่อหนองน้ำ						
Date Analysis Commenced	Jan 11, 2023						
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Chromium	mg/L	0.0003	0.0005	<0.0005	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Manganese	mg/L	0.0003	0.0005	0.10	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	3.5	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O C	Bangkok
COD	mg/L	1.5	5	22	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Bangkok
Oil & Grease *	mg/L	-	3	3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Bangkok
pH at 25 degree C *		-	-	8.5	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	356	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok
Total Kjeldahl Nitrogen as N *	mg/L	0.15	1.0	1.1	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Norg (C)	Bangkok

Technical Management

Sawitree N.

Sawitree Noisangiam
Manager

ทะเบียนเลขที่ ว-204-จ-4709

Approved by

Kanokkorn Anek

Kanokkorn Anek
Senior Manager

ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 232827

Date Received : Jan 10, 2023

Date Reported : Jan 17, 2023

Report Number : 2545348-1

Page 2 of 2

Sample Number	232827-1						
Sampled Date	Jan 10, 2023 10:50 AM						
Sample Description	Wastewater						
Location	บ่อบำบัดน้ำ						
Date Analysis Commenced	Jan 11, 2023						
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	17	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Bangkok

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

Sampling By : Teerawat Puangasuk ทะเบียนเลขที่ ว-204-จ-7107

Remark :

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

Technical Management

Savitree N.

Savitree Noisangiam
Manager

ทะเบียนเลขที่ ว-204-จ-4709

Approved by

Kanok Korn Anek

Kanok Korn Anek
Senior Manager

ทะเบียนเลขที่ ว-204-ค-6111

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Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

TESTING
No.0009

Lot ID: 232827

Date Received : Jan 10, 2023

Date Reported : Jan 17, 2023

Report Number : 2545348-2

Page 1 of 1

Sample Number	232827-1						
Sampled Date	Jan 10, 2023 10:50 AM						
Sample Description	Wastewater						
Location	บ่อหนองน้ำ						
Date Analysis Commenced	Jan 11, 2023						
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.13	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Dissolved Oxygen *	mg/L	-	0.1	6.6	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Bangkok

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

Sampling By :

Remark :

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Approved by

Sawitree N.

Sawitree Noisangiam
Manager

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Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location:

TESTING

No.0009

Lot ID: 2332330

Date Received : Mar 31, 2023

Date Reported : Apr 08, 2023

Report Number : 2618678-1

Page 1 of 2

Sample Number 2332330-1
Sampled Date Mar 31, 2023 10:25 AM
Sample Description Wastewater
Location บ่อพักน้ำทิ้ง
Date Analysis Commenced Apr 01, 2023
Condition of Sample Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Chromium	mg/L	0.0003	0.0005	Not Detected	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Manganese	mg/L	0.0003	0.0005	0.05	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	4.8	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O C	Bangkok
COD	mg/L	-	25	52	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Bangkok
Oil & Grease *	mg/L	-	3	3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Bangkok
pH at 25 degree C *		-	-	7.8	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	1092	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok
Total Kjeldahl Nitrogen as N *	mg/L	0.15	1.0	24.2	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Norg (C)	Bangkok

Technical Management

Chanatt L.

Chanattagarn Imchom

Supervisor

ทะเบียนเลขที่ ว-204-จ-4710

Approved by

Kanok Korn Anek

Kanokkorn Anek

Senior Manager

ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

TESTING

No.0009

Lot ID: 2332330

Date Received : Mar 31, 2023

Date Reported : Apr 08, 2023

Report Number : 2618678-1

Page 2 of 2

Sample Number	2332330-1						
Sampled Date	Mar 31, 2023 10:25 AM						
Sample Description	Wastewater						
Location	บ่อพักน้ำทิ้ง						
Date Analysis Commenced	Apr 01, 2023						
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	14	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Bangkok

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

Sampling By : Jiranat Khowlaor ทะเบียนเลขที่ ว-204-จ-7517

Remark :

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

Technical Management

Chanatt L.

Chanattagarn Imchom

Supervisor

ทะเบียนเลขที่ ว-204-จ-4710

Approved by

Kanok Korn Anek

Kanokkorn Anek

Senior Manager

ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

TESTING

No.0009

Lot ID: 2364409

Date Received : Jun 06, 2023

Date Reported : Jun 13, 2023

Report Number : 2682364-1

Client : Magotteaux Co., Ltd.

9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Page 1 of 1

Sample Number	2364409-1
Sampled Date	Jun 06, 2023 2:20 PM
Sample Description	Wastewater
Location	บ่อกักน้ำก่อนระบายออกนอกโรงงาน
Date Analysis Commenced	Jun 07, 2023
Condition of Sample	Contained in one amber glass bottle, two BOD bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Bangkok
COD	mg/L	-	25	41	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Bangkok
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Bangkok
pH at 25 degree C *		-	-	7.7	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	728	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok
Total Kjeldahl Nitrogen as N *	mg/L	0.15	1.0	1.7	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Norg (C)	Bangkok
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	7	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Bangkok

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

Sampling By : Norrasat Komal ทะเบียนเลขที่ ว-204-จ-5411

Remark :

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Technical Management

Suwimon C.

Suwimon Chairuangwut

Scientist (3)

ทะเบียนเลขที่ ว-204-จ-5417

Approved by

Kanokkorn Anek

Kanokkorn Anek

Senior Manager

ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

TESTING

No.0009

Lot ID: 2367227

Date Received : Jun 13, 2023

Date Reported : Jun 20, 2023

Report Number : 2691136-1

Client : Magotteaux Co., Ltd.

9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Page 1 of 1

Sample Number	2367227-1						
Sampled Date	Jun 13, 2023 10:50 AM						
Sample Description	Wastewater						
Location	บ่อพักน้ำก่อนระบายออกนอกโรงงาน						
Date Analysis Commenced	Jun 15, 2023						
Condition of Sample	Contained in one amber glass bottle, two BOD bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	2.3	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Bangkok
COD	mg/L	-	25	34	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Bangkok
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Bangkok
pH at 25 degree C *		-	-	7.6	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	540	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok
Total Kjeldahl Nitrogen as N *	mg/L	0.15	1.0	1.4	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Norg (C)	Bangkok
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Bangkok

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

Sampling By : Jiranat Khowlaor ทะเบียนเลขที่ ว-204-จ-7517

Remark :

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

Technical Management

Siriluk P.

Siriluk Puengpang

Section Head

ทะเบียนเลขที่ ว-204-จ-4720

Approved by

Kanokkorn Anek

Kanokkorn Anek

Senior Manager

ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

TESTING

No.0009

Lot ID: 2367228

Date Received : Jun 20, 2023

Date Reported : Jun 27, 2023

Report Number : 2698097-1

Client : Magotteaux Co., Ltd.

9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Page 1 of 1

Sample Number	2367228-1
Sampled Date	Jun 20, 2023 10:24 AM
Sample Description	Wastewater
Location	บ่อกักน้ำก่อนระบายออกนอกโรงงาน
Date Analysis Commenced	Jun 21, 2023
Condition of Sample	Contained in one amber glass bottle, two BOD bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Bangkok
COD	mg/L	-	25	<25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Bangkok
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Bangkok
pH at 25 degree C *		-	-	7.8	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	228	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok
Total Kjeldahl Nitrogen as N *	mg/L	0.15	1.0	<1.0	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Norg (C)	Bangkok
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Bangkok

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

Sampling By : Jiranat Khowlaor ทะเบียนเลขที่ ว-204-จ-7517

Remark :

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

Technical Management

Siriluk P.

Siriluk Puengpang

Section Head

ทะเบียนเลขที่ ว-204-จ-4720

Approved by

Kanokkorn Anek

Senior Manager

ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

TESTING

No.0009

Lot ID: 2367229

Date Received : Jun 27, 2023

Date Reported : Jul 04, 2023

Report Number : 2706350-1

Client : Magotteaux Co., Ltd.

9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Page 1 of 1

Sample Number	2367229-1						
Sampled Date	Jun 27, 2023 1:05 PM						
Sample Description	Wastewater						
Location	บ่อบำบัดน้ำก่อนระบายออกนอกโรงงาน						
Date Analysis Commenced	Jun 28, 2023						
Condition of Sample	Contained in one amber glass bottle, two BOD bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	3.9	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Bangkok
COD	mg/L	-	25	49	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Bangkok
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Bangkok
pH at 25 degree C *		-	-	8.0	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	528	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok
Total Kjeldahl Nitrogen as N *	mg/L	0.15	1.0	<1.0	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Norg (C)	Bangkok
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Bangkok

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

Sampling By : Teerawat Puangsuk ทะเบียนเลขที่ ว-204-จ-7107

Remark :

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Technical Management

Siriluk P.

Siriluk Puengpang

Section Head

ทะเบียนเลขที่ ว-204-จ-4720

Approved by

Kanokkorn Anek

Senior Manager

ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

TESTING

No.0009

Lot ID: 2332330

Date Received : Mar 31, 2023

Date Reported : Apr 08, 2023

Report Number : 2618679-1

Page 1 of 2

Sample Number	2332330-2
Sampled Date	Mar 31, 2023 10:15 AM
Sample Description	Natural Water
Location	ห้วยน้ำมา บริเวณจุดเหนือจุดระบายน้ำ (SW1)
Date Analysis Commenced	Apr 01, 2023
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Chromium	mg/L	0.0003	0.0005	<0.0005	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Iron	mg/L	0.003	0.005	0.28	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Manganese	mg/L	0.0003	0.0005	0.33	≤1	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
BOD (5 days at 20 degree C) *	mg/L	-	2.0	<2.0	≤4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O C	Bangkok
COD *	mg/L	-	25	<25	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Bangkok
Dissolved Oxygen *	mg/L	-	0.1	5.0	≥2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Bangkok
Oil & Grease	mg/L	-	3	3	No Standard	In-house method : STM 04-014 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Bangkok
pH at 25 degree C		-	-	7.0	5.0-9.0	In-house method : STM 04-003 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok

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Approved by

Chanatt L.

Chanattagarn Imchom

Supervisor

ADDRESS 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250 Thailand | PHONE +66 0 2760 3000 | FAX +66 0 2760 3197
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9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

TESTING

No.0009

Lot ID: 2332330

Date Received : Mar 31, 2023

Date Reported : Apr 08, 2023

Report Number : 2618679-1

Page 2 of 2

Sample Number	2332330-2						
Sampled Date	Mar 31, 2023 10:15 AM						
Sample Description	Natural Water						
Location	ห้วยน้ำมา บริเวณจุดเหนือจุดระบายน้ำ (SW1)						
Date Analysis Commenced	Apr 01, 2023						
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Dissolved solids Dried at 180 degree C *	mg/L	-	5	366	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok
Total Kjeldahl Nitrogen as N *	mg/L	0.15	1.0	<1.0	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Norg (C)	Bangkok
Total Suspended Solids Dried at 103-105 degree C *	mg/L	-	5	27	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Bangkok

Guideline : Notification of the National Environmental Board, No. 8, B.E.2537 issued under the Enhancement and Conservation of National Environmental Quality Act. B.E.2535, published in the Royal Government Gazette, Vol. 111, Part 16, Dated February 24, B.E. 2537 (Class 4)
n': Change from Natural condition not more than 3 degree C

Sampling By : Jiranat Khowlaor

Remark :

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

TESTING

No.0009

Lot ID: 232827

Date Received : Jan 10, 2023

Date Reported : Jan 17, 2023

Report Number : 2545352-1

Client : Magotteaux Co., Ltd.

9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location:

Page 1 of 2

Sample Number	232827-5
Sampled Date	Jan 10, 2023 11:40 AM
Sample Description	Surface Water
Location	ห้วยน้ำมา : จุดระบายน้ำทิ้ง (SW2)
Date Analysis Commenced	Jan 11, 2023
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Chromium	mg/L	0.0003	0.0005	0.0006	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Iron	mg/L	0.003	0.005	0.29	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Manganese	mg/L	0.0003	0.0005	0.71	≤1	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
BOD (5 days at 20 degree C) *	mg/L	-	2.0	3.2	≤4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O C	Bangkok
COD *	mg/L	1.5	5	22	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Bangkok
Dissolved Oxygen *	mg/L	-	0.1	6.0	≥2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Bangkok
Oil & Grease	mg/L	-	3	4	No Standard	In-house method : STM 04-014 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Bangkok
pH at 25 degree C		-	-	8.1	5.0-9.0	In-house method : STM 04-003 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok

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Approved by

Sawitree N.

Sawitree Noisangiam
Manager

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9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

TESTING

No.0009

Lot ID: 232827

Date Received : Jan 10, 2023

Date Reported : Jan 17, 2023

Report Number : 2545352-1

Page 2 of 2

Sample Number	232827-5
Sampled Date	Jan 10, 2023 11:40 AM
Sample Description	Surface Water
Location	ห้วยน้ำมา : จุดระบายน้ำทิ้ง (SW2)
Date Analysis Commenced	Jan 11, 2023
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Dissolved solids Dried at 180 degree C *	mg/L	-	5	622	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok
Total Kjeldahl Nitrogen as N *	mg/L	0.15	1.0	<1.0	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Norg (C)	Bangkok
Total Suspended Solids Dried at 103-105 degree C *	mg/L	-	5	26	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Bangkok

Guideline : Notification of the National Environmental Board, No. 8, B.E.2537 issued under the Enhancement and Conservation of National Environmental Quality Act. B.E.2535, published in the Royal Government Gazette, Vol. 111, Part 16, Dated February 24, B.E. 2537 (Class 4)
n': Change from Natural condition not more than 3 degree C

Sampling By :

Remark :

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

ADDRESS 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250 Thailand | PHONE +66 0 2760 3000 | FAX +66 0 2760 3197
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Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 232827

Date Received : Jan 10, 2023

Date Reported : Jan 17, 2023

Report Number : 2545353-1

Page 1 of 2

Sample Number 232827-6
Sampled Date Jan 10, 2023 11:50 AM
Sample Description Surface Water
Location ห้วยน้ำมา : ห้วยจตุระบายน้ำทั้ง (SW3)
Date Analysis Commenced Jan 11, 2023
Condition of Sample Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Chromium	mg/L	0.0003	0.0005	0.001	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Iron	mg/L	0.003	0.005	0.24	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Manganese	mg/L	0.0003	0.0005	0.34	≤1	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
BOD (5 days at 20 degree C) *	mg/L	-	2.0	3.3	≤4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O C	Bangkok
COD *	mg/L	1.5	5	29	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Bangkok
Dissolved Oxygen *	mg/L	-	0.1	4.2	≥2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Bangkok
Oil & Grease	mg/L	-	3	4	No Standard	In-house method : STM 04-014 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Bangkok
pH at 25 degree C		-	-	8.0	5.0-9.0	In-house method : STM 04-003 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok

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Sawitree N.

Sawitree Noisangiam
Manager

ADDRESS 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250 Thailand | PHONE +66 0 2760 3000 | FAX +66 0 2760 3197
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Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

TESTING

No.0009

Lot ID: 232827

Date Received : Jan 10, 2023

Date Reported : Jan 17, 2023

Report Number : 2545353-1

Page 2 of 2

Sample Number	232827-6						
Sampled Date	Jan 10, 2023 11:50 AM						
Sample Description	Surface Water						
Location	ห้วยน้ำมา : ห้วยจตุระบายน้ำทั้ง (SW3)						
Date Analysis Commenced	Jan 11, 2023						
Condition of Sample	Contained in two BOD bottles, one amber glass bottle and four plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Total Dissolved solids Dried at 180 degree C *	mg/L	-	5	702	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok
Total Kjeldahl Nitrogen as N *	mg/L	0.15	1.0	1.5	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Norg (C)	Bangkok
Total Suspended Solids Dried at 103-105 degree C *	mg/L	-	5	31	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Bangkok

Guideline : Notification of the National Environmental Board, No. 8, B.E.2537 issued under the Enhancement and Conservation of National Environmental Quality Act. B.E.2535, published in the Royal Government Gazette, Vol. 111, Part 16, Dated February 24, B.E. 2537 (Class 4)
n': Change from Natural condition not more than 3 degree C

Sampling By :

Remark :

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

Sawitree Noisangiam
Manager

ADDRESS 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250 Thailand | PHONE +66 0 2760 3000 | FAX +66 0 2760 3197
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ภาคผนวก ค-4

ระดับเสียงโดยทั่วไป



Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233839

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552677-1

Page 1 of 1

Sample Number 233839-1
Parameter Noise (Leq 24 hrs.)
Location บริเวณริมรั้วโรงงาน N1 (GPS 47P 0696994, 1616222)
Measurement Date Jan 13 - Jan 14, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 858517

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	59.1	77.6	55.2
03:00 PM - 04:00 PM	58.3	70.3	55.1
04:00 PM - 05:00 PM	59.2	68.1	56.2
05:00 PM - 06:00 PM	60.0	75.8	56.5
06:00 PM - 07:00 PM	60.3	73.7	57.7
07:00 PM - 08:00 PM	60.4	79.4	58.7
08:00 PM - 09:00 PM	60.8	75.2	57.9
09:00 PM - 10:00 PM	60.4	72.9	57.2
10:00 PM - 11:00 PM	59.5	77.2	55.9
11:00 PM - 12:00 AM	57.9	68.1	55.8
12:00 AM - 01:00 AM	59.1	70.7	57.0
01:00 AM - 02:00 AM	59.5	72.6	57.0
02:00 AM - 03:00 AM	59.4	74.0	56.7
03:00 AM - 04:00 AM	58.3	68.6	55.5
04:00 AM - 05:00 AM	57.6	79.6	54.0
05:00 AM - 06:00 AM	56.8	70.8	53.0
06:00 AM - 07:00 AM	58.4	72.8	55.2
07:00 AM - 08:00 AM	59.1	75.2	55.7
08:00 AM - 09:00 AM	59.6	77.2	56.8
09:00 AM - 10:00 AM	58.8	77.3	55.9
10:00 AM - 11:00 AM	59.1	72.1	55.9
11:00 AM - 12:00 PM	58.0	74.2	55.1
12:00 PM - 01:00 PM	58.3	77.1	55.3
01:00 PM - 02:00 PM	58.8	74.1	55.2

Leq Average 24 hrs. (dB(A)) 59.1
Lmax (dB(A)) 79.6
L90 (dB(A)) 55.9
Ldn (dB(A)) 65.1
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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233839

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552678-1

Page 1 of 1

Sample Number 233839-2
Parameter Noise (Leq 24 hrs.)
Location บริเวณริมรั้วโรงงาน N1 (GPS 47P 0696994, 1616222)
Measurement Date Jan 14 - Jan 15, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 858517

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	57.5	73.4	54.4
03:00 PM - 04:00 PM	57.1	74.0	53.9
04:00 PM - 05:00 PM	57.4	69.2	54.4
05:00 PM - 06:00 PM	58.3	76.6	55.6
06:00 PM - 07:00 PM	59.3	73.5	56.9
07:00 PM - 08:00 PM	60.1	68.9	58.4
08:00 PM - 09:00 PM	59.6	66.7	57.6
09:00 PM - 10:00 PM	58.6	72.3	56.9
10:00 PM - 11:00 PM	58.5	68.0	56.4
11:00 PM - 12:00 AM	56.3	70.5	53.2
12:00 AM - 01:00 AM	57.4	67.2	55.3
01:00 AM - 02:00 AM	58.3	71.0	55.7
02:00 AM - 03:00 AM	60.1	76.1	55.7
03:00 AM - 04:00 AM	61.2	76.0	55.9
04:00 AM - 05:00 AM	59.0	74.3	56.2
05:00 AM - 06:00 AM	59.1	73.3	56.4
06:00 AM - 07:00 AM	60.6	76.5	56.5
07:00 AM - 08:00 AM	60.7	76.7	55.7
08:00 AM - 09:00 AM	60.5	77.1	56.1
09:00 AM - 10:00 AM	61.2	78.7	56.1
10:00 AM - 11:00 AM	58.6	77.5	55.1
11:00 AM - 12:00 PM	60.1	75.6	55.4
12:00 PM - 01:00 PM	60.1	77.3	55.0
01:00 PM - 02:00 PM	60.2	77.6	54.9

Leq Average 24 hrs. (dB(A)) 59.4
Lmax (dB(A)) 78.7
L90 (dB(A)) 55.7
Ldn (dB(A)) 65.6
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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
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P/O :

Project Name :

Project Location :

Lot ID: 233839

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552679-1

Page 1 of 1

Sample Number 233839-3
Parameter Noise (Leq 24 hrs.)
Location บริเวณริมรั้วโรงงาน N1 (GPS 47P 0696994, 1616222)
Measurement Date Jan 15 - Jan 16, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 858517

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	58.9	75.2	54.4
03:00 PM - 04:00 PM	57.9	72.8	54.8
04:00 PM - 05:00 PM	57.8	69.0	55.1
05:00 PM - 06:00 PM	60.7	76.0	56.2
06:00 PM - 07:00 PM	60.4	76.0	56.3
07:00 PM - 08:00 PM	59.4	76.2	57.3
08:00 PM - 09:00 PM	59.7	76.6	56.9
09:00 PM - 10:00 PM	61.8	79.6	56.9
10:00 PM - 11:00 PM	58.7	74.7	56.3
11:00 PM - 12:00 AM	60.6	78.9	57.2
12:00 AM - 01:00 AM	59.4	75.0	57.0
01:00 AM - 02:00 AM	61.7	78.9	57.0
02:00 AM - 03:00 AM	60.3	77.1	56.2
03:00 AM - 04:00 AM	58.6	74.0	55.7
04:00 AM - 05:00 AM	59.4	77.0	56.1
05:00 AM - 06:00 AM	60.4	76.6	56.2
06:00 AM - 07:00 AM	61.9	78.1	56.4
07:00 AM - 08:00 AM	60.6	75.9	56.4
08:00 AM - 09:00 AM	60.6	76.5	55.8
09:00 AM - 10:00 AM	59.9	75.0	55.3
10:00 AM - 11:00 AM	60.2	77.7	54.3
11:00 AM - 12:00 PM	57.9	74.0	52.8
12:00 PM - 01:00 PM	57.6	73.7	53.8
01:00 PM - 02:00 PM	59.6	74.8	55.0

Leq Average 24 hrs. (dB(A)) 59.9
Lmax (dB(A)) 79.6
L90 (dB(A)) 56.2
Ldn (dB(A)) 66.6
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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233839

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552680-1

Page 1 of 1

Sample Number 233839-4
Parameter Noise (Leq 24 hrs.)
Location บริเวณริมรั้วโรงงาน N2 (GPS 47P 0696848, 1616192)
Measurement Date Jan 13 - Jan 14, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 858521

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	58.2	91.3	53.3
03:00 PM - 04:00 PM	55.9	74.4	53.2
04:00 PM - 05:00 PM	58.0	68.3	54.2
05:00 PM - 06:00 PM	58.8	69.3	55.4
06:00 PM - 07:00 PM	56.7	67.3	55.1
07:00 PM - 08:00 PM	56.3	67.8	55.2
08:00 PM - 09:00 PM	56.3	68.7	55.1
09:00 PM - 10:00 PM	56.1	66.5	55.1
10:00 PM - 11:00 PM	56.9	79.2	55.2
11:00 PM - 12:00 AM	56.3	70.5	54.9
12:00 AM - 01:00 AM	57.9	68.8	55.2
01:00 AM - 02:00 AM	61.2	70.1	55.7
02:00 AM - 03:00 AM	59.4	74.4	55.4
03:00 AM - 04:00 AM	56.6	68.7	54.9
04:00 AM - 05:00 AM	53.1	70.0	50.6
05:00 AM - 06:00 AM	52.6	71.4	49.2
06:00 AM - 07:00 AM	55.6	71.7	50.8
07:00 AM - 08:00 AM	58.3	71.2	55.0
08:00 AM - 09:00 AM	59.4	79.8	56.0
09:00 AM - 10:00 AM	59.3	76.9	56.6
10:00 AM - 11:00 AM	57.1	67.7	54.0
11:00 AM - 12:00 PM	56.4	76.1	53.6
12:00 PM - 01:00 PM	57.3	89.1	53.7
01:00 PM - 02:00 PM	56.4	70.5	53.4

Leq Average 24 hrs. (dB(A)) 57.5
Lmax (dB(A)) 91.3
L90 (dB(A)) 54.9
Ldn (dB(A)) 63.8

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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233839

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552681-1

Page 1 of 1

Sample Number 233839-5
Parameter Noise (Leq 24 hrs.)
Location บริเวณริมรั้วโรงงาน N2 (GPS 47P 0696848, 1616192)
Measurement Date Jan 14 - Jan 15, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 858521

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	55.6	73.6	52.5
03:00 PM - 04:00 PM	55.9	75.9	53.1
04:00 PM - 05:00 PM	56.4	69.0	53.5
05:00 PM - 06:00 PM	57.6	68.9	54.1
06:00 PM - 07:00 PM	56.7	65.9	55.0
07:00 PM - 08:00 PM	57.3	67.7	55.7
08:00 PM - 09:00 PM	56.7	67.9	55.3
09:00 PM - 10:00 PM	56.8	66.8	55.4
10:00 PM - 11:00 PM	55.5	68.4	54.1
11:00 PM - 12:00 AM	52.8	65.5	50.9
12:00 AM - 01:00 AM	56.4	80.1	52.0
01:00 AM - 02:00 AM	55.9	72.5	55.0
02:00 AM - 03:00 AM	56.6	74.7	55.7
03:00 AM - 04:00 AM	56.6	69.9	55.9
04:00 AM - 05:00 AM	56.9	69.0	56.0
05:00 AM - 06:00 AM	58.3	69.7	56.1
06:00 AM - 07:00 AM	57.8	74.1	55.4
07:00 AM - 08:00 AM	57.1	69.6	54.6
08:00 AM - 09:00 AM	57.3	73.1	54.7
09:00 AM - 10:00 AM	57.4	69.4	54.5
10:00 AM - 11:00 AM	56.8	69.0	53.8
11:00 AM - 12:00 PM	56.5	76.3	53.9
12:00 PM - 01:00 PM	59.2	92.6	53.8
01:00 PM - 02:00 PM	56.3	72.2	53.4

Leq Average 24 hrs. (dB(A)) 56.8
Lmax (dB(A)) 92.6
L90 (dB(A)) 54.5
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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

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9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233839

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552682-1

Page 1 of 1

Sample Number 233839-6
Parameter Noise (Leq 24 hrs.)
Location บริเวณริมรั้วโรงงาน N2 (GPS 47P 0696848, 1616192)
Measurement Date Jan 15 - Jan 16, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 858521

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	55.9	68.2	53.2
03:00 PM - 04:00 PM	56.3	66.4	53.2
04:00 PM - 05:00 PM	56.7	67.9	53.4
05:00 PM - 06:00 PM	57.3	68.7	54.1
06:00 PM - 07:00 PM	55.6	67.4	54.6
07:00 PM - 08:00 PM	56.4	67.3	55.4
08:00 PM - 09:00 PM	56.7	67.2	55.8
09:00 PM - 10:00 PM	57.1	67.3	56.0
10:00 PM - 11:00 PM	59.2	69.8	55.6
11:00 PM - 12:00 AM	57.8	67.7	56.0
12:00 AM - 01:00 AM	57.3	67.7	55.9
01:00 AM - 02:00 AM	57.2	71.1	55.9
02:00 AM - 03:00 AM	57.0	78.9	55.9
03:00 AM - 04:00 AM	57.2	72.4	53.6
04:00 AM - 05:00 AM	55.9	80.7	53.4
05:00 AM - 06:00 AM	58.8	71.8	55.2
06:00 AM - 07:00 AM	58.4	78.6	55.0
07:00 AM - 08:00 AM	57.4	64.9	54.6
08:00 AM - 09:00 AM	56.6	75.4	52.4
09:00 AM - 10:00 AM	55.6	75.1	51.4
10:00 AM - 11:00 AM	56.8	74.0	51.7
11:00 AM - 12:00 PM	56.9	74.7	51.3
12:00 PM - 01:00 PM	58.6	75.3	53.3
01:00 PM - 02:00 PM	58.1	74.0	54.4

Leq Average 24 hrs. (dB(A)) 57.2
Lmax (dB(A)) 80.7
L90 (dB(A)) 54.4
Ldn (dB(A)) 64.0
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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233839

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552683-1

Page 1 of 1

Sample Number 233839-7
Parameter Noise (Leq 24 hrs.)
Location บริเวณริมรั้วโรงงาน N3 (GPS 47P 0696880, 1616060)
Measurement Date Jan 13 - Jan 14, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 658242

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	65.6	77.0	62.5
03:00 PM - 04:00 PM	64.4	81.3	62.0
04:00 PM - 05:00 PM	66.5	76.3	64.8
05:00 PM - 06:00 PM	66.4	75.9	64.5
06:00 PM - 07:00 PM	66.1	76.3	64.5
07:00 PM - 08:00 PM	66.3	77.1	64.8
08:00 PM - 09:00 PM	66.7	76.6	65.0
09:00 PM - 10:00 PM	66.4	75.3	64.9
10:00 PM - 11:00 PM	66.2	76.0	64.7
11:00 PM - 12:00 AM	65.6	83.1	64.0
12:00 AM - 01:00 AM	65.8	80.6	64.0
01:00 AM - 02:00 AM	65.6	80.6	63.2
02:00 AM - 03:00 AM	65.7	79.3	63.4
03:00 AM - 04:00 AM	66.4	77.3	64.7
04:00 AM - 05:00 AM	66.4	75.7	65.1
05:00 AM - 06:00 AM	66.3	78.8	65.2
06:00 AM - 07:00 AM	65.6	75.0	62.8
07:00 AM - 08:00 AM	61.4	73.1	59.6
08:00 AM - 09:00 AM	61.7	84.0	57.6
09:00 AM - 10:00 AM	62.0	79.6	56.1
10:00 AM - 11:00 AM	61.8	82.3	57.9
11:00 AM - 12:00 PM	64.0	82.3	61.9
12:00 PM - 01:00 PM	65.7	80.6	64.3
01:00 PM - 02:00 PM	65.6	80.6	64.2

Leq Average 24 hrs. (dB(A)) 65.4
Lmax (dB(A)) 84.0
L90 (dB(A)) 64.0
Ldn (dB(A)) 72.3
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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233839

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552684-1

Page 1 of 1

Sample Number 233839-8
Parameter Noise (Leq 24 hrs.)
Location บริเวณริมรั้วโรงงาน N3 (GPS 47P 0696880, 1616060)
Measurement Date Jan 14 - Jan 15, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 658242

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	67.3	85.3	63.7
03:00 PM - 04:00 PM	69.9	75.5	63.1
04:00 PM - 05:00 PM	65.0	78.4	63.4
05:00 PM - 06:00 PM	66.0	82.4	63.8
06:00 PM - 07:00 PM	66.3	79.0	64.3
07:00 PM - 08:00 PM	66.0	77.2	64.7
08:00 PM - 09:00 PM	66.1	76.2	64.7
09:00 PM - 10:00 PM	66.9	76.1	65.2
10:00 PM - 11:00 PM	66.1	82.8	64.7
11:00 PM - 12:00 AM	63.8	74.7	59.5
12:00 AM - 01:00 AM	63.5	69.7	60.1
01:00 AM - 02:00 AM	64.6	76.5	63.4
02:00 AM - 03:00 AM	66.5	87.8	64.0
03:00 AM - 04:00 AM	65.8	74.2	63.7
04:00 AM - 05:00 AM	66.5	75.5	65.1
05:00 AM - 06:00 AM	65.7	78.7	63.3
06:00 AM - 07:00 AM	65.7	80.9	63.2
07:00 AM - 08:00 AM	65.4	79.0	63.1
08:00 AM - 09:00 AM	65.3	75.6	62.7
09:00 AM - 10:00 AM	66.8	78.6	65.4
10:00 AM - 11:00 AM	66.2	77.7	64.4
11:00 AM - 12:00 PM	65.9	78.6	64.2
12:00 PM - 01:00 PM	65.8	89.2	64.0
01:00 PM - 02:00 PM	65.4	80.3	63.7

Leq Average 24 hrs. (dB(A)) 66.1
Lmax (dB(A)) 89.2
L90 (dB(A)) 63.7
Ldn (dB(A)) 72.0
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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233839

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552685-1

Page 1 of 1

Sample Number 233839-9
Parameter Noise (Leq 24 hrs.)
Location บริเวณริมรั้วโรงงาน N3 (GPS 47P 0696880, 1616060)
Measurement Date Jan 15 - Jan 16, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 658242

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	65.7	82.4	63.7
03:00 PM - 04:00 PM	65.6	75.7	63.7
04:00 PM - 05:00 PM	64.7	77.8	63.6
05:00 PM - 06:00 PM	66.1	80.1	64.0
06:00 PM - 07:00 PM	65.7	76.0	64.5
07:00 PM - 08:00 PM	65.9	76.4	64.8
08:00 PM - 09:00 PM	65.6	77.7	64.6
09:00 PM - 10:00 PM	66.5	74.0	65.2
10:00 PM - 11:00 PM	65.9	79.6	63.1
11:00 PM - 12:00 AM	66.7	75.4	64.0
12:00 AM - 01:00 AM	66.3	77.3	64.2
01:00 AM - 02:00 AM	66.5	78.8	64.6
02:00 AM - 03:00 AM	65.3	82.5	63.9
03:00 AM - 04:00 AM	64.7	76.6	62.4
04:00 AM - 05:00 AM	64.5	79.5	62.5
05:00 AM - 06:00 AM	65.4	79.1	63.1
06:00 AM - 07:00 AM	65.2	75.5	63.1
07:00 AM - 08:00 AM	64.9	73.1	63.1
08:00 AM - 09:00 AM	64.1	85.0	62.3
09:00 AM - 10:00 AM	62.7	81.6	59.9
10:00 AM - 11:00 AM	63.8	75.3	62.3
11:00 AM - 12:00 PM	61.3	85.1	57.2
12:00 PM - 01:00 PM	63.4	83.3	61.0
01:00 PM - 02:00 PM	64.4	83.8	61.5

Leq Average 24 hrs. (dB(A)) 65.2
Lmax (dB(A)) 85.1
L90 (dB(A)) 63.1
Ldn (dB(A)) 72.0
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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

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9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233839

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552686-1

Page 1 of 1

Sample Number 233839-10
Parameter Noise (Leq 24 hrs.)
Location บริเวณริมรั้วโรงงาน N4 (GPS 47P 0697115, 1615985)
Measurement Date Jan 13 - Jan 14, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 658241

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	59.7	85.9	51.0
03:00 PM - 04:00 PM	54.8	87.9	47.9
04:00 PM - 05:00 PM	56.7	84.1	49.7
05:00 PM - 06:00 PM	55.1	68.1	50.6
06:00 PM - 07:00 PM	56.4	74.7	52.1
07:00 PM - 08:00 PM	55.7	66.3	52.3
08:00 PM - 09:00 PM	55.6	70.4	52.9
09:00 PM - 10:00 PM	55.2	68.0	52.3
10:00 PM - 11:00 PM	54.9	75.5	51.6
11:00 PM - 12:00 AM	54.6	72.1	51.0
12:00 AM - 01:00 AM	54.3	68.9	51.0
01:00 AM - 02:00 AM	53.9	64.7	51.8
02:00 AM - 03:00 AM	54.6	71.1	51.1
03:00 AM - 04:00 AM	53.7	71.5	50.5
04:00 AM - 05:00 AM	51.7	63.1	49.5
05:00 AM - 06:00 AM	53.0	70.2	50.4
06:00 AM - 07:00 AM	54.4	83.2	49.0
07:00 AM - 08:00 AM	55.8	71.2	49.2
08:00 AM - 09:00 AM	55.3	71.9	50.8
09:00 AM - 10:00 AM	55.8	78.4	49.2
10:00 AM - 11:00 AM	54.3	71.9	49.6
11:00 AM - 12:00 PM	55.0	71.5	49.4
12:00 PM - 01:00 PM	54.5	81.8	47.6
01:00 PM - 02:00 PM	56.1	76.1	48.9

Leq Average 24 hrs. (dB(A)) 55.3
Lmax (dB(A)) 87.9
L90 (dB(A)) 50.5
Ldn (dB(A)) 60.7
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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233839

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552687-1

Page 1 of 1

Sample Number 233839-11
Parameter Noise (Leq 24 hrs.)
Location บริเวณริมรั้วโรงงาน N4 (GPS 47P 0697115, 1615985)
Measurement Date Jan 14 - Jan 15, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 658241

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	56.0	79.1	50.2
03:00 PM - 04:00 PM	54.1	76.2	48.7
04:00 PM - 05:00 PM	54.0	69.8	47.9
05:00 PM - 06:00 PM	53.6	75.3	48.2
06:00 PM - 07:00 PM	56.1	71.5	52.4
07:00 PM - 08:00 PM	55.6	72.3	52.2
08:00 PM - 09:00 PM	54.8	67.5	52.0
09:00 PM - 10:00 PM	55.2	80.7	50.8
10:00 PM - 11:00 PM	53.6	65.3	51.1
11:00 PM - 12:00 AM	55.3	83.4	51.9
12:00 AM - 01:00 AM	52.7	67.0	49.2
01:00 AM - 02:00 AM	53.2	67.8	49.4
02:00 AM - 03:00 AM	54.2	71.8	50.0
03:00 AM - 04:00 AM	53.5	69.6	50.9
04:00 AM - 05:00 AM	53.2	66.6	50.6
05:00 AM - 06:00 AM	53.4	65.8	50.9
06:00 AM - 07:00 AM	57.6	87.0	51.0
07:00 AM - 08:00 AM	55.4	76.8	50.5
08:00 AM - 09:00 AM	55.3	72.7	49.6
09:00 AM - 10:00 AM	54.9	71.9	50.7
10:00 AM - 11:00 AM	54.5	68.7	49.1
11:00 AM - 12:00 PM	55.4	72.9	49.9
12:00 PM - 01:00 PM	55.0	82.6	49.7
01:00 PM - 02:00 PM	54.3	72.6	48.2

Leq Average 24 hrs. (dB(A)) 54.8
Lmax (dB(A)) 87.0
L90 (dB(A)) 50.2
Ldn (dB(A)) 60.9
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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233839

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552688-1

Page 1 of 1

Sample Number 233839-12
Parameter Noise (Leq 24 hrs.)
Location บริเวณริมรั้วโรงงาน N4 (GPS 47P 0697115, 1615985)
Measurement Date Jan 15 - Jan 16, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 658241

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
02:00 PM - 03:00 PM	54.6	72.2	49.1
03:00 PM - 04:00 PM	53.7	68.0	48.2
04:00 PM - 05:00 PM	54.8	75.1	49.0
05:00 PM - 06:00 PM	54.9	70.9	50.5
06:00 PM - 07:00 PM	55.8	73.5	52.1
07:00 PM - 08:00 PM	54.5	64.6	51.9
08:00 PM - 09:00 PM	55.7	79.0	51.9
09:00 PM - 10:00 PM	55.0	74.9	52.5
10:00 PM - 11:00 PM	55.4	72.3	51.3
11:00 PM - 12:00 AM	53.6	66.0	51.6
12:00 AM - 01:00 AM	54.2	66.0	52.0
01:00 AM - 02:00 AM	55.6	74.2	52.1
02:00 AM - 03:00 AM	54.9	70.7	52.2
03:00 AM - 04:00 AM	52.5	70.8	50.2
04:00 AM - 05:00 AM	52.5	64.3	49.9
05:00 AM - 06:00 AM	54.8	75.2	50.5
06:00 AM - 07:00 AM	55.9	72.9	51.3
07:00 AM - 08:00 AM	56.7	71.6	51.5
08:00 AM - 09:00 AM	56.4	75.3	52.0
09:00 AM - 10:00 AM	55.7	69.0	49.9
10:00 AM - 11:00 AM	55.9	74.2	49.6
11:00 AM - 12:00 PM	54.6	68.7	48.2
12:00 PM - 01:00 PM	53.8	71.0	47.1
01:00 PM - 02:00 PM	54.6	68.1	47.6

Leq Average 24 hrs. (dB(A)) 55.0
Lmax (dB(A)) 79.0
L90 (dB(A)) 50.5
Ldn (dB(A)) 61.0
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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 233851

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552668-1

Page 1 of 1

Sample Number 233851-1
Parameter Noise (Leq 24 hrs.)
Location หมู่ 4 บ้านแพะ ตำบลห้วยปลก (AN 1) (GPS 47P 0697284, 1615158)
Measurement Date Jan 17 - Jan 18, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 658243

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	55.9	88.7	39.5
12:00 PM - 01:00 PM	52.0	76.8	38.9
01:00 PM - 02:00 PM	50.3	78.3	40.9
02:00 PM - 03:00 PM	53.8	93.1	37.5
03:00 PM - 04:00 PM	51.8	78.5	37.5
04:00 PM - 05:00 PM	48.9	71.0	38.8
05:00 PM - 06:00 PM	47.8	71.2	38.1
06:00 PM - 07:00 PM	47.5	77.7	37.7
07:00 PM - 08:00 PM	56.8	86.1	40.9
08:00 PM - 09:00 PM	44.3	66.6	41.7
09:00 PM - 10:00 PM	48.1	68.9	41.9
10:00 PM - 11:00 PM	45.5	63.0	44.2
11:00 PM - 12:00 AM	47.3	64.0	46.2
12:00 AM - 01:00 AM	46.8	59.6	45.9
01:00 AM - 02:00 AM	47.1	65.6	45.5
02:00 AM - 03:00 AM	46.8	65.0	45.4
03:00 AM - 04:00 AM	46.4	59.4	45.2
04:00 AM - 05:00 AM	45.8	62.6	43.5
05:00 AM - 06:00 AM	44.2	60.2	42.1
06:00 AM - 07:00 AM	54.4	88.3	41.9
07:00 AM - 08:00 AM	50.7	78.2	44.9
08:00 AM - 09:00 AM	52.1	69.4	46.9
09:00 AM - 10:00 AM	55.9	97.0	48.2
10:00 AM - 11:00 AM	51.3	66.8	47.0

Leq Average 24 hrs. (dB(A)) 51.3
Lmax (dB(A)) 97.0
L90 (dB(A)) 41.9
Ldn (dB(A)) 55.7
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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
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P/O :

Project Name :

Project Location :

Lot ID: 233851

Date Received : Jan 20, 2023

Date Reported : Jan 26, 2023

Report Number: 2552669-1

Page 1 of 1

Sample Number 233851-2
Parameter Noise (Leq 24 hrs.)
Location หมู่ 5 บ้านแพะ ตำบลห้วยปลก (AN 2) (GPS 47P 0696655, 1616585)
Measurement Date Jan 17 - Jan 18, 2023
Measurement by Thananat Anake
Sound Level meter Serial No. 658241

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	55.2	77.3	43.9
12:00 PM - 01:00 PM	55.9	73.2	45.3
01:00 PM - 02:00 PM	56.4	72.4	46.1
02:00 PM - 03:00 PM	57.3	75.1	47.6
03:00 PM - 04:00 PM	57.1	74.0	46.9
04:00 PM - 05:00 PM	55.7	77.1	46.0
05:00 PM - 06:00 PM	55.2	69.7	45.8
06:00 PM - 07:00 PM	54.0	73.2	46.5
07:00 PM - 08:00 PM	53.1	72.2	46.5
08:00 PM - 09:00 PM	52.5	68.5	47.1
09:00 PM - 10:00 PM	52.0	69.7	48.2
10:00 PM - 11:00 PM	51.4	66.4	48.7
11:00 PM - 12:00 AM	51.3	69.1	48.3
12:00 AM - 01:00 AM	52.7	72.8	47.8
01:00 AM - 02:00 AM	51.3	72.2	47.3
02:00 AM - 03:00 AM	51.5	72.4	46.9
03:00 AM - 04:00 AM	52.2	73.7	46.5
04:00 AM - 05:00 AM	54.3	70.5	46.0
05:00 AM - 06:00 AM	58.9	79.6	48.4
06:00 AM - 07:00 AM	59.4	76.5	48.9
07:00 AM - 08:00 AM	59.1	75.5	49.9
08:00 AM - 09:00 AM	59.0	76.0	49.7
09:00 AM - 10:00 AM	59.8	80.7	48.3
10:00 AM - 11:00 AM	57.1	76.6	44.5

Leq Average 24 hrs. (dB(A)) 56.0
Lmax (dB(A)) 80.7
L90 (dB(A)) 46.9
Ldn (dB(A)) 61.6
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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

The above results are valid only for the analyzed/tested sample(s) as indicated in this report. No part of this report or certificate may be reproduced in any form without written consent from the Laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.



Analysis / Test Report

TESTING

No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

Lot ID: 233852
Date Received : Jan 20, 2023
Date Reported : Jan 21, 2023
Report Number : 2548786-1

P/O :
Project Name :
Project Location :

Page 1 of 3

Sample No. 233852-1
Parameter เสียงรบกวน
Location หมู่ 4 บ้านแพะ ตำบลหัวปลวก (AN 1) (GPS 47P 0697284, 1615158)
Measurement Date Jan 17 - 18, 2023
Measurement by Thananat Anake
Sound Level Meter 00658243

ระดับเสียง (dB(A))

เวลา	เสียงจาก แหล่งกำเนิด ^(A)	เสียงขณะ ไม่มีการรบกวน ^(B)	ผลต่าง ระดับเสียง ^(A-B)	ตัวปรับค่า ^(C)	ปรับค่าเสียงจากแหล่งกำเนิด ^(B)		เสียงพื้นฐาน ^(E)	ค่าระดับ การรบกวน ^(D-E)
					กลางวัน ^(A-C)	กลางคืน ^{(A-C)+3}		
11:00 AM - 12:00 PM	55.9	50.3	5.6	1.5	54.4	-	38.4	16.0
12:00 PM - 01:00 PM	52.0	49.9	2.1	4.5	47.5	-	37.9	9.6
01:00 PM - 02:00 PM	50.3	46.5	3.8	2.0	48.3	-	37.9	10.4
02:00 PM - 03:00 PM	53.8	51.8	2.0	4.5	49.3	-	36.1	13.2
03:00 PM - 04:00 PM	51.8	47.4	4.4	2.0	49.8	-	36.7	13.1
04:00 PM - 05:00 PM	48.9	45.8	3.1	3.0	45.9	-	37.0	8.9
05:00 PM - 06:00 PM	47.8	46.7	1.1	7.0	40.8	-	37.2	3.6
06:00 PM - 07:00 PM	47.5	47.6	-0.1	7.0	40.5	-	42.4	-1.9
07:00 PM - 08:00 PM	56.8	49.6	7.2	1.0	55.8	-	44.4	11.4
08:00 PM - 09:00 PM	44.3	44.2	0.1	7.0	37.3	-	40.8	-3.5
09:00 PM - 10:00 PM	48.1	49.4	-1.3	7.0	41.1	-	39.6	1.5
10:00 PM - 10:05 PM	44.3	44.6	-0.3	7.0	-	40.3	39.5	0.8
10:05 PM - 10:10 PM	43.7	41.1	2.6	3.0	-	43.7	40.0	3.7
10:10 PM - 10:15 PM	44.7	43.8	0.9	7.0	-	40.7	42.1	-1.4
10:15 PM - 10:20 PM	45.9	45.7	0.2	7.0	-	41.9	42.9	-1.0
10:20 PM - 10:25 PM	47.0	43.6	3.4	3.0	-	47.0	42.2	4.8
10:25 PM - 10:30 PM	45.1	44.2	0.9	7.0	-	41.1	42.5	-1.4
10:30 PM - 10:35 PM	46.1	46.1	0.0	7.0	-	42.1	44.9	-2.8
10:35 PM - 10:40 PM	45.7	46.5	-0.8	7.0	-	41.7	45.6	-3.9
10:40 PM - 10:45 PM	45.5	46.2	-0.7	7.0	-	41.5	45.5	-4.0
10:45 PM - 10:50 PM	46.1	46.1	0.0	7.0	-	42.1	45.2	-3.1
10:50 PM - 10:55 PM	45.3	46.1	-0.8	7.0	-	41.3	45.2	-3.9
10:55 PM - 11:00 PM	45.8	45.9	-0.1	7.0	-	41.8	45.2	-3.4
11:00 PM - 11:05 PM	45.4	45.8	-0.4	7.0	-	41.4	45.1	-3.7
11:05 PM - 11:10 PM	45.6	46.4	-0.8	7.0	-	41.6	45.5	-3.9
11:10 PM - 11:15 PM	47.0	46.3	0.7	7.0	-	43.0	45.6	-2.6
11:15 PM - 11:20 PM	47.7	46.8	0.9	7.0	-	43.7	45.2	-1.5
11:20 PM - 11:25 PM	47.5	48.1	-0.6	7.0	-	43.5	45.5	-2.0
11:25 PM - 11:30 PM	48.6	47.0	1.6	4.5	-	47.1	45.7	1.4
11:30 PM - 11:35 PM	47.1	46.2	0.9	7.0	-	43.1	45.2	-2.1
11:35 PM - 11:40 PM	47.1	46.8	0.3	7.0	-	43.1	45.5	-2.4
11:40 PM - 11:45 PM	47.6	45.2	2.4	4.5	-	46.1	43.9	2.2
11:45 PM - 11:50 PM	47.4	45.6	1.8	4.5	-	45.9	44.2	1.7
11:50 PM - 11:55 PM	47.4	45.5	1.9	4.5	-	45.9	44.0	1.9
11:55 PM - 12:00 AM	47.8	44.7	3.1	3.0	-	47.8	43.8	4.0
12:00 AM - 12:05 AM	46.9	46.8	0.1	7.0	-	42.9	44.0	-1.1
12:05 AM - 12:10 AM	47.7	45.4	2.3	4.5	-	46.2	44.1	2.1
12:10 AM - 12:15 AM	47.4	45.2	2.2	4.5	-	45.9	44.0	1.9
12:15 AM - 12:20 AM	47.2	45.4	1.8	4.5	-	45.7	43.8	1.9
12:20 AM - 12:25 AM	47.1	45.6	1.5	4.5	-	45.6	44.2	1.4

The above results are valid only for the analyzed/tested sample(s) as indicated in this report. No part of this report or certificate may be reproduced in any form without written consent from the Laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by

Kanok Korn Anek

Kanokkorn Anek
Senior Manager



Analysis / Test Report

TESTING

No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

Lot ID: 233852
Date Received : Jan 20, 2023
Date Reported : Jan 21, 2023
Report Number : 2548786-1

P/O :
Project Name :
Project Location :

Page 2 of 3

Sample No. 233852-1
Parameter เสียงรบกวน
Location หมู่ 4 บ้านแพะ ตำบลหัวปลวก (AN 1) (GPS 47P 0697284, 1615158)
Measurement Date Jan 17 - 18, 2023
Measurement by Thananat Anake
Sound Level Meter 00658243

ระดับเสียง (dB(A))

เวลา	เสียงจาก แหล่งกำเนิด ^(A)	เสียงขณะ ไม่มีการรบกวน ^(B)	ผลต่าง ระดับเสียง ^(A-B)	ตัวปรับค่า ^(C)	ปรับค่าเสียงจากแหล่งกำเนิด ^(D)		เสียงพื้นฐาน ^(E)	ค่าระดับ การรบกวน ^(D-E)
					กลางวัน ^(A-C)	กลางคืน ^{(A-C)+3}		
12:25 AM - 12:30 AM	46.9	44.7	2.2	4.5	-	45.4	43.4	2.0
12:30 AM - 12:35 AM	46.7	44.4	2.3	4.5	-	45.2	43.5	1.7
12:35 AM - 12:40 AM	46.3	44.7	1.6	4.5	-	44.8	43.3	1.5
12:40 AM - 12:45 AM	46.5	44.1	2.4	4.5	-	45.0	43.0	2.0
12:45 AM - 12:50 AM	46.7	44.7	2.0	4.5	-	45.2	43.1	2.1
12:50 AM - 12:55 AM	46.3	44.3	2.0	4.5	-	44.8	43.2	1.6
12:55 AM - 01:00 AM	46.2	44.0	2.2	4.5	-	44.7	42.8	1.9
01:00 AM - 01:05 AM	46.1	44.0	2.1	4.5	-	44.6	43.1	1.5
01:05 AM - 01:10 AM	45.9	44.2	1.7	4.5	-	44.4	43.2	1.2
01:10 AM - 01:15 AM	46.5	44.7	1.8	4.5	-	45.0	43.2	1.8
01:15 AM - 01:20 AM	46.1	44.4	1.7	4.5	-	44.6	43.4	1.2
01:20 AM - 01:25 AM	46.5	44.7	1.8	4.5	-	45.0	43.4	1.6
01:25 AM - 01:30 AM	46.1	45.3	0.8	7.0	-	42.1	43.1	-1.0
01:30 AM - 01:35 AM	47.1	46.3	0.8	7.0	-	43.1	43.0	0.1
01:35 AM - 01:40 AM	46.9	44.5	2.4	4.5	-	45.4	43.4	2.0
01:40 AM - 01:45 AM	46.3	47.9	-1.6	7.0	-	42.3	43.3	-1.0
01:45 AM - 01:50 AM	50.5	46.6	3.9	2.0	-	51.5	43.3	8.2
01:50 AM - 01:55 AM	48.1	44.7	3.4	3.0	-	48.1	43.3	4.8
01:55 AM - 02:00 AM	46.6	46.4	0.2	7.0	-	42.6	43.5	-0.9
02:00 AM - 02:05 AM	48.8	44.7	4.1	2.0	-	49.8	42.9	6.9
02:05 AM - 02:10 AM	46.6	44.3	2.3	4.5	-	45.1	42.6	2.5
02:10 AM - 02:15 AM	47.5	45.7	1.8	4.5	-	46.0	43.0	3.0
02:15 AM - 02:20 AM	47.1	46.3	0.8	7.0	-	43.1	43.7	-0.6
02:20 AM - 02:25 AM	48.1	44.7	3.4	3.0	-	48.1	43.1	5.0
02:25 AM - 02:30 AM	46.3	43.7	2.6	3.0	-	46.3	42.9	3.4
02:30 AM - 02:35 AM	46.4	44.7	1.7	4.5	-	44.9	43.0	1.9
02:35 AM - 02:40 AM	46.8	43.2	3.6	2.0	-	47.8	42.6	5.2
02:40 AM - 02:45 AM	45.9	42.8	3.1	3.0	-	45.9	42.1	3.8
02:45 AM - 02:50 AM	45.8	43.4	2.4	4.5	-	44.3	42.3	2.0
02:50 AM - 02:55 AM	45.5	42.7	2.8	3.0	-	45.5	42.0	3.5
02:55 AM - 03:00 AM	45.5	42.8	2.7	3.0	-	45.5	42.2	3.3
03:00 AM - 03:05 AM	45.8	43.4	2.4	4.5	-	44.3	42.4	1.9
03:05 AM - 03:10 AM	46.1	43.8	2.3	4.5	-	44.6	43.0	1.6
03:10 AM - 03:15 AM	46.4	44.2	2.2	4.5	-	44.9	43.0	1.9
03:15 AM - 03:20 AM	48.3	45.7	2.6	3.0	-	48.3	42.8	5.5
03:20 AM - 03:25 AM	46.2	45.1	1.1	7.0	-	42.2	43.1	-0.9
03:25 AM - 03:30 AM	47.3	45.2	2.1	4.5	-	45.8	43.5	2.3
03:30 AM - 03:35 AM	46.8	44.1	2.7	3.0	-	46.8	43.1	3.7
03:35 AM - 03:40 AM	46.3	44.6	1.7	4.5	-	44.8	43.1	1.7
03:40 AM - 03:45 AM	46.4	42.6	3.8	2.0	-	47.4	41.9	5.5

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Approved by

Kanok Korn Anek

Kanokkorn Anek
Senior Manager



Analysis / Test Report

TESTING

No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

Lot ID: 233852
Date Received : Jan 20, 2023
Date Reported : Jan 21, 2023
Report Number : 2548786-1

P/O :
Project Name :
Project Location :

Page 3 of 3

Sample No. 233852-1
Parameter เสียงรบกวน
Location หมู่ 4 บ้านแพะ ตำบลหัวปลวก (AN 1) (GPS 47P 0697284, 1615158)
Measurement Date Jan 17 - 18, 2023
Measurement by Thananat Anake
Sound Level Meter 00658243

ระดับเสียง (dB(A))

เวลา	เสียงจากแหล่งกำเนิด (A)	เสียงขณะไม่มีการรบกวน (B)	ผลต่างระดับเสียง (A-B)	ตัวปรับค่า (C)	ปรับค่าเสียงจากแหล่งกำเนิด (D)		เสียงพื้นฐาน (E)	ค่าระดับการรบกวน (D-E)
					กลางวัน (A-C)	กลางคืน (A-C)+3		
03:45 AM - 03:50 AM	45.4	43.1	2.3	4.5	-	43.9	42.0	1.9
03:50 AM - 03:55 AM	45.4	43.2	2.2	4.5	-	43.9	41.5	2.4
03:55 AM - 04:00 AM	45.1	43.6	1.5	4.5	-	43.6	41.3	2.3
04:00 AM - 04:05 AM	45.8	43.5	2.3	4.5	-	44.3	42.1	2.2
04:05 AM - 04:10 AM	45.3	47.5	-2.2	7.0	-	41.3	41.8	-0.5
04:10 AM - 04:15 AM	47.3	43.5	3.8	2.0	-	48.3	41.4	6.9
04:15 AM - 04:20 AM	45.3	43.7	1.6	4.5	-	43.8	42.0	1.8
04:20 AM - 04:25 AM	44.9	42.6	2.3	4.5	-	43.4	41.1	2.3
04:25 AM - 04:30 AM	44.2	42.6	1.6	4.5	-	42.7	41.2	1.5
04:30 AM - 04:35 AM	44.3	42.5	1.8	4.5	-	42.8	40.6	2.2
04:35 AM - 04:40 AM	45.4	45.3	0.1	7.0	-	41.4	41.2	0.2
04:40 AM - 04:45 AM	45.9	42.9	3.0	3.0	-	45.9	41.4	4.5
04:45 AM - 04:50 AM	44.8	44.3	0.5	7.0	-	40.8	42.2	-1.4
04:50 AM - 04:55 AM	44.8	46.7	-1.9	7.0	-	40.8	40.1	0.7
04:55 AM - 05:00 AM	48.9	40.8	8.1	0.5	-	51.4	39.5	11.9
05:00 AM - 05:05 AM	43.2	41.1	2.1	4.5	-	41.7	39.3	2.4
05:05 AM - 05:10 AM	42.8	41.3	1.5	4.5	-	41.3	39.9	1.4
05:10 AM - 05:15 AM	43.5	44.3	-0.8	7.0	-	39.5	39.8	-0.3
05:15 AM - 05:20 AM	47.4	44.5	2.9	3.0	-	47.4	39.8	7.6
05:20 AM - 05:25 AM	44.0	42.7	1.3	7.0	-	40.0	39.5	0.5
05:25 AM - 05:30 AM	43.0	42.3	0.7	7.0	-	39.0	39.8	-0.8
05:30 AM - 05:35 AM	44.6	44.8	-0.2	7.0	-	40.6	41.1	-0.5
05:35 AM - 05:40 AM	44.9	43.6	1.3	7.0	-	40.9	41.7	-0.8
05:40 AM - 05:45 AM	44.4	43.8	0.6	7.0	-	40.4	41.8	-1.4
05:45 AM - 05:50 AM	43.9	43.9	0.0	7.0	-	39.9	41.6	-1.7
05:50 AM - 05:55 AM	44.0	42.0	2.0	4.5	-	42.5	39.4	3.1
05:55 AM - 06:00 AM	42.5	43.6	-1.1	7.0	-	38.5	41.1	-2.6
06:00 AM - 07:00 AM	54.4	48.4	6.0	1.5	52.9	-	41.8	11.1
07:00 AM - 08:00 AM	50.7	56.3	-5.6	7.0	43.7	-	44.7	-1.0
08:00 AM - 09:00 AM	52.1	51.8	0.3	7.0	45.1	-	46.3	-1.2
09:00 AM - 10:00 AM	55.9	53.9	2.0	4.5	51.4	-	47.9	3.5
10:00 AM - 11:00 AM	51.3	50.3	1.0	7.0	44.3	-	46.2	-1.9

ค่ามาตรฐาน

≤ 10

Reference Method : Based on ISO 1996-1 and ISO 1996-2

มาตรฐาน

- ประกาศกระทรวงอุตสาหกรรม เรื่อง กำหนดค่าระดับเสียงการรบกวนและระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548
 - ประกาศกรมโรงงานอุตสาหกรรม เรื่อง วิธีการตรวจวัดระดับเสียงรบกวน ระดับเสียงเฉลี่ย 24 ชั่วโมง และระดับเสียงสูงสุดที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2553
 - ประกาศกระทรวงสาธารณสุข เรื่อง กำหนดค่ามาตรฐานมลพิษทางเสียงอันเกิดจากการประกอบกิจการที่เป็นอันตรายต่อสุขภาพ พ.ศ. 2561
- ระดับเสียงจากแหล่งกำเนิด ทำการตรวจวัด วันที่ 17-18 มกราคม 2566
- ระดับเสียงพื้นฐานและระดับเสียงขณะไม่มีการรบกวน (Sample No.233853-1 วันที่ตรวจวัด 17-18 มกราคม 2566)

The above results are valid only for the analyzed/tested sample(s) as indicated in this report. No part of this report or certificate may be reproduced in any form without written consent from the Laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by

Kanok Korn Anek

Kanok Korn Anek
Senior Manager



Analysis / Test Report

TESTING

No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

Lot ID: 233852
Date Received : Jan 20, 2023
Date Reported : Jan 21, 2023
Report Number : 2548787-1

P/O :
Project Name :
Project Location :

Page 1 of 3

Sample No. 233852-2
Parameter เสียงรบกวน
Location หมู่ 5 บ้านแพะ ตำบลหัวปลวก (AN 2) (GPS 47P 0696655, 1616585)
Measurement Date Jan 17 - 18, 2023
Measurement by Thananat Anake
Sound Level Meter 00658241

ระดับเสียง (dB(A))

เวลา	เสียงจาก แหล่งกำเนิด ^(A)	เสียงขณะ ไม่มีการรบกวน ^(B)	ผลต่าง ระดับเสียง ^(A-B)	ตัวปรับค่า ^(C)	ปรับค่าเสียงจากแหล่งกำเนิด ^(B)		เสียงพื้นฐาน ^(E)	ค่าระดับ การรบกวน ^(D-E)
					กลางวัน ^(A-C)	กลางคืน ^{(A-C)+3}		
11:00 AM - 12:00 PM	55.2	55.6	-0.4	7.0	48.2	-	43.3	4.9
12:00 PM - 01:00 PM	55.9	52.8	3.1	3.0	52.9	-	43.8	9.1
01:00 PM - 02:00 PM	56.4	53.1	3.3	3.0	53.4	-	44.3	9.1
02:00 PM - 03:00 PM	57.3	53.0	4.3	2.0	55.3	-	44.9	10.4
03:00 PM - 04:00 PM	57.1	53.3	3.8	2.0	55.1	-	44.7	10.4
04:00 PM - 05:00 PM	55.7	53.0	2.7	3.0	52.7	-	44.5	8.2
05:00 PM - 06:00 PM	55.2	53.3	1.9	4.5	50.7	-	46.5	4.2
06:00 PM - 07:00 PM	54.0	52.7	1.3	7.0	47.0	-	48.2	-1.2
07:00 PM - 08:00 PM	53.1	52.1	1.0	7.0	46.1	-	47.9	-1.8
08:00 PM - 09:00 PM	52.5	51.6	0.9	7.0	45.5	-	47.6	-2.1
09:00 PM - 10:00 PM	52.0	51.0	1.0	7.0	45.0	-	48.1	-3.1
10:00 PM - 10:05 PM	51.8	50.8	1.0	7.0	-	47.8	48.4	-0.6
10:05 PM - 10:10 PM	52.4	50.9	1.5	4.5	-	50.9	48.6	2.3
10:10 PM - 10:15 PM	49.4	50.5	-1.1	7.0	-	45.4	48.4	-3.0
10:15 PM - 10:20 PM	50.0	50.1	-0.1	7.0	-	46.0	48.4	-2.4
10:20 PM - 10:25 PM	53.5	52.0	1.5	4.5	-	52.0	48.4	3.6
10:25 PM - 10:30 PM	51.6	51.0	0.6	7.0	-	47.6	48.5	-0.9
10:30 PM - 10:35 PM	51.4	50.9	0.5	7.0	-	47.4	48.6	-1.2
10:35 PM - 10:40 PM	50.5	50.6	-0.1	7.0	-	46.5	48.4	-1.9
10:40 PM - 10:45 PM	50.5	50.2	0.3	7.0	-	46.5	48.6	-2.1
10:45 PM - 10:50 PM	51.9	51.1	0.8	7.0	-	47.9	48.8	-0.9
10:50 PM - 10:55 PM	50.2	50.6	-0.4	7.0	-	46.2	48.6	-2.4
10:55 PM - 11:00 PM	51.4	49.7	1.7	4.5	-	49.9	48.5	1.4
11:00 PM - 11:05 PM	53.0	51.8	1.2	7.0	-	49.0	49.2	-0.2
11:05 PM - 11:10 PM	51.5	52.3	-0.8	7.0	-	47.5	48.9	-1.4
11:10 PM - 11:15 PM	49.8	49.9	-0.1	7.0	-	45.8	48.1	-2.3
11:15 PM - 11:20 PM	49.1	49.6	-0.5	7.0	-	45.1	48.1	-3.0
11:20 PM - 11:25 PM	52.1	51.4	0.7	7.0	-	48.1	48.2	-0.1
11:25 PM - 11:30 PM	53.2	52.1	1.1	7.0	-	49.2	48.2	1.0
11:30 PM - 11:35 PM	49.5	49.6	-0.1	7.0	-	45.5	47.8	-2.3
11:35 PM - 11:40 PM	49.7	50.1	-0.4	7.0	-	45.7	48.2	-2.5
11:40 PM - 11:45 PM	51.2	50.8	0.4	7.0	-	47.2	48.0	-0.8
11:45 PM - 11:50 PM	49.3	49.8	-0.5	7.0	-	45.3	48.0	-2.7
11:50 PM - 11:55 PM	50.5	50.0	0.5	7.0	-	46.5	47.6	-1.1
11:55 PM - 12:00 AM	53.6	52.1	1.5	4.5	-	52.1	48.2	3.9
12:00 AM - 12:05 AM	50.1	50.2	-0.1	7.0	-	46.1	47.6	-1.5
12:05 AM - 12:10 AM	51.2	50.3	0.9	7.0	-	47.2	47.7	-0.5
12:10 AM - 12:15 AM	49.8	50.2	-0.4	7.0	-	45.8	48.2	-2.4
12:15 AM - 12:20 AM	50.8	50.7	0.1	7.0	-	46.8	48.0	-1.2
12:20 AM - 12:25 AM	52.4	49.4	3.0	3.0	-	52.4	47.7	4.7

The above results are valid only for the analyzed/tested sample(s) as indicated in this report. No part of this report or certificate may be reproduced in any form without written consent from the Laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by

Kanok Korn Anek

Kanokkorn Anek
Senior Manager



Analysis / Test Report

TESTING

No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

Lot ID: 233852
Date Received : Jan 20, 2023
Date Reported : Jan 21, 2023
Report Number : 2548787-1

P/O :
Project Name :
Project Location :

Page 2 of 3

Sample No. 233852-2
Parameter เสียงรบกวน
Location หมู่ 5 บ้านแพะ ตำบลหัวปลวก (AN 2) (GPS 47P 0696655, 1616585)
Measurement Date Jan 17 - 18, 2023
Measurement by Thananat Anake
Sound Level Meter 00658241

ระดับเสียง (dB(A))

เวลา	เสียงจาก แหล่งกำเนิด (A)	เสียงขณะ ไม่มีการรบกวน (B)	ผลต่าง ระดับเสียง (A-B)	ตัวปรับค่า (C)	ปรับค่าเสียงจากแหล่งกำเนิด (D)		เสียงพื้นฐาน (E)	ค่าระดับ การรบกวน (D-E)
	กลางวัน (A-C)	กลางคืน (A-C)+3						
12:25 AM - 12:30 AM	54.6	54.4	0.2	7.0	-	50.6	48.2	2.4
12:30 AM - 12:35 AM	48.6	49.3	-0.7	7.0	-	44.6	48.0	-3.4
12:35 AM - 12:40 AM	48.5	49.2	-0.7	7.0	-	44.5	47.8	-3.3
12:40 AM - 12:45 AM	53.7	51.8	1.9	4.5	-	52.2	47.7	4.5
12:45 AM - 12:50 AM	52.1	52.0	0.1	7.0	-	48.1	47.6	0.5
12:50 AM - 12:55 AM	57.6	55.0	2.6	3.0	-	57.6	47.4	10.2
12:55 AM - 01:00 AM	53.4	52.6	0.8	7.0	-	49.4	47.4	2.0
01:00 AM - 01:05 AM	53.8	52.9	0.9	7.0	-	49.8	48.0	1.8
01:05 AM - 01:10 AM	48.8	48.5	0.3	7.0	-	44.8	47.2	-2.4
01:10 AM - 01:15 AM	55.9	51.3	4.6	1.5	-	57.4	47.9	9.5
01:15 AM - 01:20 AM	51.2	53.7	-2.5	7.0	-	47.2	47.2	0.0
01:20 AM - 01:25 AM	48.4	49.2	-0.8	7.0	-	44.4	47.1	-2.7
01:25 AM - 01:30 AM	52.1	50.6	1.5	4.5	-	50.6	47.3	3.3
01:30 AM - 01:35 AM	47.7	48.7	-1.0	7.0	-	43.7	47.3	-3.6
01:35 AM - 01:40 AM	49.9	49.9	0.0	7.0	-	45.9	47.6	-1.7
01:40 AM - 01:45 AM	49.8	49.9	-0.1	7.0	-	45.8	47.7	-1.9
01:45 AM - 01:50 AM	50.0	49.1	0.9	7.0	-	46.0	47.6	-1.6
01:50 AM - 01:55 AM	48.0	49.3	-1.3	7.0	-	44.0	47.5	-3.5
01:55 AM - 02:00 AM	51.7	50.6	1.1	7.0	-	47.7	47.3	0.4
02:00 AM - 02:05 AM	54.8	55.1	-0.3	7.0	-	50.8	47.4	3.4
02:05 AM - 02:10 AM	56.6	54.7	1.9	4.5	-	55.1	47.3	7.8
02:10 AM - 02:15 AM	50.7	49.9	0.8	7.0	-	46.7	47.1	-0.4
02:15 AM - 02:20 AM	47.6	48.1	-0.5	7.0	-	43.6	46.9	-3.3
02:20 AM - 02:25 AM	47.5	48.4	-0.9	7.0	-	43.5	46.9	-3.4
02:25 AM - 02:30 AM	48.0	48.7	-0.7	7.0	-	44.0	46.9	-2.9
02:30 AM - 02:35 AM	52.5	51.2	1.3	7.0	-	48.5	46.7	1.8
02:35 AM - 02:40 AM	47.4	48.2	-0.8	7.0	-	43.4	46.7	-3.3
02:40 AM - 02:45 AM	49.8	49.6	0.2	7.0	-	45.8	46.9	-1.1
02:45 AM - 02:50 AM	51.3	50.4	0.9	7.0	-	47.3	46.7	0.6
02:50 AM - 02:55 AM	49.8	49.2	0.6	7.0	-	45.8	46.8	-1.0
02:55 AM - 03:00 AM	49.6	49.0	0.6	7.0	-	45.6	46.5	-0.9
03:00 AM - 03:05 AM	47.3	48.1	-0.8	7.0	-	43.3	46.4	-3.1
03:05 AM - 03:10 AM	47.3	48.2	-0.9	7.0	-	43.3	46.6	-3.3
03:10 AM - 03:15 AM	47.2	48.1	-0.9	7.0	-	43.2	46.5	-3.3
03:15 AM - 03:20 AM	54.4	51.9	2.5	3.0	-	54.4	46.2	8.2
03:20 AM - 03:25 AM	53.6	53.0	0.6	7.0	-	49.6	45.8	3.8
03:25 AM - 03:30 AM	48.1	48.0	0.1	7.0	-	44.1	45.7	-1.6
03:30 AM - 03:35 AM	56.0	53.4	2.6	3.0	-	56.0	46.7	9.3
03:35 AM - 03:40 AM	49.9	51.1	-1.2	7.0	-	45.9	45.8	0.1
03:40 AM - 03:45 AM	46.6	47.0	-0.4	7.0	-	42.6	45.2	-2.6

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Approved by

Kanok Korn Anek

Kanok Korn Anek
Senior Manager



Analysis / Test Report

TESTING

No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

Lot ID: 233852
Date Received : Jan 20, 2023
Date Reported : Jan 21, 2023
Report Number : 2548787-1

P/O :
Project Name :
Project Location :

Page 3 of 3

Sample No. 233852-2
Parameter เสียงรบกวน
Location หมู่ 5 บ้านแพะ ตำบลหัวปลวก (AN 2) (GPS 47P 0696655, 1616585)
Measurement Date Jan 17 - 18, 2023
Measurement by Thananat Anake
Sound Level Meter 00658241

ระดับเสียง (dB(A))

เวลา	เสียงจากแหล่งกำเนิด (A)	เสียงขณะไม่มีการรบกวน (B)	ผลต่างระดับเสียง (A-B) (C)	ตัวปรับค่า (C)	ปรับค่าเสียงจากแหล่งกำเนิด (D)		เสียงพื้นฐาน (E)	ค่าระดับการรบกวน (D-E) (F)
					กลางวัน (A-C)	กลางคืน (A-C)+3		
03:45 AM - 03:50 AM	48.1	47.0	1.1	7.0	-	44.1	45.4	-1.3
03:50 AM - 03:55 AM	53.8	51.7	2.1	4.5	-	52.3	45.2	7.1
03:55 AM - 04:00 AM	56.2	54.6	1.6	4.5	-	54.7	46.1	8.6
04:00 AM - 04:05 AM	54.6	53.9	0.7	7.0	-	50.6	46.1	4.5
04:05 AM - 04:10 AM	49.6	48.0	1.6	4.5	-	48.1	45.4	2.7
04:10 AM - 04:15 AM	55.8	54.1	1.7	4.5	-	54.3	46.1	8.2
04:15 AM - 04:20 AM	51.4	50.3	1.1	7.0	-	47.4	45.2	2.2
04:20 AM - 04:25 AM	53.9	52.1	1.8	4.5	-	52.4	45.3	7.1
04:25 AM - 04:30 AM	51.2	51.4	-0.2	7.0	-	47.2	45.5	1.7
04:30 AM - 04:35 AM	54.5	53.9	0.6	7.0	-	50.5	46.2	4.3
04:35 AM - 04:40 AM	53.9	52.8	1.1	7.0	-	49.9	45.4	4.5
04:40 AM - 04:45 AM	54.7	52.4	2.3	4.5	-	53.2	45.2	8.0
04:45 AM - 04:50 AM	54.9	53.2	1.7	4.5	-	53.4	45.2	8.2
04:50 AM - 04:55 AM	55.9	54.6	1.3	7.0	-	51.9	45.2	6.7
04:55 AM - 05:00 AM	56.7	55.0	1.7	4.5	-	55.2	45.8	9.4
05:00 AM - 05:05 AM	55.5	54.7	0.8	7.0	-	51.5	47.0	4.5
05:05 AM - 05:10 AM	54.2	52.2	2.0	4.5	-	52.7	45.0	7.7
05:10 AM - 05:15 AM	56.1	57.4	-1.3	7.0	-	52.1	47.3	4.8
05:15 AM - 05:20 AM	57.6	52.6	5.0	1.5	-	59.1	46.2	12.9
05:20 AM - 05:25 AM	57.9	59.8	-1.9	7.0	-	53.9	49.9	4.0
05:25 AM - 05:30 AM	61.4	57.7	3.7	2.0	-	62.4	50.3	12.1
05:30 AM - 05:35 AM	57.6	56.1	1.5	4.5	-	56.1	47.3	8.8
05:35 AM - 05:40 AM	59.5	55.0	4.5	1.5	-	61.0	47.3	13.7
05:40 AM - 05:45 AM	58.4	56.1	2.3	4.5	-	56.9	46.7	10.2
05:45 AM - 05:50 AM	59.6	56.6	3.0	3.0	-	59.6	46.9	12.7
05:50 AM - 05:55 AM	61.0	60.1	0.9	7.0	-	57.0	48.8	8.2
05:55 AM - 06:00 AM	61.2	59.2	2.0	4.5	-	59.7	49.0	10.7
06:00 AM - 07:00 AM	59.4	57.3	2.1	4.5	54.9	-	47.8	7.1
07:00 AM - 08:00 AM	59.1	57.4	1.7	4.5	54.6	-	48.2	6.4
08:00 AM - 09:00 AM	59.0	58.1	0.9	7.0	52.0	-	48.9	3.1
09:00 AM - 10:00 AM	59.8	59.5	0.3	7.0	52.8	-	48.7	4.1
10:00 AM - 11:00 AM	57.1	57.4	-0.3	7.0	50.1	-	44.5	5.6
ค่ามาตรฐาน								≤ 10

Reference Method : Based on ISO 1996-1 and ISO 1996-2

มาตรฐาน

- ประกาศกระทรวงอุตสาหกรรม เรื่อง กำหนดค่าระดับเสียงการรบกวนและระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548
- ประกาศกรมโรงงานอุตสาหกรรม เรื่อง วิธีการตรวจวัดระดับเสียงรบกวน ระดับเสียงเฉลี่ย 24 ชั่วโมง และระดับเสียงสูงสุดที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2553
- ประกาศกระทรวงสาธารณสุข เรื่อง กำหนดค่ามาตรฐานมลพิษทางเสียงอันเกิดจากการประกอบกิจการที่เป็นอันตรายต่อสุขภาพ พ.ศ. 2561
ระดับเสียงจากแหล่งกำเนิด ทำการตรวจวัด วันที่ 17-18 มกราคม 2566
ระดับเสียงพื้นฐานและระดับเสียงขณะไม่มีการรบกวน (Sample No.233853-2 วันที่ตรวจวัด 17-18 มกราคม 2566)

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Approved by

Kanok Korn Anek

Kanok Korn Anek
Senior Manager



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

Lot ID: 233853
Date Received : Jan 20, 2023
Date Reported : Jan 21, 2023
Report No. : 2548788-1

P/O :
Project Name :
Project Location :

Page 1 of 3

Sample No. 233853-1
Parameter Noise
Location หมู่ 4 บ้านแพะ ตำบลหัวปลวก (AN 1) (GPS 47P 0697284, 1615158) (จุดอ้างอิง) (Shut down)
Measurement Date Jan 17 - 18, 2023
Measurement by Thananat Anake
Sound Level Meter 00858516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	50.3	84.5	38.4
12:00 PM - 01:00 PM	49.9	72.8	37.9
01:00 PM - 02:00 PM	46.5	69.7	37.9
02:00 PM - 03:00 PM	51.8	91.0	36.1
03:00 PM - 04:00 PM	47.4	69.5	36.7
04:00 PM - 05:00 PM	45.8	63.2	37.0
05:00 PM - 06:00 PM	46.7	64.1	37.2
06:00 PM - 07:00 PM	47.6	84.2	42.4
07:00 PM - 08:00 PM	49.6	77.4	44.4
08:00 PM - 09:00 PM	44.2	67.7	40.8
09:00 PM - 10:00 PM	49.4	74.6	39.6
10:00 PM - 10:05 PM	44.6	70.8	39.5
10:05 PM - 10:10 PM	41.1	45.3	40.0
10:10 PM - 10:15 PM	43.8	55.3	42.1
10:15 PM - 10:20 PM	45.7	59.2	42.9
10:20 PM - 10:25 PM	43.6	49.3	42.2
10:25 PM - 10:30 PM	44.2	51.0	42.5
10:30 PM - 10:35 PM	46.1	49.2	44.9
10:35 PM - 10:40 PM	46.5	54.3	45.6
10:40 PM - 10:45 PM	46.2	48.9	45.5
10:45 PM - 10:50 PM	46.1	49.3	45.2
10:50 PM - 10:55 PM	46.1	58.9	45.2
10:55 PM - 11:00 PM	45.9	49.0	45.2
11:00 PM - 11:05 PM	45.8	51.6	45.1
11:05 PM - 11:10 PM	46.4	50.8	45.5
11:10 PM - 11:15 PM	46.3	50.6	45.6
11:15 PM - 11:20 PM	46.8	59.5	45.2
11:20 PM - 11:25 PM	48.1	68.3	45.5
11:25 PM - 11:30 PM	47.0	51.0	45.7
11:30 PM - 11:35 PM	46.2	54.4	45.2
11:35 PM - 11:40 PM	46.8	57.3	45.5
11:40 PM - 11:45 PM	45.2	51.1	43.9
11:45 PM - 11:50 PM	45.6	51.9	44.2
11:50 PM - 11:55 PM	45.5	54.9	44.0
11:55 PM - 12:00 AM	44.7	49.3	43.8
12:00 AM - 12:05 AM	46.8	60.2	44.0
12:05 AM - 12:10 AM	45.4	51.3	44.1
12:10 AM - 12:15 AM	45.2	51.6	44.0
12:15 AM - 12:20 AM	45.4	51.8	43.8
12:20 AM - 12:25 AM	45.6	52.7	44.2

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Approved by

Kanok Korn Anek

Kanokkorn Anek
Senior Manager



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

Lot ID: 233853
Date Received : Jan 20, 2023
Date Reported : Jan 21, 2023
Report No. : 2548788-1

P/O :
Project Name :
Project Location :

Page 2 of 3

Sample No. 233853-1
Parameter Noise
Location หมู่ 4 บ้านแพะ ตำบลหัวปลวก (AN 1) (GPS 47P 0697284, 1615158) (จุดอ้างอิง) (Shut down)
Measurement Date Jan 17 - 18, 2023
Measurement by Thananat Anake
Sound Level Meter 00858516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:25 AM - 12:30 AM	44.7	50.3	43.4
12:30 AM - 12:35 AM	44.4	49.2	43.5
12:35 AM - 12:40 AM	44.7	53.3	43.3
12:40 AM - 12:45 AM	44.1	47.6	43.0
12:45 AM - 12:50 AM	44.7	50.9	43.1
12:50 AM - 12:55 AM	44.3	49.5	43.2
12:55 AM - 01:00 AM	44.0	49.2	42.8
01:00 AM - 01:05 AM	44.0	47.4	43.1
01:05 AM - 01:10 AM	44.2	51.1	43.2
01:10 AM - 01:15 AM	44.7	54.3	43.2
01:15 AM - 01:20 AM	44.4	48.2	43.4
01:20 AM - 01:25 AM	44.7	54.5	43.4
01:25 AM - 01:30 AM	45.3	55.3	43.1
01:30 AM - 01:35 AM	46.3	59.6	43.0
01:35 AM - 01:40 AM	44.5	53.4	43.4
01:40 AM - 01:45 AM	47.9	59.8	43.3
01:45 AM - 01:50 AM	46.6	58.9	43.3
01:50 AM - 01:55 AM	44.7	50.1	43.3
01:55 AM - 02:00 AM	46.4	61.2	43.5
02:00 AM - 02:05 AM	44.7	52.1	42.9
02:05 AM - 02:10 AM	44.3	52.7	42.6
02:10 AM - 02:15 AM	45.7	53.4	43.0
02:15 AM - 02:20 AM	46.3	58.0	43.7
02:20 AM - 02:25 AM	44.7	52.2	43.1
02:25 AM - 02:30 AM	43.7	47.8	42.9
02:30 AM - 02:35 AM	44.7	52.5	43.0
02:35 AM - 02:40 AM	43.2	46.6	42.6
02:40 AM - 02:45 AM	42.8	51.2	42.1
02:45 AM - 02:50 AM	43.4	51.1	42.3
02:50 AM - 02:55 AM	42.7	48.9	42.0
02:55 AM - 03:00 AM	42.8	46.7	42.2
03:00 AM - 03:05 AM	43.4	47.1	42.4
03:05 AM - 03:10 AM	43.8	46.9	43.0
03:10 AM - 03:15 AM	44.2	50.7	43.0
03:15 AM - 03:20 AM	45.7	58.1	42.8
03:20 AM - 03:25 AM	45.1	54.7	43.1
03:25 AM - 03:30 AM	45.2	55.3	43.5
03:30 AM - 03:35 AM	44.1	47.6	43.1
03:35 AM - 03:40 AM	44.6	55.4	43.1
03:40 AM - 03:45 AM	42.6	51.2	41.9

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Approved by

Kanok Korn Anek

Kanokkorn Anek
Senior Manager



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

Lot ID: 233853
Date Received : Jan 20, 2023
Date Reported : Jan 21, 2023
Report No. : 2548788-1

P/O :
Project Name :
Project Location :

Page 3 of 3

Sample No. 233853-1
Parameter Noise
Location หมู่ 4 บ้านแพะ ตำบลหัวปลวก (AN 1) (GPS 47P 0697284, 1615158) (จุดอ้างอิง) (Shut down)
Measurement Date Jan 17 - 18, 2023
Measurement by Thananat Anake
Sound Level Meter 00858516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
03:45 AM - 03:50 AM	43.1	48.8	42.0
03:50 AM - 03:55 AM	43.2	50.4	41.5
03:55 AM - 04:00 AM	43.6	55.4	41.3
04:00 AM - 04:05 AM	43.5	52.6	42.1
04:05 AM - 04:10 AM	47.5	62.2	41.8
04:10 AM - 04:15 AM	43.5	58.1	41.4
04:15 AM - 04:20 AM	43.7	50.3	42.0
04:20 AM - 04:25 AM	42.6	51.6	41.1
04:25 AM - 04:30 AM	42.6	54.1	41.2
04:30 AM - 04:35 AM	42.5	53.2	40.6
04:35 AM - 04:40 AM	45.3	61.4	41.2
04:40 AM - 04:45 AM	42.9	48.1	41.4
04:45 AM - 04:50 AM	44.3	51.7	42.2
04:50 AM - 04:55 AM	46.7	59.5	40.1
04:55 AM - 05:00 AM	40.8	49.8	39.5
05:00 AM - 05:05 AM	41.1	51.8	39.3
05:05 AM - 05:10 AM	41.3	46.0	39.9
05:10 AM - 05:15 AM	44.3	57.6	39.8
05:15 AM - 05:20 AM	44.5	56.6	39.8
05:20 AM - 05:25 AM	42.7	53.3	39.5
05:25 AM - 05:30 AM	42.3	49.5	39.8
05:30 AM - 05:35 AM	44.8	55.0	41.1
05:35 AM - 05:40 AM	43.6	49.4	41.7
05:40 AM - 05:45 AM	43.8	50.4	41.8
05:45 AM - 05:50 AM	43.9	51.5	41.6
05:50 AM - 05:55 AM	42.0	50.4	39.4
05:55 AM - 06:00 AM	43.6	49.6	41.1
06:00 AM - 07:00 AM	48.4	74.8	41.8
07:00 AM - 08:00 AM	56.3	93.6	44.7
08:00 AM - 09:00 AM	51.8	71.1	46.3
09:00 AM - 10:00 AM	53.9	90.8	47.9
10:00 AM - 11:00 AM	50.3	72.0	46.2

Reference Method : Based on ISO 1996-1 and ISO 1996-2

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Approved by

Kanokkorn Anek
Senior Manager



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

Lot ID: 233853
Date Received : Jan 20, 2023
Date Reported : Jan 21, 2023
Report No. : 2548789-1

P/O :
Project Name :
Project Location :

Page 1 of 3

Sample No. 233853-2
Parameter Noise
Location หมู่ 5 บ้านแพะ ตำบลหัวปลวก (AN 1) (GPS 47P 0696655, 1616585) (จุดอ้างอิง) (Shut down)
Measurement Date Jan 17 - 18, 2023
Measurement by Thananat Anake
Sound Level Meter 00858521

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	55.6	74.4	43.3
12:00 PM - 01:00 PM	52.8	73.6	43.8
01:00 PM - 02:00 PM	53.1	69.4	44.3
02:00 PM - 03:00 PM	53.0	70.7	44.9
03:00 PM - 04:00 PM	53.3	74.6	44.7
04:00 PM - 05:00 PM	53.0	74.3	44.5
05:00 PM - 06:00 PM	53.3	67.4	46.5
06:00 PM - 07:00 PM	52.7	69.8	48.2
07:00 PM - 08:00 PM	52.1	70.4	47.9
08:00 PM - 09:00 PM	51.6	64.9	47.6
09:00 PM - 10:00 PM	51.0	70.8	48.1
10:00 PM - 10:05 PM	50.8	61.2	48.4
10:05 PM - 10:10 PM	50.9	58.5	48.6
10:10 PM - 10:15 PM	50.5	59.8	48.4
10:15 PM - 10:20 PM	50.1	56.9	48.4
10:20 PM - 10:25 PM	52.0	63.4	48.4
10:25 PM - 10:30 PM	51.0	61.7	48.5
10:30 PM - 10:35 PM	50.9	59.7	48.6
10:35 PM - 10:40 PM	50.6	62.4	48.4
10:40 PM - 10:45 PM	50.2	57.5	48.6
10:45 PM - 10:50 PM	51.1	61.9	48.8
10:50 PM - 10:55 PM	50.6	61.1	48.6
10:55 PM - 11:00 PM	49.7	52.3	48.5
11:00 PM - 11:05 PM	51.8	62.8	49.2
11:05 PM - 11:10 PM	52.3	63.9	48.9
11:10 PM - 11:15 PM	49.9	59.9	48.1
11:15 PM - 11:20 PM	49.6	51.4	48.1
11:20 PM - 11:25 PM	51.4	63.1	48.2
11:25 PM - 11:30 PM	52.1	65.3	48.2
11:30 PM - 11:35 PM	49.6	56.3	47.8
11:35 PM - 11:40 PM	50.1	68.2	48.2
11:40 PM - 11:45 PM	50.8	62.2	48.0
11:45 PM - 11:50 PM	49.8	58.3	48.0
11:50 PM - 11:55 PM	50.0	60.9	47.6
11:55 PM - 12:00 AM	52.1	67.0	48.2
12:00 AM - 12:05 AM	50.2	59.2	47.6
12:05 AM - 12:10 AM	50.3	62.2	47.7
12:10 AM - 12:15 AM	50.2	59.4	48.2
12:15 AM - 12:20 AM	50.7	62.1	48.0
12:20 AM - 12:25 AM	49.4	58.0	47.7

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Approved by

Kanokkorn Anek
Senior Manager



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

Lot ID: 233853
Date Received : Jan 20, 2023
Date Reported : Jan 21, 2023
Report No. : 2548789-1

P/O :
Project Name :
Project Location :

Page 2 of 3

Sample No. 233853-2
Parameter Noise
Location หมู่ 5 บ้านแพะ ตำบลหัวปลวก (AN 1) (GPS 47P 0696655, 1616585) (จุดอ้างอิง) (Shut down)
Measurement Date Jan 17 - 18, 2023
Measurement by Thananat Anake
Sound Level Meter 00858521

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:25 AM - 12:30 AM	54.4	70.3	48.2
12:30 AM - 12:35 AM	49.3	51.6	48.0
12:35 AM - 12:40 AM	49.2	50.7	47.8
12:40 AM - 12:45 AM	51.8	64.7	47.7
12:45 AM - 12:50 AM	52.0	63.5	47.6
12:50 AM - 12:55 AM	55.0	69.6	47.4
12:55 AM - 01:00 AM	52.6	67.5	47.4
01:00 AM - 01:05 AM	52.9	65.6	48.0
01:05 AM - 01:10 AM	48.5	50.2	47.2
01:10 AM - 01:15 AM	51.3	63.0	47.9
01:15 AM - 01:20 AM	53.7	69.2	47.2
01:20 AM - 01:25 AM	49.2	63.5	47.1
01:25 AM - 01:30 AM	50.6	66.7	47.3
01:30 AM - 01:35 AM	48.7	51.7	47.3
01:35 AM - 01:40 AM	49.9	62.5	47.6
01:40 AM - 01:45 AM	49.9	60.4	47.7
01:45 AM - 01:50 AM	49.1	59.2	47.6
01:50 AM - 01:55 AM	49.3	58.6	47.5
01:55 AM - 02:00 AM	50.6	66.1	47.3
02:00 AM - 02:05 AM	55.1	66.9	47.4
02:05 AM - 02:10 AM	54.7	70.4	47.3
02:10 AM - 02:15 AM	49.9	62.4	47.1
02:15 AM - 02:20 AM	48.1	50.1	46.9
02:20 AM - 02:25 AM	48.4	51.6	46.9
02:25 AM - 02:30 AM	48.7	50.8	46.9
02:30 AM - 02:35 AM	51.2	65.6	46.7
02:35 AM - 02:40 AM	48.2	50.6	46.7
02:40 AM - 02:45 AM	49.6	59.9	46.9
02:45 AM - 02:50 AM	50.4	64.0	46.7
02:50 AM - 02:55 AM	49.2	58.3	46.8
02:55 AM - 03:00 AM	49.0	60.4	46.5
03:00 AM - 03:05 AM	48.1	50.2	46.4
03:05 AM - 03:10 AM	48.2	50.2	46.6
03:10 AM - 03:15 AM	48.1	50.5	46.5
03:15 AM - 03:20 AM	51.9	64.4	46.2
03:20 AM - 03:25 AM	53.0	67.2	45.8
03:25 AM - 03:30 AM	48.0	59.7	45.7
03:30 AM - 03:35 AM	53.4	66.2	46.7
03:35 AM - 03:40 AM	51.1	66.3	45.8
03:40 AM - 03:45 AM	47.0	50.4	45.2

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Kanok Korn Anek

Kanokkorn Anek
Senior Manager



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

Lot ID: 233853
Date Received : Jan 20, 2023
Date Reported : Jan 21, 2023
Report No. : 2548789-1

P/O :
Project Name :
Project Location :

Page 3 of 3

Sample No. 233853-2
Parameter Noise
Location หมู่ 5 บ้านแพะ ตำบลหัวปลวก (AN 1) (GPS 47P 0696655, 1616585) (จุดอ้างอิง) (Shut down)
Measurement Date Jan 17 - 18, 2023
Measurement by Thananat Anake
Sound Level Meter 00858521

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
03:45 AM - 03:50 AM	47.0	56.9	45.4
03:50 AM - 03:55 AM	51.7	70.4	45.2
03:55 AM - 04:00 AM	54.6	68.6	46.1
04:00 AM - 04:05 AM	53.9	67.7	46.1
04:05 AM - 04:10 AM	48.0	58.8	45.4
04:10 AM - 04:15 AM	54.1	66.7	46.1
04:15 AM - 04:20 AM	50.3	63.2	45.2
04:20 AM - 04:25 AM	52.1	65.9	45.3
04:25 AM - 04:30 AM	51.4	68.5	45.5
04:30 AM - 04:35 AM	53.9	67.6	46.2
04:35 AM - 04:40 AM	52.8	67.1	45.4
04:40 AM - 04:45 AM	52.4	67.0	45.2
04:45 AM - 04:50 AM	53.2	65.8	45.2
04:50 AM - 04:55 AM	54.6	68.1	45.2
04:55 AM - 05:00 AM	55.0	68.2	45.8
05:00 AM - 05:05 AM	54.7	66.0	47.0
05:05 AM - 05:10 AM	52.2	67.9	45.0
05:10 AM - 05:15 AM	57.4	69.5	47.3
05:15 AM - 05:20 AM	52.6	68.4	46.2
05:20 AM - 05:25 AM	59.8	72.2	49.9
05:25 AM - 05:30 AM	57.7	68.1	50.3
05:30 AM - 05:35 AM	56.1	72.0	47.3
05:35 AM - 05:40 AM	55.0	74.1	47.3
05:40 AM - 05:45 AM	56.1	73.0	46.7
05:45 AM - 05:50 AM	56.6	69.6	46.9
05:50 AM - 05:55 AM	60.1	78.4	48.8
05:55 AM - 06:00 AM	59.2	76.7	49.0
06:00 AM - 07:00 AM	57.3	75.6	47.8
07:00 AM - 08:00 AM	57.4	75.1	48.2
08:00 AM - 09:00 AM	58.1	76.9	48.9
09:00 AM - 10:00 AM	59.5	78.8	48.7
10:00 AM - 11:00 AM	57.4	75.0	44.5

Reference Method : Based on ISO 1996-1 and ISO 1996-2

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Approved by

Kanokkorn Anek
Senior Manager

ภาคผนวก ค-5

ระดับเสียงในบริเวณการทำงาน



Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 234080

Date Received : Jan 20, 2023

Date Reported : Jan 25, 2023

Report Number: 2551806-1

Page 1 of 1

Sample Number 234080-1
Parameter Noise (Leq 8 hrs.)
Location เดาดหลอม
Measurement Date Jan 17, 2023
Measurement by Samart Roongan

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:45 AM - 11:45 AM	83.6	101.0	77.7
11:45 AM - 12:45 PM	86.1	103.8	80.2
12:45 PM - 01:45 PM	87.1	98.8	84.7
01:45 PM - 02:45 PM	86.8	101.5	84.1
02:45 PM - 03:45 PM	86.0	99.5	84.0
03:45 PM - 04:45 PM	87.5	105.1	84.1
04:45 PM - 05:45 PM	85.2	93.1	83.9
05:45 PM - 06:45 PM	85.0	99.6	80.3

Leq Average 8 hrs. (dB(A))

86.1

Lmax (dB(A))

105.1

Standard (dB(A))

90

140

Reference Method : Based on ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
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Technical Management

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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P/O :

Project Name :

Project Location :

Lot ID: 234080

Date Received : Jan 20, 2023

Date Reported : Jan 25, 2023

Report Number: 2551807-1

Page 1 of 1

Sample Number 234080-2
Parameter Noise (Leq 8 hrs.)
Location เครื่องคัดแยกขนาดชิ้นงาน
Measurement Date Jan 17, 2023
Measurement by Samart Roongan

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:37 AM - 12:37 PM	83.8	96.5	81.2
12:37 PM - 01:37 PM	83.4	92.8	82.2
01:37 PM - 02:37 PM	84.7	95.2	83.2
02:37 PM - 03:37 PM	86.7	101.4	83.3
03:37 PM - 04:37 PM	88.8	101.9	85.2
04:37 PM - 05:37 PM	86.6	102.7	84.4
05:37 PM - 06:37 PM	87.6	103.3	85.5
06:37 PM - 07:37 PM	88.0	102.5	85.1

Leq Average 8 hrs. (dB(A))

86.6

Lmax (dB(A))

103.3

Standard (dB(A))

90

140

Reference Method : Based on ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
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Technical Management

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 2329127

Date Received : Mar 21, 2023

Date Reported : Mar 27, 2023

Report Number: 2594180-1

Page 1 of 1

Sample Number 2329127-1
Parameter Noise (Leq 8 hrs.)
Location เตาอบชิ้นงาน
Measurement Date Mar 20, 2023
Measurement by Pongvisit Charoenslip

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:48 AM - 09:48 AM	89.2	97.6	86.0
09:48 AM - 10:48 AM	90.5	100.0	86.5
10:48 AM - 11:48 AM	90.1	98.0	85.4
11:48 AM - 12:48 PM	87.1	98.0	81.8
12:48 PM - 01:48 PM	87.5	95.8	82.7
01:48 PM - 02:48 PM	88.9	96.2	85.1
02:48 PM - 03:48 PM	88.4	96.0	85.0
03:48 PM - 04:48 PM	86.4	94.4	83.2

Leq Average 8 hrs. (dB(A))

88.7

Lmax (dB(A))

100.0

Standard (dB(A))

90

140

Reference Method : Based on ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
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Technical Management

Saranya C.

Saranya Chalermthamrong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 2342265

Date Received : Apr 20, 2023

Date Reported : Apr 26, 2023

Report Number: 2632756-1

Page 1 of 1

Sample Number 2342265-1
Parameter Noise (Leq 8 hrs.)
Location เดชาหลอม
Measurement Date Apr 20, 2023
Measurement by Tanadate Phokapipat

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:35 AM - 09:35 AM	85.8	95.2	83.5
09:35 AM - 10:35 AM	84.9	102.0	82.9
10:35 AM - 11:35 AM	85.3	101.3	83.4
11:35 AM - 12:35 PM	86.0	99.7	83.5
12:35 PM - 01:35 PM	86.7	103.7	83.5
01:35 PM - 02:35 PM	87.4	106.3	83.6
02:35 PM - 03:35 PM	86.5	101.7	83.4
03:35 PM - 04:35 PM	86.0	105.8	83.3

Leq Average 8 hrs. (dB(A))

86.1

Lmax (dB(A))

106.3

Standard (dB(A))

90

140

Reference Method : Based on ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
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Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 2342265

Date Received : Apr 20, 2023

Date Reported : Apr 26, 2023

Report Number: 2632757-1

Page 1 of 1

Sample Number 2342265-2
Parameter Noise (Leq 8 hrs.)
Location เครื่องคัดแยกขนาดชิ้นงาน
Measurement Date Apr 20, 2023
Measurement by Tanadate Phokapipat

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:30 AM - 09:30 AM	88.2	99.3	84.8
09:30 AM - 10:30 AM	88.5	100.2	84.5
10:30 AM - 11:30 AM	87.9	99.4	84.5
11:30 AM - 12:30 PM	88.9	100.3	85.8
12:30 PM - 01:30 PM	89.3	100.7	85.7
01:30 PM - 02:30 PM	88.8	99.5	85.5
02:30 PM - 03:30 PM	88.7	100.4	85.9
03:30 PM - 04:30 PM	89.1	98.4	86.2

Leq Average 8 hrs. (dB(A))

88.7

Lmax (dB(A))

100.7

Standard (dB(A))

90

140

Reference Method : Based on ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๔๖

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

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9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 2342265

Date Received : Apr 20, 2023

Date Reported : Apr 26, 2023

Report Number: 2632758-1

Page 1 of 1

Sample Number 2342265-3
Parameter Noise (Leq 8 hrs.)
Location เตาอบชิ้นงาน
Measurement Date Apr 19, 2023
Measurement by Tanadate Phokapipat

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:44 AM - 10:44 AM	86.2	99.9	79.7
10:44 AM - 11:44 AM	87.9	99.5	79.2
11:44 AM - 12:44 PM	86.0	96.6	77.7
12:44 PM - 01:44 PM	86.5	99.8	78.5
01:44 PM - 02:44 PM	88.3	99.3	80.6
02:44 PM - 03:44 PM	85.3	98.4	78.8
03:44 PM - 04:44 PM	84.7	99.7	77.8
04:44 PM - 05:44 PM	84.1	93.7	78.4

Leq Average 8 hrs. (dB(A))

86.3

Lmax (dB(A))

99.9

Standard (dB(A))

90

140

Reference Method : Based on ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๔๖

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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Life Sciences

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ภาคผนวก ค-6

ระดับความร้อนในบริเวณการทำงาน



Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 234082

Date Received : Jan 20, 2023

Date Reported : Jan 23, 2023

Report Number: 2541317-1

Page 1 of 3

Sample Number 234082-1
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Jan 17, 2023
Measurement by Samart Roongan
Location ปฏิบัติงาน 2 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : คุณธนายุทธ ดาวจรัส แผนก : เตาหลอม)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณหน้าเตาหลอม	30	27.2	24.4	33.6	33.2
ห้องควบคุมเตาหลอม	90	19.6	17.2	25.1	25.1
Average (WBGT)		21.5			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management


Supot Salamteh
Section Head

Approved by


Wichan Choonharat
Assistant Manager

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Analysis / Test Report

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 234082

Date Received : Jan 20, 2023

Date Reported : Jan 23, 2023

Report Number: 2541317-1

Page 2 of 3

Sample Number 234082-2
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Jan 17, 2023
Measurement by Samart Roongan
Location ปฏิบัติงาน 2 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : คุณธนกร ดาวจรัส แผนก : เทหล่อ)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณเทหล่อ	30	27.1	23.6	35.1	34.7
ห้องควบคุมเทหล่อ	90	19.9	17.5	25.4	25.4
Average (WBGT)		21.7			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management


Supot Salamteh
Section Head

Approved by


Wichan Choonharat
Assistant Manager

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P/O :

Project Name :

Project Location :

Lot ID: 234082

Date Received : Jan 20, 2023

Date Reported : Jan 23, 2023

Report Number: 2541317-1

Page 3 of 3

Sample Number 234082-3
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Jan 17, 2023
Measurement by Samart Roongan
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : คุณขวัญชัย มณฑะ แพณก : เดอาบ)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
เดอาบชิ้นงาน	120	24.7	22.1	30.8	30.6
Average (WBGT)		24.7			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management


Supot Salamteh
Section Head

Approved by


Wichan Choonharat
Assistant Manager

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Client : Magotteaux Co., Ltd.
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P/O :

Project Name :

Project Location :

Lot ID: 2342266

Date Received : Apr 20, 2023

Date Reported : Apr 24, 2023

Report Number: 2624602-1

Page 1 of 4

Sample Number 2342266-1
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Apr 20, 2023
Measurement by Phitsanupong Chaiya
Location ปฏิบัติงาน 2 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : คุณวรชิต สิงห์ แผนก : เตาหลอม)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณหน้าเตาหลอม	30	30.4	27.2	37.7	37.5
ห้องควบคุม	90	20.8	18.9	25.1	25.0
Average (WBGT)		23.2			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management


Supot Salamteh
Section Head

Approved by


Wichan Choonharat
Assistant Manager

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P/O :

Project Name :

Project Location :

Lot ID: 2342266

Date Received : Apr 20, 2023

Date Reported : Apr 24, 2023

Report Number: 2624602-1

Page 2 of 4

Sample Number 2342266-2
Parameter Heat Stress (Sampling Time : 01.00 PM - 03.00 PM)
Measurement Date Apr 20, 2023
Measurement by Phitsanupong Chaiya
Location ปฏิบัติงาน 2 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : คุณธนกร ดาวจรัส แผนก : เทหล่อ)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณเทหล่อ	30	30.7	26.3	41.1	41.1
ห้องควบคุม	90	22.2	20.1	27.2	27.0
Average (WBGT)		24.4			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management


Supot Salamteh
Section Head

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Assistant Manager

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P/O :

Project Name :

Project Location :

Lot ID: 2342266

Date Received : Apr 20, 2023

Date Reported : Apr 24, 2023

Report Number: 2624602-1

Page 3 of 4

Sample Number 2342266-3
Parameter Heat Stress (Sampling Time : 01.00 PM - 03.00 PM)
Measurement Date Apr 20, 2023
Measurement by Phitsanupong Chaiya
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : คุณณณพ พักขาว แผนก : เตาอบ)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณเตาอบชิ้นงาน	120	30.9	27.2	39.6	39.3
Average (WBGT)		30.9			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management


Supot Salamteh
Section Head

Approved by


Wichan Choonharat
Assistant Manager

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P/O :

Project Name :

Project Location :

Lot ID: 2342266

Date Received : Apr 20, 2023

Date Reported : Apr 24, 2023

Report Number: 2624602-1

Page 4 of 4

Sample Number 2342266-4
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Apr 20, 2023
Measurement by Phitsanupong Chaiya
Location ปฏิบัติงาน 2 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : คุณณพนัย แก้วกระจำจาง แผนก : Loop)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
Loop Process	20	34.0	28.8	46.0	45.9
ห้องควบคุม	100	25.8	22.9	32.6	32.5
Average (WBGT)		27.2			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

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

Technical Management


Supot Salamteh
Section Head

Approved by


Wichan Choonharat
Assistant Manager

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ภาคผนวก ค-7

คุณภาพอากาศในสถานประกอบการ



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 234083

Date Received : Jan 20, 2023

Date Reported : Feb 16, 2023

Report Number : 2541325-1

Page 1 of 10

Sample Number	234083-1
Sampled Date	Jan 17, 2023
Sample Description	Air Quality
Location	บริเวณเตาหลอม
Personal Sampling	คุณนายพร ดาวัจรัส
Date Analysis Commenced	Jan 23, 2023
Condition of Sample	Drawn into two filter papers placed in each cassette
Barometric Pressure	759 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	09:25 AM - 11:25 AM	mg/m3	-	0.15	<0.15	5	Based on NIOSH (1998), 0600	OSHA	Bangkok
Metals Testing									
Chromium *	09:25 AM - 11:25 AM	mg/m3	-	0.002	<0.002	0.5	NIOSH (2003), 7301	ACGIH	Bangkok
Manganese *	09:25 AM - 11:25 AM	mg/m3	-	0.001	<0.001	0.1(1)	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 (2022).

OSHA : Occupational Safety and Health Administration

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2012)

Sampled By : Samart Roongan

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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

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Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 234083

Date Received : Jan 20, 2023

Date Reported : Feb 16, 2023

Report Number : 2541325-1

Page 2 of 10

Sample Number	234083-2
Sampled Date	Jan 17, 2023
Sample Description	Air Quality
Location	บริเวณเทห์ล่อ
Personal Sampling	คุณธนกร ดาวจรัส
Date Analysis Commenced	Jan 23, 2023
Condition of Sample	Drawn into two filter papers placed in each cassette
Barometric Pressure	759 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	09:31 AM - 11:31 AM	mg/m3	-	0.15	<0.15	5	Based on NIOSH (1998), 0600	OSHA	Bangkok
Metals Testing									
Chromium *	09:31 AM - 11:31 AM	mg/m3	-	0.002	<0.002	0.5	NIOSH (2003), 7301	ACGIH	Bangkok
Manganese *	09:31 AM - 11:31 AM	mg/m3	-	0.001	<0.001	0.1(1)	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 (2022).

OSHA : Occupational Safety and Health Administration

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2012)

Sampled By : Samart Roongan

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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

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Analysis / Test Report

TESTING
No.0009

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P/O :

Project Name :

Project Location :

Lot ID: 234083

Date Received : Jan 20, 2023

Date Reported : Feb 16, 2023

Report Number : 2541325-1

Page 3 of 10

Sample Number	234083-3
Sampled Date	Jan 19, 2023
Sample Description	Air Quality
Location	เครื่องคัดแยกขนาดชั้นงาน
Personal Sampling	คุณสุนทรีย์ ชินทรักษา
Date Analysis Commenced	Jan 23, 2023
Condition of Sample	Drawn into two filter papers placed in each cassette
Barometric Pressure	759 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Respirable Dust	09:20 AM - 11:20 AM	mg/m3	-	0.15	<0.15	5	Based on NIOSH (1998), 0600	OSHA	Bangkok
Silica (SiO ₂) *	09:20 AM - 12:20 PM	mg/m3	-	0.020	<0.020	0.025 (R)	NIOSH (1994), 7601	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)

OSHA : Occupational Safety and Health Administration

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2012)

Sampled By : Samart Roongan

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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

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Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
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P/O :

Project Name :

Project Location :

Lot ID: 234083

Date Received : Jan 20, 2023

Date Reported : Feb 16, 2023

Report Number : 2541325-1

Page 4 of 10

Sample Number	234083-4
Sampled Date	Jan 19, 2023
Sample Description	Air Quality
Location	ปรับปรุงคุณภาพทราย
Personal Sampling	คุณสุวัฒน์ คชารัตน์
Date Analysis Commenced	Jan 23, 2023
Condition of Sample	Drawn into two filter papers placed in each cassette
Barometric Pressure	759 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Respirable Dust	09:30 AM - 11:30 AM	mg/m3	-	0.15	<0.15	5	Based on NIOSH (1998), 0600	OSHA	Bangkok
Silica (SiO ₂) *	09:30 AM - 12:30 PM	mg/m3	-	0.020	<0.020	0.025 (R)	NIOSH (1994), 7601	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)

OSHA : Occupational Safety and Health Administration

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2012)

Sampled By : Samart Roongan

Remark :

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

Saranya C.

Saranya Chalermthamrong
Scientist (4)

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Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 234083

Date Received : Jan 20, 2023

Date Reported : Feb 16, 2023

Report Number : 2541325-1

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Sample Number	234083-5
Sampled Date	Jan 17, 2023
Sample Description	Air Quality
Location	เครื่องปั้นแบบทราย
Personal Sampling	คุณอรุณวิทย์ ผลอินทร์
Date Analysis Commenced	Jan 24, 2023
Condition of Sample	Drawn into one filter paper placed in plastic cassette
Barometric Pressure	759 mmHg
Atmospheric Temperature	30.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Triethanolamine(TEA) *	09:20 AM - 11:20 AM	mg/m3	-	0.1	<0.1	5	OSHA, PV2141	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 (2022).

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2012)

Sampled By : Samart Roongan

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Saranya Chalermthamrong
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Analysis / Test Report

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No.0009

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P/O :

Project Name :

Project Location :

Lot ID: 234083

Date Received : Jan 20, 2023

Date Reported : Feb 16, 2023

Report Number : 2541325-1

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Sample Number 234083-6
Sampled Date Jan 17, 2023
Sample Description Air Quality
Location บริเวณเตาหลอม
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into two filter papers placed in each cassette
Barometric Pressure 759 mmHg
Atmospheric Temperature 30.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Total dust	09:25 AM - 11:25 AM	mg/m3	-	0.15	0.34	15	Based on NIOSH (1994), 0501	OSHA	Bangkok
Metals Testing									
Chromium *	09:25 AM - 11:25 AM	mg/m3	-	0.002	<0.002	0.5	NIOSH (2003), 7301	ACGIH	Bangkok
Manganese *	09:25 AM - 11:25 AM	mg/m3	-	0.001	0.002	0.1(1)	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 (2022).

OSHA : Occupational Safety and Health Administration

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2012)

Sampled By : Samart Roongan

Remark :

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P/O :
Project Name :
Project Location :

Lot ID: 234083

Date Received : Jan 20, 2023
Date Reported : Feb 16, 2023
Report Number : 2541325-1

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Sample Number 234083-7
Sampled Date Jan 17, 2023
Sample Description Air Quality
Location บริเวณเทศบาล
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into two filter papers placed in each cassette
Barometric Pressure 759 mmHg
Atmospheric Temperature 30.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Total dust	09:31 AM - 11:31 AM	mg/m3	-	0.15	1.11	15	Based on NIOSH (1994), 0501	OSHA	Bangkok
Metals Testing									
Chromium *	09:31 AM - 11:31 AM	mg/m3	-	0.002	<0.002	0.5	NIOSH (2003), 7301	ACGIH	Bangkok
Manganese *	09:31 AM - 11:31 AM	mg/m3	-	0.001	<0.001	0.1(1)	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 (2022).

OSHA : Occupational Safety and Health Administration

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2012)

Sampled By : Samart Roongan

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P/O :

Project Name :

Project Location :

Lot ID: 234083

Date Received : Jan 20, 2023

Date Reported : Feb 16, 2023

Report Number : 2541325-1

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Sample Number 234083-8
Sampled Date Jan 19, 2023
Sample Description Air Quality
Location เครื่องคัดแยกขนาดชั้นงาน
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into three filter papers placed in each cassette
Barometric Pressure 759 mmHg
Atmospheric Temperature 29.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Respirable Dust	09:20 AM - 11:20 AM	mg/m3	-	0.15	<0.15	5	Based on NIOSH (1998), 0600	OSHA	Bangkok
Silica (SiO ₂) *	09:20 AM - 12:20 PM	mg/m3	-	0.020	<0.020	0.025 (R)	NIOSH (1994), 7601	MOL	Bangkok
Total dust	09:20 AM - 11:20 AM	mg/m3	-	0.15	0.34	15	Based on NIOSH (1994), 0501	OSHA	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)

OSHA : Occupational Safety and Health Administration

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2012)

Sampled By : Samart Roongan

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P/O :
Project Name :
Project Location :

Lot ID: 234083

Date Received : Jan 20, 2023
Date Reported : Feb 16, 2023
Report Number : 2541325-1

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Sample Number 234083-9
Sampled Date Jan 19, 2023
Sample Description Air Quality
Location ปรับปรุงคุณภาพทราย
Date Analysis Commenced Jan 23, 2023
Condition of Sample Drawn into three filter papers placed in each cassette
Barometric Pressure 759 mmHg
Atmospheric Temperature 29.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Respirable Dust	09:30 AM - 11:30 AM	mg/m3	-	0.15	<0.15	5	Based on NIOSH (1998), 0600	OSHA	Bangkok
Silica (SiO ₂) *	09:30 AM - 12:30 PM	mg/m3	-	0.020	<0.020	0.025 (R)	NIOSH (1994), 7601	MOL	Bangkok
Total dust	09:30 AM - 11:30 AM	mg/m3	-	0.15	<0.15	15	Based on NIOSH (1994), 0501	OSHA	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)

OSHA : Occupational Safety and Health Administration

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2012)

Sampled By : Samart Roongan

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P/O :

Project Name :

Project Location :

Lot ID: 234083

Date Received : Jan 20, 2023

Date Reported : Feb 16, 2023

Report Number : 2541325-1

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Sample Number 234083-10
Sampled Date Jan 17, 2023
Sample Description Air Quality
Location เครื่องปั้นแบบทราย
Date Analysis Commenced Jan 24, 2023
Condition of Sample Drawn into one filter paper placed in plastic cassette
Barometric Pressure 759 mmHg
Atmospheric Temperature 30.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Triethanolamine(TEA) *	09:20 AM - 11:20 AM	mg/m3	-	0.1	<0.1	5	OSHA, PV2141	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 (2022).

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2012)

Sampled By : Samart Roongan

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Saranya Chalermthamrong
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TESTING
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Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 2342267

Date Received : Apr 20, 2023

Date Reported : May 10, 2023

Report Number : 2624603-1

Page 1 of 10

Sample Number	2342267-1
Sampled Date	Apr 20, 2023
Sample Description	Air Quality
Location	บริเวณเตาหลอม
Personal Sampling	คุณวรชิต สิงหะ
Date Analysis Commenced	Apr 21, 2023
Condition of Sample	Drawn into two filter papers placed in each cassette
Barometric Pressure	752 mmHg
Atmospheric Temperature	35.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Respirable Dust	08:55 AM - 10:55 AM	mg/m3	-	0.15	0.18	5	Based on NIOSH (1998), 0600	OSHA	Bangkok
Metals Testing									
Chromium *	08:55 AM - 10:55 AM	mg/m3	-	0.002	<0.002	0.5	NIOSH (2003), 7301	ACGIH	Bangkok
Manganese *	08:55 AM - 10:55 AM	mg/m3	-	0.001	<0.001	0.1(1)	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 (2022).

OSHA : Occupational Safety and Health Administration

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2013)

Sampled By : Phitsanupong Chaiya

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Approved by

Sawitree N.

Sawitree Noisangiam
Manager



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 2342267

Date Received : Apr 20, 2023

Date Reported : May 10, 2023

Report Number : 2624603-1

Page 2 of 10

Sample Number	2342267-2
Sampled Date	Apr 20, 2023
Sample Description	Air Quality
Location	บริเวณเทห์ล่อ
Personal Sampling	คุณธนกร ดาวจรัส
Date Analysis Commenced	Apr 21, 2023
Condition of Sample	Drawn into two filter papers placed in each cassette
Barometric Pressure	752 mmHg
Atmospheric Temperature	35.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Respirable Dust	01:15 PM - 03:15 PM	mg/m3	-	0.15	0.35	5	Based on NIOSH (1998), 0600	OSHA	Bangkok
Metals Testing									
Chromium *	01:15 PM - 03:15 PM	mg/m3	-	0.002	<0.002	0.5	NIOSH (2003), 7301	ACGIH	Bangkok
Manganese *	01:15 PM - 03:15 PM	mg/m3	-	0.001	0.001	0.1(1)	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 (2022).

OSHA : Occupational Safety and Health Administration

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2013)

Sampled By : Phitsanupong Chaiya

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Sawitree N.

Sawitree Noisangiam
Manager



Analysis / Test Report

TESTING
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9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 2342267

Date Received : Apr 20, 2023

Date Reported : May 10, 2023

Report Number : 2624603-1

Page 3 of 10

Sample Number 2342267-3
Sampled Date Apr 20, 2023
Sample Description Air Quality
Location เครื่องคัดแยกขนาดชั้นงาน
Personal Sampling คุณสาธิต แจ่มใส
Date Analysis Commenced Apr 21, 2023
Condition of Sample Drawn into two filter papers placed in each cassette
Barometric Pressure 752 mmHg
Atmospheric Temperature 35.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Respirable Dust	08:35 AM - 10:35 AM	mg/m3	-	0.15	0.42	5	Based on NIOSH (1998), 0600	OSHA	Bangkok
Silica (SiO ₂) *	08:35 AM - 11:35 AM	mg/m3	-	0.020	<0.020	0.025 (R)	NIOSH (1994), 7601	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)

OSHA : Occupational Safety and Health Administration

Sampled By : Phitsanupong Chaiya

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Approved by

Sawitree N.

Sawitree Noisangiam
Manager

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P/O :

Project Name :

Project Location :

Lot ID: 2342267

Date Received : Apr 20, 2023

Date Reported : May 10, 2023

Report Number : 2624603-1

Page 4 of 10

Sample Number	2342267-4
Sampled Date	Apr 20, 2023
Sample Description	Air Quality
Location	ปรับปรุงคุณภาพทราย
Personal Sampling	คุณวิทยา จันแก้ว
Date Analysis Commenced	Apr 21, 2023
Condition of Sample	Drawn into two filter papers placed in each cassette
Barometric Pressure	752 mmHg
Atmospheric Temperature	35.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Respirable Dust	01:20 PM - 03:20 PM	mg/m3	-	0.15	<0.15	5	Based on NIOSH (1998), 0600	OSHA	Bangkok
Silica (SiO ₂) *	01:20 PM - 04:20 PM	mg/m3	-	0.020	<0.020	0.025 (R)	NIOSH (1994), 7601	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)

OSHA : Occupational Safety and Health Administration

Sampled By : Phitsanupong Chaiya

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Manager



Analysis / Test Report

TESTING
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P/O :

Project Name :

Project Location :

Lot ID: 2342267

Date Received : Apr 20, 2023

Date Reported : May 10, 2023

Report Number : 2624603-1

Page 5 of 10

Sample Number	2342267-5
Sampled Date	Apr 20, 2023
Sample Description	Air Quality
Location	เครื่องปั้นแบบทราย
Personal Sampling	คุณวชิรวิทย์ เกตุศรี
Date Analysis Commenced	Apr 25, 2023
Condition of Sample	Drawn into one filter paper placed in plastic cassette
Barometric Pressure	752 mmHg
Atmospheric Temperature	35.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Triethanolamine(TEA) *	08:50 AM - 10:50 AM	mg/m3	-	0.1	<0.1	5	OSHA, PV2141	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 (2022).

Sampled By : Phitsanupong Chaiya

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P/O :

Project Name :

Project Location :

Lot ID: 2342267

Date Received : Apr 20, 2023

Date Reported : May 10, 2023

Report Number : 2624603-1

Page 6 of 10

Sample Number 2342267-6
Sampled Date Apr 20, 2023
Sample Description Air Quality
Location บริเวณเตาหลอม
Date Analysis Commenced Apr 21, 2023
Condition of Sample Drawn into two filter papers placed in each cassette
Barometric Pressure 752 mmHg
Atmospheric Temperature 35.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Total dust	08:55 AM - 10:55 AM	mg/m3	-	0.15	0.35	15	Based on NIOSH (1994), 0500	OSHA	Bangkok
Metals Testing									
Chromium *	08:55 AM - 10:55 AM	mg/m3	-	0.002	<0.002	0.5	NIOSH (2003), 7301	ACGIH	Bangkok
Manganese *	08:55 AM - 10:55 AM	mg/m3	-	0.001	<0.001	0.1(1)	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 (2022).

OSHA : Occupational Safety and Health Administration

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2013)

Sampled By : Phitsanupong Chaiya

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Manager



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
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P/O :

Project Name :

Project Location :

Lot ID: 2342267

Date Received : Apr 20, 2023

Date Reported : May 10, 2023

Report Number : 2624603-1

Page 7 of 10

Sample Number 2342267-7
Sampled Date Apr 20, 2023
Sample Description Air Quality
Location บริเวณเทศบาล
Date Analysis Commenced Apr 21, 2023
Condition of Sample Drawn into two filter papers placed in each cassette
Barometric Pressure 752 mmHg
Atmospheric Temperature 35.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Total dust	01:15 PM - 03:15 PM	mg/m3	-	0.15	0.66	15	Based on NIOSH (1994), OSHA 0500		Bangkok
Metals Testing									
Chromium *	01:15 PM - 03:15 PM	mg/m3	-	0.002	<0.002	0.5	NIOSH (2003), 7301	ACGIH	Bangkok
Manganese *	01:15 PM - 03:15 PM	mg/m3	-	0.001	<0.001	0.1(1)	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 (2022).

OSHA : Occupational Safety and Health Administration

Note : (1)Guideline for Metal and Inorganic compounds as Manganese (2013)

Sampled By : Phitsanupong Chaiya

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 Noisangiam
Manager

The above results are valid only for the analyzed/tested sample(s) as indicated in this report. No part of this report or certificate may be reproduced in any form without written consent from the Laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 2342267

Date Received : Apr 20, 2023

Date Reported : May 10, 2023

Report Number : 2624603-1

Page 8 of 10

Sample Number 2342267-8
Sampled Date Apr 20, 2023
Sample Description Air Quality
Location เครื่องคัดแยกขนาดชั้นงาน
Date Analysis Commenced Apr 21, 2023
Condition of Sample Drawn into three filter papers placed in each cassette
Barometric Pressure 752 mmHg
Atmospheric Temperature 35.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Respirable Dust	08:35 AM - 10:35 AM	mg/m3	-	0.15	0.25	5	Based on NIOSH (1998), 0600	OSHA	Bangkok
Silica (SiO ₂) *	08:35 AM - 11:35 AM	mg/m3	-	0.020	<0.020	0.025 (R)	NIOSH (1994), 7601	MOL	Bangkok
Total dust	08:35 AM - 10:35 AM	mg/m3	-	0.15	0.57	15	Based on NIOSH (1994), 0500	OSHA	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)

OSHA : Occupational Safety and Health Administration

Sampled By : Phitsanupong Chaiya

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 Noisangiam
Manager

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Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :
Project Name :
Project Location :

Lot ID: 2342267

Date Received : Apr 20, 2023
Date Reported : May 10, 2023
Report Number : 2624603-1

Page 9 of 10

Sample Number 2342267-9
Sampled Date Apr 20, 2023
Sample Description Air Quality
Location ปรับปรุงคุณภาพทราย
Date Analysis Commenced Apr 21, 2023
Condition of Sample Drawn into three filter papers placed in each cassette
Barometric Pressure 752 mmHg
Atmospheric Temperature 35.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Respirable Dust	01:10 PM - 03:10 PM	mg/m3	-	0.15	0.35	5	Based on NIOSH (1998), 0600	OSHA	Bangkok
Silica (SiO ₂) *	01:10 PM - 04:10 PM	mg/m3	-	0.020	<0.020	0.025 (R)	NIOSH (1994), 7601	MOL	Bangkok
Total dust	01:10 PM - 03:10 PM	mg/m3	-	0.15	0.83	15	Based on NIOSH (1994), 0500	OSHA	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)

OSHA : Occupational Safety and Health Administration

Sampled By : Phitsanupong Chaiya

Remark :

- LOD : Limit of Detection
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Approved by

Sawitree N.

Sawitree Noisangiam
Manager



Analysis / Test Report

TESTING
No.0009

Client : Magotteaux Co., Ltd.
9 Moo 5, Teennoen Rd., Huapluk, Saohai, Saraburi Thailand 18160

P/O :

Project Name :

Project Location :

Lot ID: 2342267

Date Received : Apr 20, 2023

Date Reported : May 10, 2023

Report Number : 2624603-1

Page 10 of 10

Sample Number 2342267-10
Sampled Date Apr 20, 2023
Sample Description Air Quality
Location เครื่องปั้นแบบทราย
Date Analysis Commenced Apr 25, 2023
Condition of Sample Drawn into one filter paper placed in plastic cassette
Barometric Pressure 752 mmHg
Atmospheric Temperature 35.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Triethanolamine(TEA) *	08:50 AM - 10:50 AM	mg/m3	-	0.1	<0.1	5	OSHA, PV2141	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 (2022).

Sampled By : Phitsanupong Chaiya

Remark :

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

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Approved by

Savitree N.

Savitree Noisangiam
Manager

ภาคผนวก ง

เอกสารการสอบเทียบเครื่องมือตรวจวิเคราะห์



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Ambient	Particulate Matter (PM-10)	High Volume	BKK_FS0388	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	High Volume	BKK_FS1062	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	High Volume	BKK_FS0385	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	Digital Balance	BKK_EN0004	25-Feb-22	25-Feb-23	12
Ambient	Total Suspended Particulate	High Volume	BKK_FS0370	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	BKK_FS0368	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	BKK_FS0367	-	-	On site Calibration
Ambient	Total Suspended Particulate	Digital Balance	BKK_EN0004	25-Feb-22	25-Feb-23	12
Ambient	Iron as FeO2	High Volume	BKK_FS0370	-	-	On site Calibration
Ambient	Iron as FeO2	High Volume	BKK_FS0368	-	-	On site Calibration
Ambient	Iron as FeO2	High Volume	BKK_FS0367	-	-	On site Calibration
Ambient	Iron as FeO2	ICP-OES	BKK_EL0037	13-Sep-21	12-Mar-23	18
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	BKK_FS0794	5-Jan-23	5-Jul-23	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	BKK_FS1086	5-Jan-23	5-Jul-23	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	BKK_FS1088	5-Jan-23	5-Jul-23	6
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_FS0975	5-Jan-23	5-Jan-24	12
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	SGK_FS0039	10-Dec-22	11-Jun-24	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0435	31-Jan-22	27-Jul-23	18
Stack	Oxides of Nitrogen	Console Control Unit	BKK_FS1093	3-Jan-23	3-Jul-23	6
Stack	Oxides of Nitrogen	Console Control Unit	BKK_FS0507	3-Jan-23	3-Jul-23	6
Stack	Oxides of Nitrogen	Flue gas Analyzer	BKK_FS1158	21-Nov-22	21-Nov-23	12
Stack	Oxides of Nitrogen	Flue gas Analyzer	BKK_FS1156	8-Dec-22	8-Dec-23	12
Stack	Oxides of Nitrogen	Vacuum Gauge	BKK_FS0896	21-Jul-22	19-Jan-24	18
Stack	Oxides of Nitrogen	Spectrophotometer	BKK_EN0018	16-Sep-22	16-Sep-23	12
Stack	Total Suspended Particulate	Console Control Unit	BKK_FS1093	3-Jan-23	3-Jul-23	6
Stack	Total Suspended Particulate	Console Control Unit	BKK_FS0507	3-Jan-23	3-Jul-23	6
Stack	Total Suspended Particulate	Flue gas Analyzer	BKK_FS1158	21-Nov-22	21-Nov-23	12
Stack	Total Suspended Particulate	Flue gas Analyzer	BKK_FS1156	8-Dec-22	8-Dec-23	12
Stack	Total Suspended Particulate	Digital Balance	BKK_EN0002	25-Feb-22	25-Feb-23	12
Stack	Triethanolamine	Console Control Unit	BKK_FS1093	3-Jan-23	3-Jul-23	6
Stack	Triethanolamine	Flue gas Analyzer	BKK_FS1158	21-Nov-22	21-Nov-23	12
Stack	Triethanolamine	Dry Gas	BKK_FS0505	3-Jan-23	3-Jul-23	6
Workplace	Total Dust	Field Rotameter	BKK_FS1013	3-Jan-23	3-Apr-23	3
Workplace	Total Dust	Field Rotameter	BKK_FS1022	3-Apr-23	3-Jul-23	3
Workplace	Total Dust	Digital Balance	BKK_EN0004	8-Feb-23	8-Feb-24	12
Workplace	Respirable Dust	Field Rotameter	BKK_FS1013	3-Jan-23	3-Apr-23	3
Workplace	Respirable Dust	Field Rotameter	BKK_FS1022	3-Apr-23	3-Jul-23	3
Workplace	Respirable Dust	Digital Balance	BKK_EN0004	8-Feb-23	8-Feb-24	12
Workplace	Chromium	Field Rotameter	BKK_FS1013	3-Jan-23	3-Apr-23	3
Workplace	Chromium	Field Rotameter	BKK_FS1022	3-Apr-23	3-Jul-23	3
Workplace	Chromium	ICP-OES	BKK_EL0037	2-Mar-23	1-Mar-24	12
Workplace	Silica (SiO2)	Field Rotameter	BKK_FS1013	3-Jan-23	3-Apr-23	3
Workplace	Silica (SiO2)	Field Rotameter	BKK_FS1022	3-Apr-23	3-Jul-23	3
Workplace	Silica (SiO2)	Spectrophotometer	BKK_EN0018	16-Sep-22	16-Sep-23	12
Workplace	Manganese	Field Rotameter	BKK_FS1013	3-Jan-23	3-Apr-23	3
Workplace	Manganese	Field Rotameter	BKK_FS1022	3-Apr-23	3-Jul-23	3
Workplace	Manganese	ICP-OES	BKK_EL0037	2-Mar-23	1-Mar-24	12
Workplace	Triethanolamine	Field Rotameter	BKK_FS1013	3-Jan-23	3-Apr-23	3
Workplace	Triethanolamine	Field Rotameter	BKK_FS1022	3-Apr-23	3-Jul-23	3



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

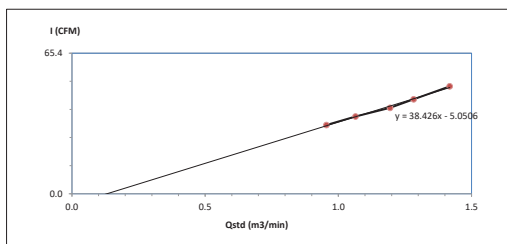
Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Noise	Leq 24 hrs	Sound Calibrator	BKK_FS0630	26-Apr-22	26-Apr-23	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0098	15-Aug-22	15-Aug-23	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0099	11-Jul-22	11-Jul-23	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0107	2-Nov-22	2-Nov-23	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0111	16-Dec-22	16-Dec-23	12
Noise	Leq 24 hrs	Sound Calibrator	BKK_FS0630	26-Apr-22	26-Apr-23	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0098	15-Aug-22	15-Aug-23	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0100	11-Jul-22	11-Jul-23	12
Noise	Leq 24 hrs	Sound Calibrator	BKK_FS0630	26-Apr-22	26-Apr-23	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0098	15-Aug-22	15-Aug-23	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0100	11-Jul-22	11-Jul-23	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0106	2-Nov-22	2-Nov-23	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0111	16-Dec-22	16-Dec-23	12
Noise	Noise Contour	Sound Calibrator	BKK_FS0631	20-Dec-22	20-Dec-23	18
Noise	Noise Contour	Sound Level Meter	BKK_FS0993	25-Oct-22	25-Oct-23	12
Noise	Noise Contour	Sound Level Meter	BKK_FS0994	7-Sep-22	7-Sep-23	12
Noise	Leq 8 hrs	Sound Calibrator	BKK_FS0631	20-Dec-22	20-Dec-23	18
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0993	25-Oct-22	25-Oct-23	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0994	7-Sep-22	7-Sep-23	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0998	19-Sep-22	19-Sep-23	12
Noise	Leq 8 hrs	Sound Calibrator	BKK_FS0618	7-Dec-22	7-Dec-23	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0997	19-Jan-23	19-Jan-24	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0998	19-Sep-22	19-Sep-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_FS0641	26-May-22	26-May-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_FS0642	14-Feb-22	14-Feb-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_FS0649	17-Mar-22	17-Mar-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_FS0659	11-Jul-22	11-Jul-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_FS0669	8-Jul-22	8-Jul-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_FS0655	28-Sep-22	28-Sep-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_FS0658	8-Jul-22	8-Jul-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_FS0660	8-Jul-22	8-Jul-23	12
Water Lab	pH at 25 oC	pH meter	BKK_EN0072	12-Sep-22	12-Mar-24	18
Water Lab	Total Suspended Solids	Electronic Top-Loading Balance	BKK_EN0002	8-Feb-23	8-Feb-24	12
Water Lab	Total Suspended Solids	Oven	BKK_EN0273	29-Nov-22	29-May-24	18
Water Lab	BOD (5 days at 20°C)	DO Meter	BKK_EN0017	24-May-22	24-Nov-23	18
Water Lab	BOD (5 days at 20°C)	Incubator	BKK_EN0272	17-May-22	17-May-23	12
Water Lab	BOD (5 days at 20°C)	Incubator	BKK_EN0305	5-Apr-23	5-Apr-24	18
Water Lab	COD	Hot Block	BKK_EN0222	1-Mar-23	1-Mar-24	12
Water Lab	COD	Spectrophotometer	BKK_EN0018	16-Sep-22	16-Sep-23	12
Water Lab	Dissolved Oxygen	Burette	BKK_EN0171	30-Aug-22	1-Mar-24	18
Water Lab	Dissolved Oxygen	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Water Lab	Oil & Grease	Electronic Top-Loading Balance	BKK_EN0002	8-Feb-23	8-Feb-24	12
Water Lab	Oil & Grease	Water Bath	BKK_EN0148	31-Jan-22	1-Aug-23	18
Water Lab	Total Kjeldahl Nitrogen	Digestion Unit	BKK_EN0366	30-Jun-22	30-Jun-23	12
Water Lab	Total Kjeldahl Nitrogen	Discrete analyzer	BKK_EN0037	5-Jan-23	5-Jan-24	12
Water Lab	Total Dissolved Solids 180°C	Electronic Top-Loading Balance	BKK_EN0002	8-Feb-23	8-Feb-24	12
Water Lab	Total Dissolved Solids 180°C	Oven	BKK_EN0273	29-Nov-22	29-May-24	18
Water Lab	Chromium	ICP-MS	BKK_EL0026	14-Jun-22	14-Dec-23	18
Water Lab	Chromium	Hot Block	BKK_EL0054	7-Apr-22	7-Oct-23	18
Water Lab	Chromium	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Water Lab	Iron	ICP-MS	BKK_EL0026	14-Jun-22	14-Dec-23	18
Water Lab	Iron	Hot Block	BKK_EL0054	7-Apr-22	7-Oct-23	18
Water Lab	Iron	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Water Lab	Manganese	ICP-MS	BKK_EL0026	14-Jun-22	14-Dec-23	18
Water Lab	Manganese	Hot Block	BKK_EL0054	7-Apr-22	7-Oct-23	18
Water Lab	Manganese	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18



High Volume Air Sampler Calibration Worksheet

Project Site : Magotteaux Co., Ltd. Barometric Pressure (mm Hg) : 756
Calibrate Location : กรุงเทพมหานคร (A1) Temperature (°C) : 32
Calibrate Date : 12-Jan-23 High Volume ID : BKK_FS0388
CalibrationSheet No.: C-120123-BKK_FS0388 High Volume Model : TE-5009X
Calibrator ID: BKK_FS0624 High Volume S/N: 5328
Calibrator Model: TE-5028A Calibrator Slope : 1.64942
Calibrator S/N : 2584 Calibrator Intercept : -0.02902

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I: Chart (CFM)	Linear Regression
1	2.4	0.9550	32	Slope : 38.4260 Intercept : -5.0506 Correlation Coefficient : 0.9969
2	3.0	1.0643	36	
3	3.8	1.1941	40	
4	4.4	1.2828	44	
5	5.4	1.4179	50	



Calibrated by :
(Mr. Thananat Anake)
Field Scientist(2)

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

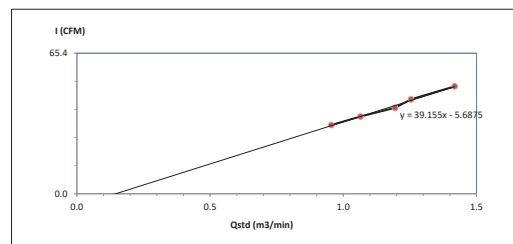
FORM NO.: F 06-074 REVISION NO.: ISSUE DATE: 14/03/16



High Volume Air Sampler Calibration Worksheet

Project Site : Magotteaux Co., Ltd. Barometric Pressure (mm Hg) : 756
Calibrate Location : กรุงเทพมหานคร (A2) Temperature (°C) : 32
Calibrate Date : 12-Jan-23 High Volume ID : BKK_FS1062
CalibrationSheet No.: C-120123-BKK_FS1062 High Volume Model : TE-5009X
Calibrator ID: BKK_FS0624 High Volume S/N: 5686
Calibrator Model: TE-5028A Calibrator Slope : 1.64942
Calibrator S/N : 2584 Calibrator Intercept : -0.02902

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I: Chart (CFM)	Linear Regression
1	2.4	0.9550	32	Slope : 39.1553 Intercept : -5.6875 Correlation Coefficient : 0.9959
2	3.0	1.0643	36	
3	3.8	1.1941	40	
4	4.2	1.2539	44	
5	5.4	1.4179	50	



Calibrated by :
(Mr. Thananat Anake)
Field Scientist(2)

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

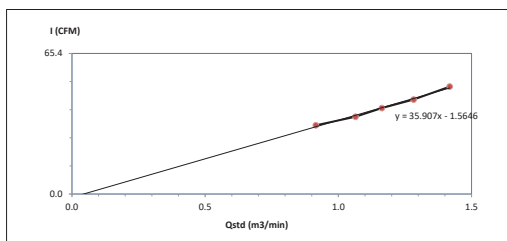
FORM NO.: F 06-074 REVISION NO.: ISSUE DATE: 14/03/16



High Volume Air Sampler Calibration Worksheet

Project Site : Magotteaux Co., Ltd. Barometric Pressure (mm Hg) : 756
Calibrate Location : กรุงเทพมหานคร (A3) Temperature (°C) : 32
Calibrate Date : 12-Jan-23 High Volume ID : BKK_FS0385
CalibrationSheet No.: C-120123-BKK_FS0385 High Volume Model : TE-5009X
Calibrator ID: BKK_FS0624 High Volume S/N: 4789
Calibrator Model: TE-5028A Calibrator Slope : 1.64942
Calibrator S/N : 2584 Calibrator Intercept : -0.02902

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I: Chart (CFM)	Linear Regression
1	2.2	0.9155	32	Slope : 35.9068 Intercept : -1.5646 Correlation Coefficient : 0.9959
2	3.0	1.0643	36	
3	3.6	1.1631	40	
4	4.4	1.2828	44	
5	5.4	1.4179	50	



Calibrated by :
(Mr. Thananat Anake)
Field Scientist(2)

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

FORM NO.: F 06-074 REVISION NO.: ISSUE DATE: 14/03/16



PENTA
CALIBRATION

PENTA CALIBRATION CO., LTD.
66/124 The Connect 33 Village Kanthanasphisek Road
Dokmai Praset Bangkok 10250
Tel: +66 (0) 2089-9773
www.pentalcal.com

Certificate of Calibration

Represent to Certificate of Calibration /PTC/07/22072

Certificate No.: PTC/07/22072 Page: 1 of 3
Equipment: Digital Balance Condition: Normal
Manufacturer: METTLER TOLEDO Serial No: 1123091884
Model: XP105 ID No: BKK_EN0004
Type of Balance: Multi interval

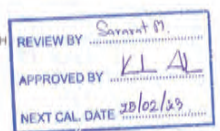
Customer: ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakarn 40 Phatthanakarn Rd.,
khwaeng Phatthanakarn, Khet Suan Luang, Bangkok 10250.

Environment Condition: Temperature 21.0 °C ± 0.4 °C
Humidity 62.8 %RH ± 3.7 %RH
Air density 1.20 kg/m³

Calibration Place: ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakarn 40 Phatthanakarn Rd.,
khwaeng Phatthanakarn, Khet Suan Luang, Bangkok 10250.

The Method used: In house method, PTC-WI-07; base on Euramet cg. 18
Traceability: This certificate is traceable to the SI Units through Thai Calibration Service Co.,Ltd.
, NSC-ONSC Accreditation No.: Calibration 0189

Date Received: February 25, 2022
Calibration Date: February 25, 2022
Issued Date: March 01, 2022
Calibration By: Mr. Rungroj Metakul



(Mr. Kriangsak Kalasri)
Reviewed by

Approved By :
(Mr. Keattisak Kerdto)
Laboratory Manager

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

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty indicated 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

Represent to Certificate of Calibration :PTC/07/22072

Certificate No.: PTC/07/22072

Page: 2 of 3

Measurement Results:

Without Adjustment :

Function Calibration: Non Adjustment

Eccentric Error: Weight to be 1/3 ,1/2 or of Maximum capacity



Eccentricity test 30 (g)				
Position (g)				
1	2	3	4	5
0.0000	0.0000	0.0000	0.0000	0.0000
Maximum deviation: 0.0000				

Repeatability Test : Weight to be 1/2 $\leq L_1 \leq$ Maximum capacity

Determination of the standard deviation of weighing balance., Readability 0.0001 (g)

Nominal test value (g)	Standard Deviation
100	0.00005

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
40	40.00005	40.0000	0.0000	0.00016	2.11
50	50.00001	50.0000	0.0000	0.00015	2.13
60	60.00003	60.0000	0.0000	0.00016	2.08
70	70.00003	70.0000	0.0000	0.00017	2.07
80	80.00005	80.0001	-0.0001	0.00019	2.04
90	90.00006	90.0001	0.0000	0.00020	2.03
100	100.00002	99.9999	0.0001	0.00018	2.06

Note: Weight of adjust - (g)

PTC/MS-07-02; 2 Feb. 2020

Represent to Certificate of Calibration :PTC/07/22072

Certificate No.: PTC/07/22072

Page: 3 of 3

Measurement Results:

Without Adjustment :

Function Calibration: Non Adjustment

Eccentric Error: Weight to be 1/3 ,1/2 or of Maximum capacity



Eccentricity test 30 (g)				
Position (g)				
1	2	3	4	5
0.00000	-0.00001	-0.00002	0.00000	0.00000
Maximum deviation: 0.00002				

Repeatability Test : Weight to be 1/2 $\leq L_1 \leq$ Maximum capacity

Determination of the standard deviation of weighing balance., Readability 0.00001 (g)

Nominal test value (g)	Standard Deviation
20	0.000006

Error of Indication : from nominal value., Readability 0.00001 (g)

Nominal Value (g)	Conventional Mass (g)	Indication (g)	Correction of Balance (g)	Uncertainty (g)	k
0	0.000000	0.00000	0.00000	0.000016	2.52
0.1	0.100000	0.10000	0.00000	0.000019	2.00
0.5	0.499999	0.50000	0.00000	0.000019	2.00
2	2.000010	1.99999	0.00002	0.000024	2.00
5	5.000005	5.00001	0.00000	0.000027	2.00
10	10.000015	10.00001	0.00000	0.000031	2.00
20	20.000019	20.00001	0.00001	0.000042	2.00
30	30.000034	30.00006	-0.00003	0.000069	2.00

Note: Weight of adjust - (g)

The End of Certificate

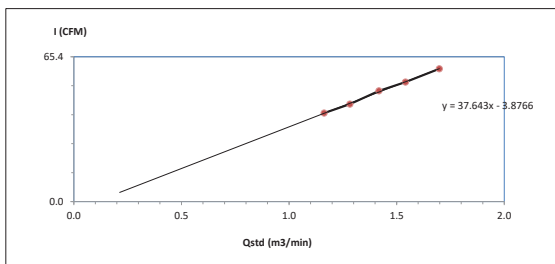
PTC/MS-07-02; 2 Feb. 2020



High Volume Air Sampler Calibration Worksheet

Project Site :	Magotteaux Co., Ltd.	Barometric Pressure (mm Hg) :	756
Calibrate Location :	วัดบางเขน (A1)	Temperature (°C) :	32
Calibrate Date :	12-Jan-23	High Volume ID :	BKK FS0370
CalibrationSheet No.:	C-120123-BKK FS0370	High Volume Model :	TE-5009X
Calibrator ID:	BKK FS0624	High Volume S/N :	4798
Calibrator Model :	TE-5028A	Calibrator Slope :	1.64942
Calibrator S/N :	2584	Calibrator Intercept :	-0.02902

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	3.6	1.1631	40	Slope : 37.6431 Intercept : -3.8766 Correlation Coefficient : 0.9991
2	4.4	1.2828	44	
3	5.4	1.4179	50	
4	6.4	1.5411	54	
5	7.8	1.6983	60	



Calibrated by :
(Mr. Thananat Anake)
Field Scientist(2)

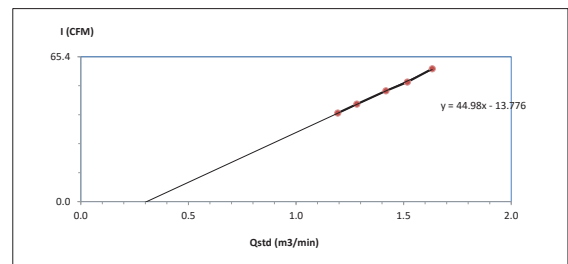
Approved by :
(Mr. Noppong Juntarupan)
Enviro Field Coordinator Scientist (3)



High Volume Air Sampler Calibration Worksheet

Project Site :	Magotteaux Co., Ltd.	Barometric Pressure (mm Hg) :	756
Calibrate Location :	วัดบางเขน (A2)	Temperature (°C) :	32
Calibrate Date :	12-Jan-23	High Volume ID :	BKK FS0368
CalibrationSheet No.:	C-120123-BKK FS0368	High Volume Model :	TE-5009X
Calibrator ID:	BKK FS0624	High Volume S/N :	4165
Calibrator Model :	TE-5028A	Calibrator Slope :	1.64942
Calibrator S/N :	2584	Calibrator Intercept :	-0.02902

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	3.8	1.1941	40	Slope : 44.9799 Intercept : -13.7757 Correlation Coefficient : 0.9993
2	4.4	1.2828	44	
3	5.4	1.4179	50	
4	6.2	1.5173	54	
5	7.2	1.6328	60	



Calibrated by :
(Mr. Thananat Anake)
Field Scientist(2)

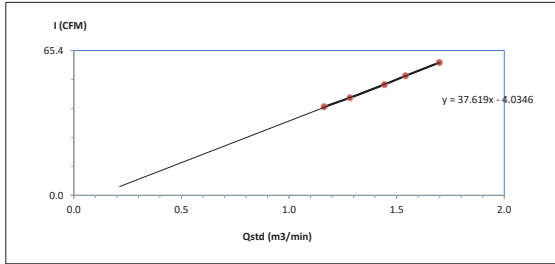
Approved by :
(Mr. Noppong Juntarupan)
Enviro Field Coordinator Scientist (3)



High Volume Air Sampler Calibration Worksheet

Project Site : Magotteaux Co., Ltd. Barometric Pressure (mm Hg) : 756
 Calibrate Location : โรงงานถ่านหิน (A3) Temperature (°C) : 32
 Calibrate Date : 12-Jan-23 High Volume ID : BKK_FS0367
 Calibration Sheet No. : C-120123-BKK_FS0367 High Volume Model : TE-5009X
 Calibrator ID : BKK_FS0624 High Volume S/N : 4162
 Calibrator Model : TE-5028A Calibrator Slope : 1.64942
 Calibrator S/N : 2584 Calibrator Intercept : -0.02902

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	3.6	1.1631	40	Slope : 37.6193 Intercept : -4.0346 Correlation Coefficient : 0.9996
2	4.4	1.2828	44	
3	5.6	1.4434	50	
4	6.4	1.5411	54	
5	7.8	1.6983	60	



Calibrated by :
 (Mr. Thananat Anake)
 Field Scientist (2)

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

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

Certificate of System Qualification

ES-OQ

System ID : MY16010005
 Organization Name : ALS Laboratory Group (Thailand) Co., Ltd.
 Organization Location : 104 Phatthanakarn 40 Phatthanakarn Rd., Bangkok 10250

Date : September 13, 2021 5:48:11 PM
 EQP Name : Agilent/Recommended
 EQP Revision : ES.02.50
 Overall Qualification Status : Pass

Preparation

Pass

Instrument Tests

Pass

Autosampler Operation

Pass



Date : September 13, 2021 5:49:11 PM
 System ID : MY16010005

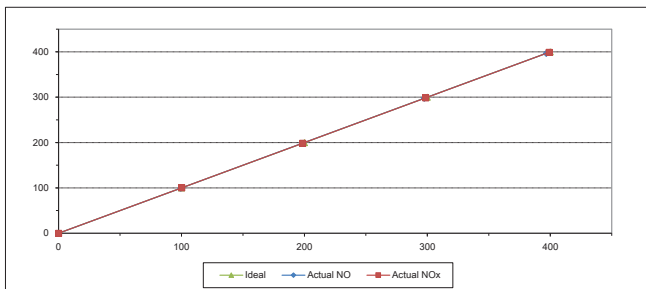
Page 1/5



MULTIPOINT CALIBRATION REPORT

Calibration Date : 5-Jan-23 Equipment Name : NOx Analyzer
 Manufacturer : HORIBA Model : APNA-370
 Serial No. : R0A0GWJC Equipment ID : BKK_FS0794
 Calibrator Manufacturer : Teledyne API Model : 700
 Serial No. : 947
 Std. Gas Concentration (PPM) : 55.88 Cylinder No. : GN0027222
 Cylinder Pressure (psi) : 1800 Certified By : Airgas Inc.
 Certified Date : 9-Feb-22 Expired Date : 9-Feb-30

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	99.40	-0.60	-0.60	100.20	0.20	0.20
2	200.00	198.20	-1.80	-0.90	198.60	-1.40	-0.70
3	300.00	297.50	-2.50	-0.83	298.70	-1.30	-0.43
4	400.00	396.70	-3.30	-0.83	399.10	-0.90	-0.22
AVERAGE (%)				-0.61			-0.21



Calibrated By

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

Approved By

(Mr. Sarayuth Jitranont)
 Assistant General Manager

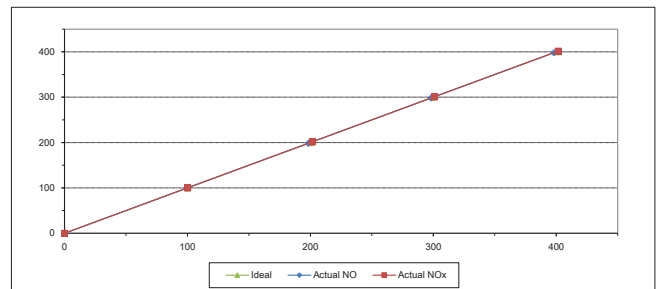
FORM NO.: F 06-056 REVISION NO.: - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date : 5-Jan-23 Equipment Name : NOx Analyzer
 Manufacturer : HORIBA Model : APNA-370
 Serial No. : 30K18RHM Equipment ID : BKK_FS1086
 Calibrator Manufacturer : Teledyne API Model : 700
 Serial No. : 947
 Std. Gas Concentration (PPM) : 55.88 Cylinder No. : GN0027222
 Cylinder Pressure (psi) : 1800 Certified By : Airgas Inc.
 Certified Date : 9-Feb-22 Expired Date : 9-Feb-30

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.05	0.05	0.05	0.10	0.10	0.10
1	100.00	99.50	-0.50	-0.50	100.20	0.20	0.20
2	200.00	198.30	-1.70	-0.85	201.60	1.60	0.80
3	300.00	298.10	-1.90	-0.63	301.10	1.10	0.37
4	400.00	398.20	-1.80	-0.45	401.60	1.60	0.40
AVERAGE (%)				-0.48			0.37



Calibrated By

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

Approved By

(Mr. Sarayuth Jitranont)
 Assistant General Manager

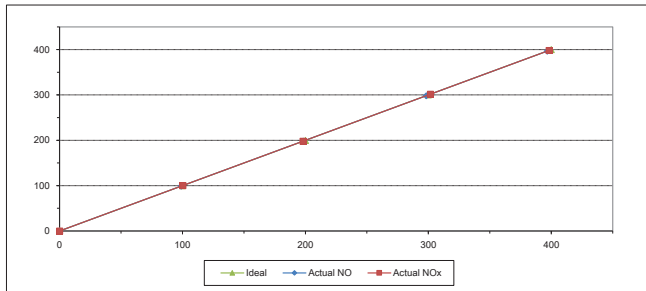
FORM NO.: F 06-056 REVISION NO.: - ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	5-Jan-23	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	PX13CWA0	Equipment ID	BKK_FS1088
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	55.88	Cylinder No.	GN0027222
Cylinder Pressure (psi)	1800	Certified By	Airgas Inc.
Certified Date	9-Feb-22	Expired Date	9-Feb-30

Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	99.00	-1.00	-1.00	100.30	0.30	0.30
2	200.00	198.30	-1.70	-0.85	198.10	-1.90	-0.95
3	300.00	298.40	-1.60	-0.53	301.70	1.70	0.57
4	400.00	396.70	-3.30	-0.83	398.30	-1.70	-0.42
AVERAGE (%)				-0.62			-0.08



Calibrated By

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

Approved By

(Mr. Sarayuth Jitranont)
Assistant General Manager

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



JIRANATEE ASSOCIATES CO., LTD.

Jirantee Associates Co., Ltd.
63/4-55, 5/75-35
Pochaisarn 2/71, Rd. Wachana, Bangkok,
Bangkok 10002(Thailand)
Tel: +662-000012
Mobile: +662-000012
E-mail: jirantee@jirantee.com
Web site: www.jirantee.com

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

Air speed measurement laboratory
Calibration services department.

REVIEW BY	Manakorn P.
APPROVED BY	26/10
NEXT CAL. DATE	9/3/24

Certificate Number

CL-003-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

Cup anemometer

Novallux

Sensor: WS-02F

Data logger: 110-WS-250L-D

Sensor: WSD-002

Data logger: AS443

BKK FS0975

Used item

ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan Rd, Phatthanakan Rd, Khwaeng Suan Luang,

Khet Suan Luang, Bangkok 10250 Thailand.

Calibration procedure:

The cup anemometer was calibrated against Standard air velocity transducer model: 8455-12 and pitot tube with precision differential pressure meter model: DP4250 in an open test section of Effel-type wind tunnel with 900 cm² cross test section area. The WS-02F based on IEC 61400-12-1, Wind energy generation systems - Part 12-1: Power performance measurements of electricity producing wind turbines, March 2017 was used as a calibration guideline.

Traceability:

This certificate provides a traceability of the measurement to recognized the national standards, and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: NMW-003-21 and NMW-006-22

Uncertainty of Measurement:

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

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

28 Dec 2022

05 Jan 2023

09 Jan 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature: 23.0 ± 0.0 °C

Relative Humidity: 55.0 ± 15.0 %RH

Atmospheric Pressure: 1010.6 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITIONS

Wind tunnel cross-section area¹ 900 cm²

Win direction frontal area² 100 cm²

Diameter of mounting pipe³ - mm

Blockage ratio of test object⁴ 0.143 [-]

Preconditioning

Measurement Condition

24 hours at ambient conditions.

The average values during measurement are (23.0) °C, (45.8) %RH and (1010.6) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

(Mr. Jirawat Sakam)

(Mr. Sarayuth Jitranont)



Approved signature:

26/10

Mr. Panyee Booncharoen

Calibration Department Manager

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



JIRANATEE ASSOCIATES CO., LTD.

Jirantee Associates Co., Ltd.
63/4-55, 5/75-35
Pochaisarn 2/71, Rd. Wachana, Bangkok,
Bangkok 10002(Thailand)
Tel: +662-000012
Mobile: +662-000012
E-mail: jirantee@jirantee.com
Web site: www.jirantee.com

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

Air speed measurement laboratory
Calibration services department.

Certificate Number

CL-003-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

Wind Direction Sensor

Novallux

Sensor: WS-02F

Data logger: 110-WS-250L-D

Sensor: WSD-002

Data logger: AS443

BKK FS0975

Used item

ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan Rd, Phatthanakan Rd, Khwaeng Suan Luang,

Khet Suan Luang, Bangkok 10250 Thailand.

Calibration procedure:

The wind direction sensor was calibrated against Standard Rotary Encoder model: AX0001FS-DM04-P3-S-00 in an open test section of Effel-type wind tunnel with 900 cm² cross test section area. The WS-02F based on IEC 61400-12-1, Wind energy generation systems - Part 12-1: Power performance measurements of electricity producing wind turbines, March 2017 was used as a calibration guideline.

Traceability:

This certificate provides a traceability of the measurement to recognized the national standards, and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: NMW-003-21 and NMW-006-22

Uncertainty of Measurement:

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

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

28 Dec 2022

06 Jan 2023

09 Jan 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature: 23.0 ± 0.0 °C

Relative Humidity: 55.0 ± 15.0 %RH

Atmospheric Pressure: 1010.6 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITION

Wind tunnel cross-section area¹ 900 cm²

Win direction frontal area² 129 cm²

Diameter of mounting pipe³ - mm

Blockage ratio of test object⁴ 0.143 [-]

Preconditioning

Measurement Condition

24 hours at ambient conditions.

The average values during measurement are (24.0) °C, (53.7) %RH and (1015.2) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

(Mr. Jirawat Sakam)

(Mr. Sarayuth Jitranont)



Approved signature:

26/10

Mr. Panyee Booncharoen

Calibration Department Manager

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

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The cup anemometer, Unit Under Calibration (UUC) was exercise at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 300 mm respectively away from wind tunnel nozzle. UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below:

v_{ref} (m/s)	Temp. wind tunnel °C	Temp. room °C	v_{ref} ² (m/s)	Error (m/s)	U (k=2) (m/s)
0.989	23.96	23.80	0.9	-0.1	0.19
2.035	23.72	23.80	1.9	-0.2	0.16
3.058	23.98	23.80	3.0	-0.1	0.32
4.139	23.86	23.80	4.0	-0.1	0.20
5.01	23.90	23.80	5.0	0.0	0.20
6.01	23.98	23.80	6.0	0.0	0.19
7.06	23.80	23.80	7.0	-0.1	0.22
8.17	23.84	23.80	8.2	0.0	0.24
9.10	23.90	23.80	9.2	0.1	0.32
10.09	23.90	23.80	10.0	-0.1	0.37
11.14	23.90	23.80	11.1	0.0	0.23
12.14	24.00	23.80	12.1	0.0	0.34
13.20	23.90	23.80	13.2	0.0	0.32
14.27	23.90	23.80	14.2	0.0	0.35
15.25	23.92	23.80	15.2	0.0	0.34
16.30	23.92	23.80	16.3	0.0	0.29

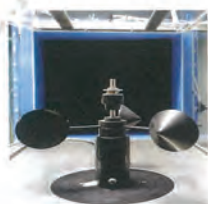
Remark:

¹ Calibration results only exist for the stated circumstances and environmental conditions during which calibration took place

² Velocity of standard

³ Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



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



Certificate Number
CL-003-66

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

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

Air speed m/s	D ₁₀₀ Degree (°)	D ₁₀₀ Degree (°)	Error Degree (°)	U (k=2) Degree (°)
5.00	0.000	0	0	0.58
	45.000	42	-3	0.76
	90.000	89	-2	0.68
	135.000	133	-2	0.74
	180.001	181	1	0.74
	225.000	227	2	0.74
	270.000	273	3	0.74
	315.000	318	3	0.74

Remark:

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

² Direction of standard

³ Direction of Unit Under Calibration



End of Certificate of Calibration

J NAC
JIRANATEE ASSOCIATES CO., LTD.
Jiranatee Associates Co., Ltd.
43/14-15, 47/70-36
Petchburi 237, 43 Wattana, Bangkok, Thailand 10600 (Thailand)
Tel: +66(0)8608012
Mobile: +66(0)8399463
E-mail: jnac-calibration@jiranatee.com
Web site: www.jiranatee.com

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

Pressure measurement laboratory
Calibration services department.



CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

Certificate No. : CL-001-66

MEASUREMENT ITEM : Digital barometer
MANUFACTURER : Novalynx
MODEL/TYPE : 110-WS-25BP
SERIAL NUMBER : AS443
ID NUMBER : BKK_F50975
CONDITION AS RECEIVED : Used item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.
104 Phattanakarn 40, Phattanakarn Rd,
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.

RECEIVED DATE : 28 Dec 2022
MEASUREMENT DATE : 06 Jan 2023
ISSUE DATE : 09 Jan 2023

Calibration procedure:

The pressure calibration was done by in-house calibration method as WI-CL-003 according to comparison method with Digital pressure calibrator based on OXO-R-6-1

Traceability:

The measurement results are traceable to the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) which complies with the requirements of ISO/IEC 17025:2017, ANSI/NCSL Z540-1 via Certificate number: MP-0205-22

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

CONDITION OF THIS RESULT OF CALIBRATION:

1. Reference Standard Instrument:

Instrument	Model	Serial No.	Certificate No.	Due Date
Absolute Pressure Transducer	CPG2500	4100126P	MP-0205-22	02 Dec 2023

2. The UUC² was installed in vertical orientation above reference standard instrument and center of UUC² was used as the reference level.

3. Calibration conditions:

4. Condition	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal
Pressure transmitting medium	: Air
p ₀ (20°C, 1 bar)	: 1.19 kg/m ³
H _{rel}	: (15815) %
T _{amb}	: (23.18) °C
p _{ref}	: (1010110) mbar

5. The certificate is valid only to the item calibrated on date and place of calibration

Calibrated by:
[Signature] Mr. Soravit Thachulad
[Signature] Miss Jitraporn Lertsomphol



Approved signatory: [Signature]
Mr. Panyia Booncharoen
Calibration Department Manager

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

J NAC
JIRANATEE ASSOCIATES CO., LTD.
Jiranatee Associates Co., Ltd.
43/14-15, 47/70-36
Petchburi 237, 43 Wattana, Bangkok, Thailand 10600 (Thailand)
Tel: +66(0)8608012
Mobile: +66(0)8399463
E-mail: jnac-calibration@jiranatee.com
Web site: www.jiranatee.com

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

Pressure measurement laboratory
Calibration services department.



CERTIFICATE OF CALIBRATION

Certificate No. : CL-001-66

Page 2 of 2 Pages

MEASUREMENT RESULTS : ☒ Without adjustment ☐ With adjustment

CALIBRATION IN THE RANGE OF : 950 – 1050 mbar

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

STD (mbar)	UUC ¹ (mbar)	Error (mbar)	Uncertainty (k=2) (mbar)
950.16	950.9	0.7	0.93
970.12	970.6	0.5	0.77
990.09	990.4	0.3	0.53
1010.10	1010.1	0.0	0.37
1030.11	1029.8	-0.3	0.48
1050.12	1049.7	-0.4	0.61

Note: UUC¹ Unit Under Calibration

¹ To convert the result in report unit to Pa should be multiply by 100



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ISO/IEC 17025:2017
NSC-TISI-TIS 17025
CALIBRATION 0367

Air speed measurement laboratory
Calibration services department.



Certificate Number

CL-015-65

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM : Cup anemometer
MANUFACTURER : Novalynx
MODEL/TYPE : Sensor: WS-02F
Data logger: 110-WS-25DL-D
Sensor: WS0-005
SERIAL NUMBER : Data logger: AS447
ID NUMBER : SKR_F50939
CONDITION AS RECEIVED : Used item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.
104 Phattanakarn 40, Phattanakarn Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE : 07 Dec 2022
MEASUREMENT DATE : 10 Dec 2022
ISSUE DATE : 12 Dec 2022

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:	
Temperature	: 23.0 ± 0.0 °C
Relative Humidity	: 55.0 ± 15.0 %RH
Atmospheric Pressure	: 1009.8 hPa

PLACE OF CALIBRATION

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

CALIBRATION CONDITIONS	
Wind tunnel cross-section area	: 900 cm ²
Win direction frontal area	: 100 cm ²
Diameter of mounting pipe	: mm
Blockage ratio of test object ¹	: 0.11 [-]

Preconditioning : 24 hours at ambient conditions.
Measurement Condition : The average values during measurement are (24.1) °C, (47.2) %RH and (1009.8) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:
[Signature] Mr. Soravit Thachulad
[Signature] Miss Jitraporn Lertsomphol



Approved signatory: [Signature]
Mr. Panyia Booncharoen
Calibration Department Manager

Remark:

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

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Certificate Number

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Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The cup anemometer, Unit Under Calibration (UUC) was exercised at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 300 mm respectively away from wind tunnel nozzle. UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

V_{std} [m/s]	Temp. wind tunnel [°C]	Temp. room [°C]	V_{uuc} [m/s]	Error [m/s]	U (k=2) [m/s]
0.985	23.54	24.05	0.8	-0.2	0.14
2.050	24.10	24.05	1.9	-0.2	0.16
3.026	23.92	24.05	2.9	-0.1	0.17
4.234	24.20	24.05	3.9	-0.3	0.20
5.03	23.80	24.05	4.9	-0.1	0.19
6.02	24.10	24.05	5.9	-0.1	0.18
7.07	23.76	24.05	6.9	-0.2	0.17
8.18	23.76	24.05	8.1	-0.1	0.19
9.11	23.86	24.05	8.9	-0.2	0.19
10.09	23.78	24.05	10.0	-0.1	0.22
11.16	23.90	24.05	10.8	-0.3	0.21
12.13	23.76	24.05	12.1	0.0	0.20
13.20	23.90	24.05	13.0	-0.2	0.25
14.26	23.88	24.05	14.0	-0.2	0.30
15.25	24.00	24.05	14.9	-0.3	0.28
16.31	24.00	24.05	16.0	-0.3	0.26

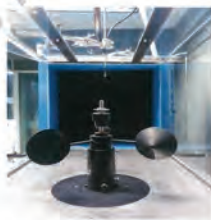
Remark:

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

² Velocity of standard.

³ Velocity of Unit Under Calibration.

PHOTO OF CALIBRATION SET-UP



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

End of Certificate of Calibration



JIRANATEE ASSOCIATES CO., LTD.

Jiranatee Associates Co., Ltd.
63/14-15, 67/35-36
Petchkasem 7/7, Rd. Wattana, Bangkok,
Bangkok 10601 (Thailand)
Tel: +66(0)880812
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E-mail: jnac-calibration@jiranatee.com
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ISO/IEC 17025:2017
NSC-TIS-TIS 17025
CALIBRATION 0367

Air speed measurement laboratory
Calibration services department.

Certificate Number

CL-016-65

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

: Wind Direction Sensor

MANUFACTURER

: Novallux

MODEL/TYPE

: Sensor: WS-02F

: Data logger: 110-WS-250K-D

SERIAL NUMBER

: Sensor: WSD-005

: Data logger: AS447

ID NUMBER

: SGK_F50039

CONDITION AS-RECEIVED

: Used item

CUSTOMER

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

RECEIVED DATE

: 07 Dec 2022

MEASUREMENT DATE

: 12 Dec 2022

ISSUE DATE

: 12 Dec 2022

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

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

PLACE OF CALIBRATION

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

CALIBRATION CONDITION

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

Preconditioning

: 24 hours at ambient conditions.

Measurement Condition

: The average values during measurement are (24.0)°C, (50.1) %RH and (1011.8) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

☒ Mr. Sorawit Thachalad
☐ Miss Jitragorn Lertsomphol



Approved signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

Remark:

¹ Nozzle cross-section area of the wind tunnel
² Projected cross-section area of the tested object include mounting pipe
³ Diameter of mounting pipe
⁴ Ratio A_0/A_1

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Certificate Number

CL-016-65

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

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

Air speed m/s	D^{+45} Degree (°)	D^{-45} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
5.02	0.001	0	0	0.58
	45.000	41	-4	0.74
	90.001	87	-3	0.68
	135.000	133	-2	0.74
	180.001	181	1	0.68
	225.000	229	4	0.76
	270.001	275	5	0.74
	315.000	320	5	0.74

Remark:

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

² Direction of standard

³ Direction of Unit Under Calibration

End of Certificate of Calibration



JIRANATEE ASSOCIATES CO., LTD.

Jiranatee Associates Co., Ltd.
63/14-15, 67/35-36
Petchkasem 7/7, Rd. Wattana, Bangkok,
Bangkok 10601 (Thailand)
Tel: +66(0)880812
Mobile: +66(0)83999453
E-mail: jnac-calibration@jiranatee.com
Web site: www.jiranatee.com

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

Pressure measurement laboratory
Calibration services department.



CERTIFICATE OF CALIBRATION

Certificate No. : CL-019-65

Page 1 of 2 Pages

MEASUREMENT ITEM

: Digital barometer

MANUFACTURER

: Novallux

MODEL/TYPE

: 110-WS-25BP

SERIAL NUMBER

: AS447

ID NUMBER

: SGK_F50039

CONDITION AS-RECEIVED

: Used item

CUSTOMER

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

RECEIVED DATE

: 07 Dec 2022

MEASUREMENT DATE

: 10 Dec 2022

ISSUE DATE

: 12 Dec 2022

Calibration procedure:

The pressure calibration was done by in-house calibration method as WS-CL-003 according to comparison method with Digital pressure calibrator based on DKD-R 6-1

Traceability:

The measurement results are traceable to the international system of units (SI) through MENSOR which complies with the requirements of ISO/IEC 17025:2017. ANSI/NCSL Z540-1 via Certificate number: 201479

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

CONDITION OF THIS RESULT OF CALIBRATION:

1. Reference Standard Instrument:

Instrument	Model	Serial No.	Certificate No.	Due Date
Absolute Pressure Transducer	CPG2500	41003BL1	201479	13 Sep 2022

2. Calibration effort for calibration sequence A

3. The UUC* was installed in vertical orientation above reference standard instrument and center of UUC* was used as the reference level.

4. Calibration conditions:

4. Condition
Pressure transmitting medium : ☒ Normal ☐ Abnormal
: Air
 ρ [20°C, 1 bar] : 1.19 kg/m^3
 H_{amb} : $(55 \pm 15) \text{ m}$
 t_{amb} : $(23 \pm 3) \text{ °C}$
 p_{amb} : $(1010 \pm 10) \text{ mbar}$

5. The certificate is valid only to the item calibrated on date and place of calibration

Calibrated by:

☒ Mr. Sorawit Thachalad
☐ Miss Jitragorn Lertsomphol



Approved signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

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CERTIFICATE OF CALIBRATION

Certificate No. : CL-019-65

Page 2 of 2 Pages

MEASUREMENT RESULTS : ☒ Without adjustment ☐ With adjustment
CALIBRATION IN THE RANGE OF : 950 – 1050 mbar

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

STD (mbar)	UUC* (mbar)	Error (mbar)	Uncertainty (k=2) (mbar)
950.00	950.4	0.4	0.61
970.00	970.2	0.2	0.48
990.00	990.0	0.0	0.37
1010.00	1009.7	-0.3	0.52
1030.00	1029.5	-0.5	0.66
1050.00	1049.2	-0.8	0.95

Note: UUC* Unit Under Calibration

: To convert the result in report unit to Pa should be multiply by 100

End of certificate



CERTIFICATE OF CALIBRATION

Certificate No: WS-04012022
Page: 1 of 2 pages

Measurement Item : Cup anemometer with data logger.

Manufacturer : Data logger: Novolynx
Cup anemometer: Novolynx

Model/Type : Data logger: 110-WS-250L-D
Cup anemometer: WS-029

Serial Number : Data logger: AS444
Cup anemometer: WSD-033

ID No : Data logger: RYD_F30435
Cup anemometer: -

Customer : ALS laboratory group (Thailand) co., Ltd.
104 Phathanakan 40, Phathanakan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

Test Conditions : Wind tunnel cross test section area : 900 cm²
Anemometer frontal area : 100 cm²
Diameter of mounting pipe : - mm
Blockage ratio of test object : 0.111 { }

Test Conditions : Air temperature : 24.4 ±0.8 °C
Air pressure : 1011.2 ±0.4 hPa
Relative air humidity : 55.6 ±3.6 %RH

Calibration Procedure : Calibration was carried out based on:
ISO: 51400-12-1 ED1: 2005-Power Performance Measurements of Electricity Producing Wind Turbines;
MDS&NET Anemometer Calibration Procedure - Version 2: 2009.

Traceability : This calibration documents the traceable to national standard, which realizes the unit of measurements according to the International system of units (SI) through National Institute of Metrology Thailand (NIMT).

Measurement Date : JAN 26, 2022.
Issued Date : JAN 31, 2022.

Calibrated by
☒ Mr. Soravit Thachalad
☐ Miss Orathai Wivattayaya



Approved Signatory:
Mr. Parinya Boontharoen
Calibration Department Manager

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Continuation of Certificate of Calibration Number

Certificate No: WS-04012022
Page 2 of 2 Pages

Result of calibration: ☒ Without adjustment ☐ With adjustment

Calibration in the range of 1 – 16 m/s at a calibration interval of 1 m/s.

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

V _{IND} Reading m/s	V _{LAB} Reading m/s	Error (m/s)	Uncertainty (%)
2.070	2.0	-0.1	2.4
4.105	4.1	0.0	1.2
6.01	6.0	0.0	0.99
8.01	8.0	0.0	0.71
10.01	10.1	0.1	1.1
12.01	12.2	0.2	0.68
13.98	14.3	0.3	0.61
15.94	16.1	0.2	1.4
14.98	15.1	0.1	1.0
13.00	13.1	0.1	0.76
11.02	11.1	0.1	0.63
9.02	9.0	0.0	0.97
7.03	7.0	0.0	0.84
5.166	5.1	-0.1	1.2
2.995	3.0	0.0	1.6
1.029	0.9	-0.1	4.6

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%.

Appendix 1: Instrumentations

NO	Sensor	Manufacturer	Model/Type	Calibration Date	Certificate Report Number	Range
1	Pilot static	TESTO INC.	04352145	Aug 07, 2021	MW-0034-21	5 – 30 m/s
2	Precision Differential Pressure Meter	Zorglab	DM92500	Aug 07, 2021	MW-0034-21	5 – 30 m/s
3	Air velocity transducer (hot wire)	TSI INC.	8455-12	Aug 08, 2021	MW-0035-21	0 – 5 m/s
4	Temperature	Zorglab	DSR-T1P	March 30, 2021	CL-027-24	-30 – 70 °C
5	Relative humidity	Zorglab	DSR-T1P	March 30, 2021	RH403032021	0 – 100 %RH
6	Atmospheric pressure	Zorglab	DSR-T1P	March 30, 2021	BP61032021	500 – 1100 hPa
7	Wind tunnel	CS50M	MP3300	-	-	0 – 50 Hz

End of certificate of calibration



CERTIFICATE OF CALIBRATION

Certificate No: WD-04012022
Page: 1 of 2 pages

Measurement Item : Wind direction sensor with data logger.

Manufacturer : Data logger: Novolynx
Wind direction sensor: Novolynx

Model/Type : Data logger: 110-WS-250L-D
Wind direction sensor: WS-029

Serial Number : Data logger: AS444
Wind direction sensor: WSD-003

ID No : Data logger: RYD_F30435
Wind direction sensor: -

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

Environmental Condition: The measurement was carried out in an ambient temperature of (23±3) °C, and relative humidity of (40±10) %.

Measurement Method:

The wind direction sensor calibration according to comparison method with reference angle measurement electronic theodolite and line laser is used for axis control. The measurement were taken at 45° intervals in clockwise and counterclockwise directions.

Note: The UUC was warmed up for 1 hour prior to the calibration being performed

Traceability:

The measurement results are traceable to the International system of units (SI) through Certificate No: G21086014, Certificate No: RWS64/0025.

Measurement Date : JAN 25, 2022.
Issued Date : JAN 31, 2022.

Performed by
☒ Mr. Soravit Thachalad
☐ Miss Orathai Wivattayaya



Approved Signatory:
Mr. Parinya Boontharoen
Calibration Department Manager

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Continuation of Certificate of Calibration Number

Certificate No: WD-04012022
Page 2 of 2 pages

Result of calibration: ☐ Without adjustment ☒ With adjustment.
Calibration in the range of 0 ~ 360 ° at a calibration interval of 45°.
The results of calibration and associated measurement uncertainties are reported in table below.

NO	Turning Direction	Nominal Angle (°)	Standard Reading (°)	UUC* Reading (°)	Error (°)	Uncertainty ±(°)
1	Clockwise	0/360	0	0	0	3.0
2		45	45	41	-4	3.0
3		90	90	87	-3	3.0
4		135	135	133	-2	3.0
5		180	180	180	0	3.0
6		225	225	227	2	3.0
7		270	270	272	2	3.0
8		315	315	317	2	3.0
9	Counter Clockwise	0/360	0	0	0	3.0
10		45	45	41	-4	3.0
11		90	90	87	-3	3.0
12		135	135	133	-2	3.0
13		180	180	180	0	3.0
14		225	225	227	2	3.0
15		270	270	272	2	3.0
16		315	315	317	2	3.0

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 of Calibration



CALIBRATION REPORT

Calibration No.: RH-04012022
Page 1 of 1 Pages

Measurement Item: Relative humidity with data logger.

Manufacturer: Data logger: Novasyns.
Relative humidity sensor: Novasyns.

Model/Type: Data logger: 110-WS-25DL-D
Relative humidity sensor: HUM60

Serial Number: Data logger: A5444
Relative humidity sensor: R1131112

ID No: Data logger: RYG_FSG435
Relative humidity sensor: -

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

Environmental Condition:

The measurement was carried out in an ambient temperature of (25±3)°C, and relative humidity of (50±15)%.

Measurement Method:

The Relative humidity with data logger, Unit Under Calibration (UUC) was calibrated by comparison method with the equilibrium of standard salt solution CH₃COOK: Potassium Acetate, Mg(NO₃)₂: Magnesium Nitrate, KCl: Potassium Chloride to determine the errors.

Measurement Date: JAN 24, 2022
Issued Date: JAN 25, 2022

Measurement Results:

The results of calibration are reported in table below.

Standard salt solution	Standard (RH%)	UUC _{measured}	Error
CH ₃ COOK: Potassium Acetate	22.51	22.3	-0.2
Mg(NO ₃) ₂ : Magnesium Nitrate	52.89	52.5	-0.4
KCl: Potassium Chloride	84.34	84.1	-0.2

Performed by
☐ Mr. Sorawit Thachalad
☒ Miss Orathai Wivattayaya



Approved Signatory:

Mr. Parinya Booncharoen,
Calibration Department Manager

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CALIBRATION REPORT

Calibration Number: : RH-04012022
Page 1 of 2 Pages

Measurement Item: Rain gauge with data logger.

Manufacturer: Data logger: Novasyns.
Rain gauge: Novasyns.

Model/Type: Data logger: 110-WS-25DL-D
Rain gauge: 110-WS-25P0

Serial Number: Data logger: A5444
Rain gauge: RG-003

ID NO: RYG_FSG435

Customer: ALS laboratory group (Thailand) co., Ltd.
104 Phatthanasan 40, Phatthanasan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250, Thailand.

Environmental Condition:

The measurement was carried out in an ambient temperature of (25±3)°C, and relative humidity of (50±15)%.

Measurement Method:

The Rain gauge, Unit Under Calibration (UUC) was calibrated by Precision reference bottle with flow adjuster at low rate 0.6 ml per minute or 1 tipping every 20 seconds. The tipping number was determined by procedures below.

- Obtain rain gauge inlet area.
Rain gauge precise diameter in cm = Diameter/2 = R (radius)
Rain gauge area= $\pi R^2 \times 1.14$ (UUC diameter=20.3 cm, UUC radius=10.15 cm)
Rain gauge area= 323.6 cm².
- Obtain theoretical correct rain gauge answer (number of tipping) using 323.6 cm² inlet area and 0.5 L of rain.
a) 10,000 cm³ / 323.6 cm² inlet area = 30.90 (rain gauge area = 1/30.90 of square meter)
b) 30.90 * 0.5 L volume=15.45 mm (mm of rain over 1 m² surface) 500 ml of rain volume on the rain gauge area = 15.45 mm of rain.
c) Number of tipping=15.45 / 0.25 mm= 62 tipplings.

Note: Rain gauge is fully cleaned and leveling prior the calibration performed.

Measurement Date: JAN 28, 2022
Issued Date: JAN 31, 2022

Performed by
☒ Mr. Sorawit Thachalad
☐ Miss Orathai Wivattayaya



Approved Signatory:

Mr. Parinya Booncharoen,
Calibration Department Manager

Continuation of Calibration of Calibration Number:

Calibration Number: RH-04012022
Page 2 of 2 Pages

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment.
The results of calibration are reported in table below:

Quantity of H ₂ O (ml)	Determined Tipping	Tipping count	Acceptable Tipping count
500	62	64	60 - 64
500	62	63	60 - 64
500	62	62	60 - 64
500	62	63	60 - 64
500	62	62	60 - 64

Remark: The procedure is made to verify the correct reading of the Unit under Calibration rain gauge when a precise volume of water falls into its cone. We suggest that the number of tipping should be within ±2% different from the 62 tipping (correct range: 60-64 tipping) it means that the rain gauge meets the manufacturer acceptable limit.

End of calibration report



CERTIFICATE OF CALIBRATION

Certificate No. : CL-005-65

Page 1 of 2 Pages

MEASUREMENT ITEM : Digital barometer
MANUFACTURER : Novalynx
MODEL/TYPE : 110-WS-25BP
SERIAL NUMBER : A5444
ID NUMBER : RYG_FS0435
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.
Khwaeng Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand.
RECEIVED DATE : 12 Jan 2022
MEASUREMENT DATE : 29 Jan 2022
ISSUE DATE : 31 Jan 2022

Calibration procedure:
The pressure calibration was done by in-house calibration method as WI-CL-003 according to comparison method with Digital pressure calibrator based on DKD-R 6-3

Traceability:
The measurement results are traceable to the international system of units (SI) through MENSOR which complies with the requirements of ISO/IEC 17025:2017, ANSI/NCSL 2540-1 via Certificate number: 201479

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

CONDITION OF THIS RESULT OF CALIBRATION:

1. Reference Standard Instrument:

Instrument	Model	Serial No.	Certificate No.	Due Date
Absolute Pressure Transducer	CPG2500	4100181	201479	13 Sep 2022

2. The UUC* was installed in vertical orientation above reference standard instrument and center of UUC* was used as the reference level.

3. Calibration conditions:

Pressure transmitting medium : Air
 $\rho_{air}(20^{\circ}\text{C}, 1\text{bar})$: 1.19 kg/m³
 Δh : -0.080 m
 T_{amb} : (23±2) °C
 P_{amb} : 1009.5 mbar

4. The certificate is valid only to the item calibrated on date and place of calibration.

Calibrated by:

☒ Mr. Sorawit Thachalad
☐ Miss Orattai Wiwatwittaya



Approved signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

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

MEASUREMENT RESULTS : ☒ Without adjustment ☐ With adjustment

CALIBRATION IN THE RANGE OF : 950 – 1050 mbar

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

STD (mbar)	UUC* (mbar)	Error (mbar)	Uncertainty(k=2) (mbar)
950.32	951.181	0.856	1.3
970.14	970.682	0.538	0.70
990.05	990.524	0.470	0.58
1009.95	1010.105	0.157	0.34
1029.84	1029.946	0.107	0.25
1049.78	1049.594	-0.190	0.35

Note: UUC* Unit Under Calibration

End of certificate



CERTIFICATE OF CALIBRATION

Certificate No.: CL-004-65
Page 1 of 2

Equipment Name: Data Logger with Temperature Sensor
Manufacturer: Novalynx
Model: 110-WS-25DL-D
Serial No.: A5444
ID No.: RYG_FS0435

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

Received date: 12 Jan 2022
Calibration date: 24 Jan 2022
Issue date: 25 Jan 2022

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

Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Orattai Wiwatwittaya



Approved Signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

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

Certificate No.: CL-004-65
Page 2 of 2

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 – 40 °C

Function:

This equipment was connected with temperature sensor Model : HMP60 S/N : R1131114

Dimension : Diameter 12mm, Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.053	19.8	-0.3	0.099
60	25.005	24.5	-0.5	0.099
60	29.995	29.5	-0.5	0.099
60	34.976	34.4	-0.6	0.099
60	39.957	39.3	-0.7	0.099

UUC*: Unit Under Calibration

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





CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Calibration of Date : 3 Jan 23
Next Cal. Date : 3 Jul 23
Barometric Pressure (mmHg) : 759
Relative Humidity (%) : 58.0
Temperature (C°) : 27.0

Reference Dry Gas Meter Data

Reference Dry Gas Meter ID : BKK_FS0629
Serial No. : 1607009
Correction Factor (Y) : 1.0000
Next Calibration Date : 9 Dec 23

Console Control Meter Data

Calibration No. : C-030123-BKK_FS1093
Dry Gas Meter ID : BKK_FS1093
Serial No. : 1706090
Model No. : XC-572-V

ΔH (mm H ₂ O)	Θ Minutes	Reference Dry Gas Meter Calibration					Console Control : Drygas Meter							Dry Gas Meter Correction Factor (Y)	Orifice Calibration Factor (ΔW)	
		Vr (Litres)			Tr		Vm (Litres)			Ti		To				Avg Tr (°C)
		Final	Initial	Total	Final	Initial	Total	Final	Initial	Total	Final	Initial	Total			
15	12.40	150.00	0.00	150.00	34.0	32.0	302617.0	302468.0	149.00	32.0	32.0	32.0	0.9987	46.0355		
25	9.53	150.00	0.00	150.00	34.0	32.0	302773.0	302625.0	148.00	32.0	32.0	32.0	1.0045	47.2983		
50	6.73	150.00	0.00	150.00	33.0	32.0	303035.0	302786.0	149.00	32.0	32.0	32.0	0.9986	46.8591		
100	4.71	150.00	0.00	150.00	33.0	34.0	303365.0	303217.0	148.00	34.0	34.0	34.0	1.0071	45.6034		
150	3.82	150.00	0.00	150.00	33.0	34.0	303690.0	303550.0	149.00	35.0	34.0	34.5	0.9972	44.9960		
												Avg.	1.0012	46.5565		

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

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

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

Calibrated by:

Worawich

(Mr. Worawich Tongpoom)

Field Scientist(2)

Approved by:

Samart

(Mr. Samart Roo-ngan)

Field Specialist(1)

FORM NO.1 06-024 REVISION NO.2 ISSUE DATE: 30 Jan 22



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date :	3 Jan 23	Ambient Temperature (°C)	30
Calibration sheet No. :	C-030123-BKK_FS1093	Relative Humidity (%) :	62
Digital Temperature ID :	BKK_FS1093	Reference Temperature ID	BKK_FS1144
Serial No. :	1706090	Serial No. :	201090006013
Model :	XC-572-V	Model :	Digicon-CC-VT-MS
		Next Calibrate :	31 Jan 23

Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	± 3	Pass
	25	25	0	± 3	Pass
	50	50	0	± 3	Pass
	100	100	0	± 3	Pass
	150	150	0	± 3	Pass
	200	200	0	± 3	Pass
Probe	250	249	-1	± 3	Pass
	300	299	-1	± 3	Pass
	500	498	-2	± 3	Pass
	100	100	0	± 3	Pass
	120	120	0	± 3	Pass
	140	141	1	± 3	Pass
Oven	100	100	0	± 3	Pass
	120	120	0	± 3	Pass
Filter	140	141	1	± 3	Pass
	100	100	0	± 3	Pass
	120	120	0	± 3	Pass
	140	141	1	± 3	Pass
Exit	0	0	0	± 3	Pass
	10	10	0	± 3	Pass
Meter	20	20	0	± 3	Pass
	0	0	0	± 3	Pass
	25	25	0	± 3	Pass
	50	50	0	± 3	Pass
AUX	0	0	0	± 3	Pass
	25	25	0	± 3	Pass
	50	50	0	± 3	Pass

MPE : (Maximum permissible error of measurement) ค่าความผิดพลาดสูงสุดของการวัดอุณหภูมิ

Calibrated by :

(Mr. Prasert Surakhnan)

Field Scientist (3)

Approved by :

(Mr. Samart Roo-ngan)

Specialist (1)

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



Stopwatch Calibration Test Report

Calibration Date : 3 Jan 23
Barometric Pressure (mmHg) : 759
Relative Humidity (%) : 58.0

Next Cal. Date : 3 Jul 23
Temperature (°C) : 27.0

Reference Stopwatch Data

Stopwatch ID No. : E18061
Model : F808
Serial No. : -
Calibration Date : 8 Sep 20
Certificate No. : E-2009018

Console Control Meter Data

Dry Gas Meter No. : BKK_FS1093
Model : XC-572-V
Serial No. : 1706090

Run No.	Time Actual (m:ss.ms)	Time Reading (m:ss)	Diff. (ms)	Diff. (min)
1	5:00:11	5:00	11	0.00018
2	5:00:10	5:00	10	0.00017
3	5:00:11	5:00	11	0.00018
4	5:00:10	5:00	10	0.00017
5	5:00:12	5:00	12	0.00020
6	5:00:12	5:00	12	0.00020
7	5:00:10	5:00	10	0.00017
8	5:00:10	5:00	10	0.00017
9	5:00:08	5:00	8	0.00013
10	5:00:09	5:00	9	0.00015
Average				0.00017
SD				0.00002

Calibrate by :

Mr. Prasert Surakhnan

Field Scientist (3)

Approved by :

Mr. Samart Roo-ngan

Specialist (1)



Pitot Tube Calibration Data

Pitot Tube Identification Number : BKK_FS1104
Lab test duct Number : 258-1-13-01
Calibration Sheet No. : C-030123-BKK_FS1104

Calibration Date : 3 Jan 23
Standard Pitot ID : BKK_FS0441
Cp Standard : 0.99

Type S Pitot Tube Coefficient Data					
	Type s pitot tube Leg A,B	Standard pitot tube (ΔP , mm.H ₂ O)	Type s pitot tube (ΔP , mm.H ₂ O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 2	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 3	A	12.00	16.80	0.845	-
	B	12.00	16.80	-	0.845
			\bar{C}_p	0.842	0.842

$$C_{P(S)} = C_{P_{std}} \sqrt{\frac{\Delta P_{std}}{\Delta P_{(s)}}}$$

$$\left[C_{P(A)} - C_{P(B)} \right] \text{ must BE } \leq 0.01$$

$$\text{Average deviation(A or B)} = \frac{\sum_{i=1}^n [C_{P(s)} - C_{P(A \text{ or } B)}]}{3} \text{ must BE } \leq 0.01$$

Calibrated by :

(Mr. Worawich Tongpoom)

Field Scientist (2)

Approved by :

(Mr. Samart Roo-ngan)

Specialist (1)

FORM NO. : F 06-025 REVISION NO. : 1 ISSUE DATE : 30 Jan 22



Pitot Tube Calibration Data


Pitot Tube Identification Number : BKK_FS1105 Calibration Date : 3 Jan 23
Lab test duct Number : 258-1-13-01 Standard Pitot ID : BKK_FS0441
Calibration Sheet No. : C-030123-BKK_FS1105 Cp Standard : 0.99


Type S Pitot Tube Coefficient Data					
	Type s pitot tube Leg A,B	Standard pitot tube (ΔP , mm.H ₂ O)	Type s pitot tube (ΔP , mm.H ₂ O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	16.80	0.845	-
	B	12.00	16.80	-	0.845
Test 2	A	12.00	17.20	0.835	-
	B	12.00	17.20	-	0.835
Test 3	A	12.00	16.80	0.845	-
	B	12.00	16.80	-	0.845
\bar{C}_p				0.842	0.842

$$C_p(S) = C_{p,std} \sqrt{\frac{\Delta P(std)}{\Delta P(s)}}$$

$$\left[C_{p(A)} - C_{p(B)} \right] \text{ must BE } \leq 0.01$$

$$\text{Average deviation(A or B)} = \frac{\sum_{i=1}^3 [C_p(s) - C_p(A \text{ or } B)]}{3} \text{ must BE } \leq 0.01$$

Calibrated by : 
(Mr. Worawich Tongpoom)
Field Scientist (2)

Approved by : 
(Mr. Samart Roo-ngan)
Specialist (1)

FORM NO.: F 06-025 REVISION NO.: 1 ISSUE DATE: 30 Jan 22



PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

Calibration Date : 3 Jan 23 Nozzle Set ID. : BKK_FS1093
Calibration Sheet No. : C-030123-BKK_FS1106 Vernier Caliper ID. : RYG_FS0539

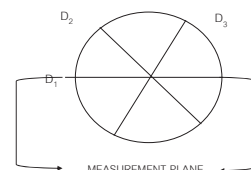
Nozzle ID #	Nozzle Diameter (cm.)			Hi - Lo ΔD	$(D_1 + D_2 + D_3) / 3$ D_{avg}
	D_1	D_2	D_3		
1	0.300	0.300	0.300	0.000	0.300
2	0.450	0.450	0.450	0.000	0.450
3	0.600	0.600	0.600	0.000	0.600
4	0.790	0.790	0.790	0.000	0.790
5	0.950	0.950	0.950	0.000	0.950
6	1.090	1.090	1.090	0.000	1.090
7	1.250	1.250	1.250	0.000	1.250
8	1.600	1.600	1.600	0.000	1.600


Where :


D_1, D_2, D_3 = There different nozzle diameters at 60 degrees to each other, each measured the nearest 0.025 mm.

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

D_{avg} = $(D_1 + D_2 + D_3) / 3$



Calibrated by : 
(Mr. Worawich Tongpoom)
Field Scientist (2)

Approved by : 
(Mr. Samart Roo-ngan)
Field Specialist (1)

FORM NO.: F 06-026 REVISION NO.: 1 ISSUE DATE: 9-1-62



CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Calibration of Date : 3 Jan 23 Barometric Pressure (mmHg) : 759
Next Cal. Date : 3 Jul 23 Relative Humidity (%) : 58.0
Temperature (C°) : 27.0
Reference Dry Gas Meter Data
Calibration No. : C-030123-BKK_FS0507
Dry Gas Meter ID : BKK_FS0629
Serial No. : 1607009
Correction Factor (Y) : 1.0000
Model No. : XC-572-V
Next Calibration Date : 9 Dec 23

ΔH (mm.H ₂ O)	Θ Minutes	Reference Dry Gas Meter Calibration				Console Control Dry Gas Meter						Dry Gas Meter Correction Factor (Y)	Orifice Calibration Factor
		Vr (Liters)		Tr (°C)	Vm (Liters)		Ti (°C)	To (°C)	Avg Tr (°C)				
		Final	Initial		Final	Initial							
15	12.25	150.00	0.00	150.00	30.0	910899.4	910747.0	152.40	33.0	33.0	0.9926	45.5175	
25	9.36	150.00	0.00	150.00	31.0	911111.8	910960.0	152.80	33.0	33.0	0.9927	44.5529	
50	6.56	150.00	0.00	150.00	32.0	911265.4	911117.0	152.40	34.0	34.0	0.9859	43.9430	
100	4.56	150.00	0.00	150.00	32.0	911479.2	911327.0	152.20	34.0	34.0	0.9825	42.4661	
150	3.76	150.00	0.00	150.00	32.0	911650.4	911498.0	151.40	34.0	34.0	0.9830	43.3091	
Avg.												0.9859	43.9637

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

ΔH_{avg} : Orifice pressure differential that equates to 21.24 in of air @ 25°C and 760 mm of mercury, mmH₂O : tolerance for individual value ± 5.08 from average.

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

Calibrated by :


(Mr. Worawich Tongpoom)
Field Scientist(2)

Approved by :


(Mr. Samart Roo-ngan)
Field Specialist(1)

FORM NO.: F 06-024 REVISION NO.: 2 ISSUE DATE: 30 Jan 22




DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date : 3 Jan 23 Ambient Temperature (°C) : 30
Calibration sheet No. : C-030123-BKK_FS0508 Relative Humidity (%) : 62
Digital Temperature ID : BKK_FS0508 Reference Temperature ID : BKK_FS1144
Serial No. : 1503017 Serial No. : 201090006013
Model : XC-572-V Model : Digicon-CC-VT-MS
Next Calibrate : 31 Jan 23

Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	± 3	Pass
	25	25	0	± 3	Pass
	50	51	1	± 3	Pass
	100	101	1	± 3	Pass
	150	151	1	± 3	Pass
	200	201	1	± 3	Pass
Probe	250	252	2	± 3	Pass
	300	302	2	± 3	Pass
	500	503	3	± 3	Pass
	100	101	1	± 3	Pass
	120	121	1	± 3	Pass
	140	141	1	± 3	Pass
Oven	100	100	0	± 3	Pass
	120	121	1	± 3	Pass
	140	141	1	± 3	Pass
Filter	100	100	0	± 3	Pass
	120	121	1	± 3	Pass
	140	142	2	± 3	Pass
Exit	0	1	1	± 3	Pass
	10	11	1	± 3	Pass
	20	21	1	± 3	Pass
Meter	0	0	0	± 3	Pass
	25	25	0	± 3	Pass
	50	50	0	± 3	Pass
AUX	0	0	0	± 3	Pass
	25	25	0	± 3	Pass
	50	50	0	± 3	Pass

MPE : (Maximum permissible error of measurement) ค่าความผิดพลาดสูงสุดของภาวที่ออกมาได้

Calibrated by : 
(Mr. Prasert Surakhian)
Field Scientist (3)

Approved by : 
(Mr. Samart Roo-ngan)
Specialist (1)

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



Stopwatch Calibration Test Report

Calibration Date : 3 Jan 23 Next Cal. Date : 3 Jul 23
Barometric Pressure (mmHg) : 759 Temperature (°C) : 27.0
Relative Humidity (%) : 58.0

Reference Stopwatch Data

Stopwatch ID No. : E18061
Model : F808
Serial No. : -
Calibration Date : 8 Sep 20
Certificate No. : E-2009018

Console Control Meter Data

Dry Gas Meter No. : BKK_FS0507
Model : XC-572-V
Serial No. : 1503017

Run No.	Time Actual (m:ss.ms)	Time Reading (m:ss)	Diff. (ms)	Diff. (min)
1	5:00:11	5:00	11	0.00018
2	5:00:12	5:00	12	0.00020
3	5:00:11	5:00	11	0.00018
4	5:00:09	5:00	9	0.00015
5	5:00:07	5:00	7	0.00012
6	5:00:11	5:00	11	0.00018
7	5:00:11	5:00	11	0.00018
8	5:00:09	5:00	9	0.00015
9	5:00:11	5:00	11	0.00018
10	5:00:12	5:00	12	0.00020
			Average	0.00017
			SD	0.00003

Calibrate by :

Mr. Prasert Surakhan

Field Scientist (3)

Approved by :

Mr. Samart Roo-ngan

Specialist (1)



Pitot Tube Calibration Data

Pitot Tube Identification Number : BKK_FS0511 Calibration Date : 3 Jan 23
Lab test duct Number : 258-1-13-01 Standard Pitot ID : BKK_FS0441
Calibration Sheet No. : C-030123-BKK_FS0511 Cp Standard : 0.99

Type S Pitot Tube Coefficient Data					
	Type s pitot tube Leg A,B	Standard pitot tube (ΔP , mm.H ₂ O)	Type s pitot tube (ΔP , mm.H ₂ O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 2	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 3	A	12.00	16.80	0.845	-
	B	12.00	16.80	-	0.845
\bar{C}_p				0.842	0.842

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

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

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

Calibrated by :

(Mr. Worawich Tongpoom)

Field Scientist (2)

Approved by :

(Mr. Samart Roo-ngan)

Specialist (1)

FORM NO.: F 06-025 REVISION NO.: 1 ISSUE DATE: 30 Jun 22



Pitot Tube Calibration Data

Pitot Tube Identification Number : BKK_FS0512 Calibration Date : 3 Jan 23
Lab test duct Number : 258-1-13-01 Standard Pitot ID : BKK_FS0441
Calibration Sheet No. : C-030123-BKK_FS0512 Cp Standard : 0.99

Type S Pitot Tube Coefficient Data					
	Type s pitot tube Leg A,B	Standard pitot tube (ΔP , mm.H ₂ O)	Type s pitot tube (ΔP , mm.H ₂ O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 2	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 3	A	12.00	16.80	0.845	-
	B	12.00	16.80	-	0.845
\bar{C}_p				0.842	0.842

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

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

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

Calibrated by :

(Mr. Worawich Tongpoom)

Field Scientist (2)

Approved by :

(Mr. Samart Roo-ngan)

Specialist (1)

FORM NO.: F 06-025 REVISION NO.: 1 ISSUE DATE: 30 Jun 22



PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

Calibration Date : 3 Jan 23 Nozzle Set ID. : BKK_FS0513
Calibration Sheet No. : C-030123-BKK_FS0513 Vernier Caliper ID. : RYG_FS0539

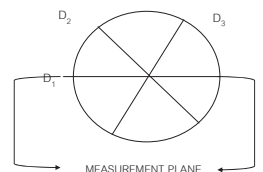
Nozzle ID #	Nozzle Diameter (cm.)			Hi - Lo ΔD	$(D_1 + D_2 + D_3) / 3$ D_{avg}
	D_1	D_2	D_3		
1	0.315	0.315	0.315	0.000	0.315
2	0.475	0.475	0.475	0.000	0.475
3	0.635	0.635	0.635	0.000	0.635
4	0.790	0.790	0.790	0.000	0.790
5	0.950	0.950	0.950	0.000	0.950
6	1.110	1.110	1.110	0.000	1.110
7	1.270	1.270	1.270	0.000	1.270
8	1.600	1.600	1.600	0.000	1.600

Where :

D_1, D_2, D_3 = There different nozzle diameters at 60 degrees to each other, each measured the nearest 0.025 mm.

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

D_{avg} = $(D_1 + D_2 + D_3) / 3$



Calibrated by :

(Mr. Worawich Tongpoom)

Field Scientist (2)

Approved by :

(Mr. Samart Roo-ngan)

Field Specialist (1)

FORM NO.: F 06-026 REVISION NO.: 1 ISSUE DATE: 9-1-2023

Certificate No.: G 650809
Date of issue : 29-Nov-22

Instrument description : Flue gas Analyzer
Instrument model : Testo 340
Instrument serial no. : 63119029
ID no. or control no. : BKK_F51158
Manufacturer : Testo SE & Co. KGaA
Probe description : -
Probe model : -
Probe serial : -
Customer name : ALS LABORATORY GROUP (THAILAND) CO.,LTD.
Customer address : 104 Phatthanakan 40, Phatthanakan Road, Khwaeng Phatthanakan,

REVIEW BY: *Naraborn P.*
APPROVED BY: *[Signature]*
NEXT CAL DATE: 21/11/23

Total pages of certificate : 3 Pages
Receiving no. : L-224149
Receiving date : 21-Nov-22
Parameter of calibration : Gas Calibration (Oxygen 2.496,10.04,21.02 %vol, Carbon Monoxide 80.14,309.9,1003 ppm), Nitric Oxide 30.08,150.9,320.6 ppm, Sulphur Dioxide 50.04,100.8,601.1 ppm)

Condition of UUC : Used
Ambient condition : All of the Measurement were carried out the stabilized laboratory
Temperature : 23 ± 5 °C
Humidity : 55 ± 15 %RH
Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsoonghong, Lakso, Bangkok 10210
Calibration procedure no. : WI-CL-28-C

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

Date of calibration : 28-Nov-22

[Signature]
Mr. Sedawut Nuathong
Calibration Technician

[Signature]
Mrs. Nongluck Wongsettee
Technical Manager

FM-CL-09-C Rev.8

Page 1 of 3

Issued Date 26/02/16

Entech Industrial Solution Co.,Ltd.

17/121 Soi Ngamwongwan 47 Yaek 48, Toongsoonghong, Lakso, Bangkok 10210 THAILAND Tel: 0-2779-8888 Calibration@entech.co.th
Tax ID : 0105536035591 www.entech.co.th

Certificate No.: G 650809

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O2) 2.496 % Vol	4219/21	Linde	30-Sep-25
Oxygen (O2) 10.04 % Vol	CG-0153-21	Nimt	18-Nov-26
Oxygen (O2) 21.02 % Vol	CG-0041-22	Nimt	10-Feb-27
Carbon monoxide (CO) 80.14 ppm	CG-0040-22	Nimt	14-Feb-27
Carbon monoxide (CO) 309.9 ppm	2803/21	Linde	22-Jun-23
Carbon monoxide (CO) 1003 ppm	2583/22	Linde	09-Aug-24
Nitric Oxide (NO) 30.08 ppm	CG-0089-22	Nimt	13-Jun-24
Nitric Oxide (NO) 150.9 ppm	2857/21	Linde	27-Jun-23
Nitric Oxide (NO) 320.6 ppm	2944/21	Linde	02-Jul-23
Sulphur Dioxide (SO2) 50.04 ppm	3205/21	Linde	25-Jul-23
Sulphur Dioxide (SO2) 100.8 ppm	3507/22	Linde	09-Nov-24
Sulphur Dioxide (SO2) 601.1 ppm	3204/21	Linde	20-Jul-23

Measured room conditions

Temperature : 23.4 °C Humidity : 54.1 %RH Pressure : 1015.6 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 1,200 ml/min Gas pressure : 1021.8 mbar

Calibration Results Before Adjustment (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O2 (%Vol)	2.496	2.44	-0.058	0.20
O2 (%Vol)	10.04	9.91	-0.13	0.40
O2 (%Vol)	21.02	21.08	0.06	0.80
CO (ppm)	80.14	85	4.85	3.0
CO (ppm)	309.9	323	13.1	6.0
CO (ppm)	1003	1049	46	12
NO (ppm)	30.08	27	-3.08	8.0
NO (ppm)	150.9	145	-5.9	8.0
NO (ppm)	320.6	298	-22.6	12
SO2 (ppm)	50.04	41	-9.04	6.0
SO2 (ppm)	100.8	95	-5.8	6.0
SO2 (ppm)	601.1	589	-12.1	13

FM-CL-09-C Rev.8

Page 2 of 3

Issued Date 26/02/16

Entech Industrial Solution Co.,Ltd.

17/121 Soi Ngamwongwan 47 Yaek 48, Toongsoonghong, Lakso, Bangkok 10210 THAILAND Tel: 0-2779-8888 Calibration@entech.co.th
Tax ID : 0105536035591 www.entech.co.th

Certificate No.: G 650809

Calibration Results After Adjustment (Table 3)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O2 (%Vol)	2.496	2.44	-0.058	0.20
O2 (%Vol)	10.04	9.91	-0.13	0.40
O2 (%Vol)	21.02	21.08	0.06	0.80
CO (ppm)	80.14	79	-1.14	3.0
CO (ppm)	309.9	308	-1.9	6.0
CO (ppm)	1003	997	-6	12
NO (ppm)	30.08	30	-0.08	8.0
NO (ppm)	150.9	151	0.1	8.0
NO (ppm)	320.6	311	-9.6	12
SO2 (ppm)	50.04	48	-2.04	6.0
SO2 (ppm)	100.8	100	-0.8	6.0
SO2 (ppm)	601.1	605	3.9	13

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

End of Report

Instrument description : Flue gas Analyzer
Instrument model : Testo 350 New
Instrument serial no. : 62985022
ID no. or control no. : BKK_F51156
Manufacturer : Testo SE & Co. KGaA
Probe description : -
Probe model : -
Probe serial : -
Customer name : ALS LABORATORY GROUP (THAILAND) CO.,LTD.
Customer address : 104 Phatthanakan 40, Phatthanakan Road, Khwaeng Phatthanakan, Khet Suan Luang, Bangkok, 10250 Thailand
Total pages of certificate : 3 Pages
Receiving no. : L-224282
Receiving date : 07-Dec-22
Parameter of calibration : Gas Calibration (Oxygen 2.496,10.04,21.02 %vol, Carbon Monoxide 80.14,309.9,1003 ppm), Nitrogen Dioxide 30.34,80.96,202.2 ppm, Nitric Oxide 30.08,150.9,320.6 ppm, Sulphur Dioxide 50.04,100.8,601.1 ppm)

REVIEW BY: *Naraborn P.*
APPROVED BY: *[Signature]*
NEXT CAL DATE: 8/12/23

Condition of UUC : Used
Ambient condition : All of the Measurement were carried out the stabilized laboratory
Temperature : 23 ± 5 °C
Humidity : 55 ± 15 %RH
Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsoonghong, Lakso, Bangkok 10210
Calibration procedure no. : WI-CL-28-C

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

Date of calibration : 08-Dec-22

[Signature]
Mr. Sedawut Nuathong
Calibration Technician

[Signature]
Mrs. Nongluck Wongsettee
Technical Manager

FM-CL-09-C Rev.8

Page 3 of 3

Issued Date 26/02/16

Entech Industrial Solution Co.,Ltd.

17/121 Soi Ngamwongwan 47 Yaek 48, Toongsoonghong, Lakso, Bangkok 10210 THAILAND Tel: 0-2779-8888 Calibration@entech.co.th
Tax ID : 0105536035591 www.entech.co.th

Entech Industrial Solution Co.,Ltd.

17/121 Soi Ngamwongwan 47 Yaek 48, Toongsoonghong, Lakso, Bangkok 10210 THAILAND Tel: 0-2779-8888 Calibration@entech.co.th
Tax ID : 0105536035591 www.entech.co.th



Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.498 % Vol	4219/21	Linde	30-Sep-25
Oxygen (O ₂) 10.04 % Vol	CG-0153-21	Nmt	18-Nov-26
Oxygen (O ₂) 21.02 % Vol	CG-0041-22	Nmt	10-Feb-27
Carbon monoxide (CO) 80.14 ppm	CG-0040-22	Nmt	14-Feb-27
Carbon monoxide (CO) 309.9 ppm	2803/21	Linde	22-Jun-23
Carbon monoxide (CO) 1003 ppm	2583/22	Linde	09-Aug-24
Nitrogen Dioxide (NO ₂) 30.34 ppm	2703/22	Linde	22-Aug-24
Nitrogen Dioxide (NO ₂) 80.96 ppm	2041/22	Linde	26-Jun-24
Nitrogen Dioxide (NO ₂) 202.2 ppm	3239/21	Linde	20-Jul-23
Nitric Oxide (NO) 30.08 ppm	CG-0089-22	Nmt	13-Jul-24
Nitric Oxide (NO) 150.9 ppm	2657/21	Linde	27-Jul-23
Nitric Oxide (NO) 320.6 ppm	2944/21	Linde	02-Jul-23
Sulphur Dioxide (SO ₂) 50.04 ppm	3205/21	Linde	25-Jul-23
Sulphur Dioxide (SO ₂) 100.8 ppm	3507/22	Linde	09-Nov-24
Sulphur Dioxide (SO ₂) 601.1 ppm	3204/21	Linde	20-Jul-23

Measured room conditions

Temperature : 21.4 °C Humidity : 57.5 %RH Pressure : 1016.2 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 1,200 ml/min Gas pressure : 1021.5 mbar

Calibration Results Before Adjustment (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.498	2.48	-0.018	0.20
O ₂ (%Vol)	10.04	9.94	-0.10	0.40
O ₂ (%Vol)	21.02	21.09	0.07	0.80
CO (ppm)	80.14	82	1.86	3.0
CO (ppm)	309.9	313	3.1	6.0
CO (ppm)	1003	1010	7	12
NO ₂ (ppm)	30.34	23.6	-6.74	8.0
NO ₂ (ppm)	80.96	63.2	-17.76	8.0
NO ₂ (ppm)	202.2	173.6	-28.6	12
NO (ppm)	30.08	27	-3.08	8.0
NO (ppm)	150.9	148	-2.9	8.0
NO (ppm)	320.6	302	-18.6	12
SO ₂ (ppm)	50.04	44	-6.04	6.0
SO ₂ (ppm)	100.8	96	-4.8	6.0
SO ₂ (ppm)	601.1	592	-9.1	13



Calibration Results After Adjustment (Table 3)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.498	2.48	-0.018	0.20
O ₂ (%Vol)	10.04	9.94	-0.10	0.40
O ₂ (%Vol)	21.02	21.09	0.07	0.80
CO (ppm)	80.14	82	1.86	3.0
CO (ppm)	309.9	313	3.1	6.0
CO (ppm)	1003	1010	7	12
NO ₂ (ppm)	30.34	31.1	0.76	8.0
NO ₂ (ppm)	80.96	82.1	1.14	8.0
NO ₂ (ppm)	202.2	205.4	3.2	12
NO (ppm)	30.08	29	-1.08	8.0
NO (ppm)	150.9	150	-0.9	8.0
NO (ppm)	320.6	316	-4.6	12
SO ₂ (ppm)	50.04	50	-0.04	6.0
SO ₂ (ppm)	100.8	100	-0.8	6.0
SO ₂ (ppm)	601.1	599	-2.1	13

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

End of Report



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request No. 23-65/0497-03

MTC.No. 23-65/0497-03

Number of Pages(S) 2

CALIBRATION CERTIFICATE

Nomenclature : " P " VACUUM GAUGE

Model : F221AVD

Serial No. : VG06 ID. BKK_FS0896

Range : -30 in Hg to 0 in Hg

Scale Interval : 0.5 in Hg

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

104 Phattanakarn 40, Phattanakarn Rd.,

Khwaeng Phattanakarn, Khel Suan Luang, Bangkok 10250, Thailand.

Calibration method : Normal

Received date : 7 June 2022

Calibration date : 21 July 2022

Standard : Reference Pressure Monitor, Serial 1950, Certificate no. 23-64/0581-01

Due Date 3 August 2022

The Standard used for the measurement is traceable to SI Unit through National Institute of Metrology (THAILAND).

CALIBRATED BY : (Mr.Uthai Chaiyapatt)

APPROVED BY : (Ms.Kirana Luanghirun)

Director
Mechanical Engineering Standards Laboratory

Ref. 2013265060702513003

Issued Date : 22 July 2022

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request 23-65/0497-03

2 / 2

MTC.No. 23-65/0497-03

Calibration range : -27 in Hg to 0 in Hg

Calibration method : The Vacuum Gauge Under Calibration (UUC) was calibrated by comparison method followed DAKS-DKD-R 6-1: Calibration of Pressure Gauge, edition 03/2014

Calibration condition : Temperature (23.4 ± 2) °C , Relative Humidity (66 ± 10) %
Atmospheric pressure (1001 ± 10) hPa,
Local gravity (9.783003 ± 0.000050) m/s²

Measurement Data :

Gauge position : Vertical

Medium : Air

Reference level : Gauge inlet

Unit : in Hg

UUC Reading	Gauge Pressure	Error	(±) Uncertainty
0	0.00	0.00	0.12
-10	-9.82	-0.18	0.14
-20	-19.95	-0.05	0.12
-26	-26.08	0.08	0.12
-27	-27.05	0.05	0.12
-28	-28.06	0.06	0.12

Note : 1. The reading taken after the gauge is lightly tapped.

2. Conversion factor : in Hg = 3.386384 kPa

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

The End of Calibration Certificate

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.



Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor 7 Ramad Road
Siam Bangkok Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com



Certificate of Calibration

Number of Page(s) 1 of 3

Certificate No. BSCC-UV-307/22
Equipment UVVis Spectrophotometer
Model UV-1800
Manufacturer Shimadzu
Serial No. A11454908533CD
ID No. BKK_EN0018
Date of receipt 16 September 2022
Date of calibration 16 September 2022
Date of issue 23 September 2022

REVIEW BY *Sulok P.*
APPROVED BY *K. A.*
NEXT CAL. DATE *16/9/23*

Customer name ALS Laboratory Group (Thailand) Co., Ltd.
Address 104 Soi Phatthanakan 40, Phatthanakan Road, Phatthanakan, Suan Luang, Bangkok 10250

Temperature (22.1-23.3) °C (On site)
Humidity (58.8-63.2) %RH (On site)

Equipment condition Good Operation

Calibration Location Organic Prep

Calibration Procedure In-house method WI-UV-702-01 based on ASTM E275-01

Traceability Wavelength Accuracy is traceable to certificate No. 95917 and 95918
Photometric Accuracy is traceable to certificate No. 95924 and 95937
Stray Light is traceable to certificate No. 95908
The above certificate are traceable to SI unit through Sarna Scientific Ltd.
(UKAS accredited calibration laboratory NO. 0659)

Calibrated by Mr. Waruth Janphung

Approved by

Mr. Kanchit Choothep
Technical Manager

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced
except in full, without written approval of the Bara Scientific Co., Ltd.

FM-UV-702-02 Rev.01 (23/01/63)



Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor 7 Ramad Road
Siam Bangkok Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com



Certificate of Calibration

Certificate No. BSCC-UV-307/22 Number of Page(s) 2 of 3

Calibration Results:

1. Wavelength Accuracy

Certified Wavelength (nm)	UUC (nm)	Error (nm)	Uncertainty (±nm)
241.70	241.65	-0.05	0.18
334.02	333.92	-0.10	0.18
418.53	418.46	-0.07	0.18
572.99	572.96	-0.03	0.18
879.41	879.17	-0.24	0.18

2. Photometric Accuracy (UV)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
235	0.0000 0.7487	0.0000 0.7461	0.0000 -0.0006	0.0075 0.0075
257	0.0000 0.8662	0.0000 0.8647	0.0000 -0.0015	0.0075 0.0075
313	0.0000 0.2904	0.0000 0.2911	0.0000 0.0007	0.0075 0.0075
350	0.0000 0.6429	0.0000 0.6426	0.0000 -0.0003	0.0075 0.0075

*CNR = Customer not request

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
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FM-UV-702-02 Rev.01 (23/01/63)



Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor 7 Ramad Road
Siam Bangkok Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com



Certificate of Calibration

Certificate No. BSCC-UV-307/22 Number of Page(s) 3 of 3

Calibration Results:

3. Photometric Accuracy (Visible)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
420.0	0.0000 0.5783 0.7628 1.0206	0.0000 0.5777 0.7635 1.0230	0.0000 -0.0006 0.0007 0.0024	0.0042 0.0042 0.0046 0.0042
440.0	0.0000 0.5621 0.7455 0.9685	0.0000 0.5618 0.7460 1.0005	0.0000 -0.0003 0.0005 0.0020	0.0042 0.0042 0.0048 0.0042
465.0	0.0000 0.5227 0.6880 0.9487	0.0000 0.5219 0.6884 0.9503	0.0000 -0.0008 0.0004 0.0016	0.0042 0.0042 0.0051 0.0042
545.1	0.0000 0.5207 0.6973 0.9959	0.0000 0.5199 0.6971 0.9964	0.0000 -0.0008 -0.0002 0.0005	0.0042 0.0042 0.0049 0.0042
590.0	0.0000 0.5544 0.7233 1.0942	0.0000 0.5534 0.7242 1.0943	0.0000 -0.0010 -0.0011 0.0001	0.0042 0.0042 0.0050 0.0042
635.0	0.0000 0.5616 0.6927 1.0881	0.0000 0.5606 0.6921 1.0885	0.0000 -0.0010 -0.0006 0.0004	0.0042 0.0042 0.0053 0.0042

*CNR = Customer not request

4. Stray Light*

Standard cut-off wavelength (nm)	Unit Under Calibration(UUC) Wavelength (nm)	Transmission (%T)	Absorbance (A)
200.95±0.11nm	200.30	0.9505	2.0229

The Stray light transmission reference is less than 1.0%T and Stray light absorbance reference is greater than 2.00A
*Stray Light not NSC-ONSC Accredited.

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

End of Certificate

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced
except in full, without written approval of the Bara Scientific Co., Ltd.

FM-UV-702-02 Rev.01 (23/01/63)



PENTA
CALIBRATION

PENTA CALIBRATION CO., LTD.
66/124 The Connect 33 Village Kanchanaphisek Road
Dokmai Prawat Bangkok 10250
Tel : +66 (0) 2069-9773
www.pentalab.com

Certificate of Calibration

Represent to Certificate of Calibration PTC/07/22071

Certificate No.: PTC/07/22071 Page: 1 of 2
Equipment: Digital Balance Condition: Normal
Manufacturer: Sartorius Serial No: 26207042
Model: MSE224-100-DU ID No: BKK_EN0002
Type of Balance: Single interval

Customer: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40 Phatthanakan Rd.,
khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250.

Environment Condition: Temperature 21.5 °C ± 0.7 °C
Humidity 61.8 %RH ± 4.7 %RH
Air density 1.19 kg/m³

Calibration Place: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40 Phatthanakan Rd.,
khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250.

The Method used: In house method, PTC-WI-07, base on Euramet cg. 18

Traceability: This certificate is traceable to the SI Units through Thai Calibration Service Co., Ltd.
, NSC-ONSC Accreditation No.: Calibration 0189

Date Received: February 25, 2022

Calibration Date: February 25, 2022

Issued Date: March 01, 2022

Calibration By: Mr. Rungraje Metakul



REVIEW BY *Santana M.*
APPROVED BY *K. A.*
NEXT CAL. DATE *25/02/23*

(Mr. Kriangsak Kalasin)
Reviewed by

Approved By :
(Mr. Kattisak Kerdto)
Laboratory Manager

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

PTG-FMD-07-02-2 Feb. 2020

Represent to Certificate of Calibration PTC07/22071

Certificate No.: PTC07/22071

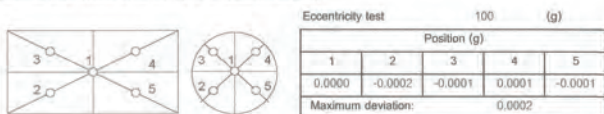
Page: 2 of 2

Measurement Results:

Without Adjustment :

Function Calibration: Non Adjustment

Eccentric Error: Weight to be 1/3, 1/2 or of Maximum capacity



Repeatability Test : Weight to be $1/2 \leq L_1 \leq$ Maximum capacity

Determination of the standard deviation of weighing balance., Readability 0.0001 (g)

Nominal test value (g)	Standard Deviation
200	0.00005

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	0.00016	2.52
0.1	0.10000	0.1000	0.0000	0.00017	2.20
0.5	0.50000	0.5000	0.0000	0.00016	2.28
1	1.00001	1.0000	0.0000	0.00016	2.28
2	2.00001	2.0000	0.0000	0.00016	2.28
5	5.00001	5.0000	0.0000	0.00016	2.28
10	10.00002	10.0000	0.0000	0.00016	2.28
20	20.00002	20.0000	0.0000	0.00016	2.23
50	50.00001	50.0000	0.0000	0.00017	2.15
100	100.00002	99.9999	0.0001	0.00020	2.06
120	120.00004	120.0000	0.0000	0.00023	2.03
150	150.00003	150.0000	0.0000	0.00026	2.00
200	200.00003	199.9999	0.0001	0.00030	2.00

Note: Weight of adjust (g)

The End of Certificate

PTC-FIMC-07-02: 3 Feb. 2020



DRY GAS METER CALIBRATION TEST REPORT

Calibration of Date : 3 Jan 23

Next Calibration Date 3 Jul 23

Barometric Pressure (mm.Hg) : 760

Relative Humidity (%) : 58.0

Temperature (°C) : 30.0

Dry Gas Meter Data.

Calibration sheet No.: C-030123-BKK_FS0505

Dry Gas Meter No.: BKK_FS0505

Console Serial No.: 1503004

Model No.: XC-60-CV

Reference Dry Gas Meter Data

Reference Dry Gas Meter ID.: BKK_FS0629

Serial No.: 1607009

Correction Factor (Yr) : 1.0000

Next Calibration Date : 9 Dec 23

Reference Dry Gas Meter Calibration				Dry Gas Meter						Dry Gas Meter Correction
Vr (Liters)			Tr (°C)	Vm (Liters)			Ti (°C)	To (°C)	Avg. Tm (°C)	Factor (Y)
Final	Initial	Total		Final	Initial	Total				
30.01	0.00	30.01	30.0	29.08	0.00	29.08	27.0	27.0	27.0	1.0217
30.00	0.00	30.00	30.0	29.02	0.00	29.02	27.0	27.0	27.0	1.0237
60.00	0.00	60.00	32.0	58.14	0.00	58.14	28.0	28.0	28.0	1.0184
59.99	0.00	59.99	30.0	58.38	0.00	58.38	28.0	28.0	28.0	1.0209
90.02	0.00	90.02	30.0	87.81	0.00	87.81	28.0	28.0	28.0	1.0184
90.03	0.00	90.03	31.0	87.97	0.00	87.97	28.0	28.0	28.0	1.0133
Avg.										1.0194

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

Calibrate by:

Mr.Prasert Surakhan
Field Scientist (3)

Approved by:

Mr.Samart Roo-ngan
Specialist (1)

FORM NO.: F-06-028 REVISION NO.: 1 ISSUE DATE: 30/03/21



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date : 3 Jan 23		Ambient Temperature (°C) 30		
Calibration sheet No. : C-030123-BKK_FS0505		Relative Humidity (%) : 58		
Digital Temperature ID : 228-2-33-01		Reference Temperature ID BKK_FS1144		
Console Serial No. 1503004		Serial No. : 201090006013		
Model : XC-62-CV		Model : Digicon-CC-VT-MS		
		Last Calibrate : 31 Jan 23		
Location	Reference Temperature °C	Digital Temperature °C	Error °C	Remark
Stack	0	1	1	
	25	23	-2	
	50	48	-2	
	100	99	-1	
	150	149	-1	
	200	197	-3	
	250	247	-3	
	300	297	-3	
	500	498	-2	
	1000	995	-5	
Probe	1200	1195	-5	
	100	98	-2	
	120	118	-2	
Filter	140	138	-2	
	100	98	-2	
Exit	120	118	-2	
	140	138	-2	
	0	0	0	
Meter	10	9	-1	
	20	19	-1	
	0	0	0	
AUX	25	24	-1	
	50	48	-2	
	0	0	0	
	25	23	-2	
	50	48	-2	

Calibrated by:
Mr.Prasert Surakhan
Field Scientist (3)

Approved by:
Mr.Samart Roo-ngan
Field Specialist (1)

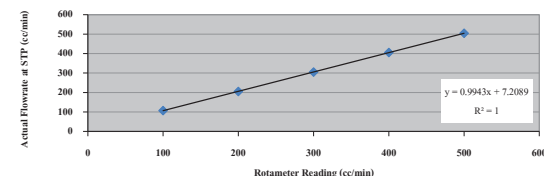
FORM NO.: F-04-007 REVISION NO.: 1 ISSUE DATE: 01-01-07



Rotameter Calibration Report

Calibration Date :	3 Jan 2023	Next cal. :	2 Jul 2023
Rotameter ID :	BKK_FS0506	Barometric Pressure (mmHg):	760
Calibration Sheet No :	C-030123-BKK_FS0506	Temperature (°C) :	30.0
Primary Equipment Data			
Brand :	Bios	Model :	Defender 520M
Serial No.	13780	ID :	BKK_FS0614

Calibration Data					
Rotameter Reading(cc/min)	Actual Flowrate (cc/min)				Actual Flowrate at STP (cc/min)
	1	2	3	Avg.	
100	108.6	109.1	109.3	109.0	107.2
200	208.9	208.9	209.2	209.0	205.5
300	309.6	310.1	310.5	310.1	304.9
400	412.3	411.9	412.1	412.1	405.3
500	512.3	513.1	513.4	512.9	504.5



Calibrated by:
(Mr.Prasert Surakhan)
Enviro Field Services Scientist(3)

Approved By:
(Mr.Wichan Choonharat)
Manager

FORM NO.: F-06-028 REVISION NO.: 1 ISSUE DATE: 12/11/18



ROTA METER CALIBRATION RESULT JANUARY 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0577	03 Jan 23	Y = 1.0259x - 0.6354	0.9997
BKK_FS0579	05 Jan 23	Y = 1.0005x + 0.2803	1.0000
BKK_FS0583	05 Jan 23	Y = 0.9976x + 1.2146	1.0000
BKK_FS0584	03 Jan 23	Y = 1.0104x - 0.3929	1.0000
BKK_FS0586	05 Jan 23	Y = 1.001x - 1.3619	0.9999
BKK_FS0587	03 Jan 23	Y = 1.0038x + 0.881	1.0000
BKK_FS0588	05 Jan 23	Y = 1.0015x - 0.6876	0.9999
BKK_FS0590	05 Jan 23	Y = 0.9958x + 1.7452	1.0000
BKK_FS0591	03 Jan 23	Y = 0.9677x + 64.54	0.9951
BKK_FS0593	03 Jan 23	Y = 0.9792x + 21.393	0.9972
BKK_FS0594	03 Jan 23	Y = 1.0455x - 43.344	0.9976
BKK_FS0595	05 Jan 23	Y = 0.9993x + 1.18	1.0000
BKK_FS0597	05 Jan 23	Y = 0.9788x + 22.286	0.9971
BKK_FS1004	03 Jan 23	Y = 0.9943x + 7.1619	0.9996
BKK_FS1005	03 Jan 23	Y = 1.0045x + 2.1167	0.9998
BKK_FS1006	03 Jan 23	Y = 1.0288x - 0.3852	0.9999
BKK_FS1008	03 Jan 23	Y = 1.0181x + 0.1282	0.9998
BKK_FS1009	05 Jan 23	Y = 1.0018x + 1.1293	1.0000
BKK_FS1011	03 Jan 23	Y = 1.0463x - 1.9344	0.9985
BKK_FS1012	03 Jan 23	Y = 1.0082x - 53.425	0.9999
BKK_FS1013	03 Jan 23	Y = 1.0058x - 9.701	1.0000
BKK_FS1014	05 Jan 23	Y = 0.9869x + 1.2643	0.9995
BKK_FS1015	05 Jan 23	Y = 1.004x - 0.7571	0.9999
BKK_FS1016	05 Jan 23	Y = 0.978x + 24.623	0.9973
BKK_FS1017	17 Jan 23	Y = 1.0022x + 0.4211	1.0000
BKK_FS1018	17 Jan 23	Y = 0.9893x + 5.8317	1.0000
BKK_FS1019	17 Jan 23	Y = 0.9859x - 11.574	0.9986
BKK_FS1020	03 Jan 23	Y = 1.0208x - 0.6221	0.9998
BKK_FS1021	03 Jan 23	Y = 0.992x - 44.599	0.9997
BKK_FS1022	03 Jan 23	Y = 1.0067x - 12.483	0.9999
BKK_FS1023	03 Jan 23	Y = 1.0013x + 0.5823	0.9993
BKK_FS1024	03 Jan 23	Y = 1.0036x - 50.787	0.9999
BKK_FS1025	03 Jan 23	Y = 0.974x + 27.034	0.9969
BKK_FS1026	05 Jan 23	Y = 0.9783x + 1.7075	0.9991
BKK_FS1027	05 Jan 23	Y = 1.145x - 90.325	0.9797
BKK_FS1028	05 Jan 23	Y = 0.9815x + 13.626	0.9969
BKK_FS1029	03 Jan 23	Y = 0.9706x + 3.6283	0.9951
BKK_FS1030	03 Jan 23	Y = 1.0197x - 52.982	0.9999



ROTA METER CALIBRATION RESULT JANUARY 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS1031	03 Jan 23	Y = 0.9995x - 0.1581	1.0000
BKK_FS1039	03 Jan 23	Y = 1.0242x - 4.3007	0.9986
BKK_FS1040	03 Jan 23	Y = 1.0035x + 1.0705	0.9998
BKK_FS1041	03 Jan 23	Y = 0.9791x + 0.252	1.0000
BKK_FS1042	03 Jan 23	Y = 1.0186x - 3.7429	0.9999
BKK_FS1043	03 Jan 23	Y = 1.0038x + 2.961	0.9999
BKK_FS1044	03 Jan 23	Y = 1.0189x + 0.2969	1.0000
BKK_FS1163	18 Jan 23	Y = 1.0127x + 0.8332	0.9996
BKK_FS1164	18 Jan 23	Y = 1.2176x + 4.7376	0.9952
BKK_FS1165	18 Jan 23	Y = 1.0005x - 47.94	1.0000
BKK_FS1166	18 Jan 23	Y = 1.0346x - 35.841	0.9996
BKK_FS1200	03 Jan 23	Y = 1.0168x + 0.4034	0.9997
BKK_FS1201	03 Jan 23	Y = 0.7655x + 60.985	0.9986
BKK_FS1202	03 Jan 23	Y = 0.9593x + 87.615	0.9958
RYG_FS0197	03 Jan 23	Y = 1.0305x - 94.849	0.9991
RYG_FS0198	03 Jan 23	Y = 1.0103x - 19.254	0.9999
RYG_FS0199	03 Jan 23	Y = 0.9897x + 0.998	0.9983

Review By :

(Mr. Wichan Choonharat)
Enviro Field Services Manager

Approved By :

(Mr. Sarayuth Jittrantont)
Assistant General Manager


ROTA METER CALIBRATION RESULT APRIL 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0577	03 Apr 23	Y = 1.0246x - 1.1844	0.9982
BKK_FS0579	03 Apr 23	Y = 1.0313x - 0.8177	0.9999
BKK_FS0583	03 Apr 23	Y = 1.0023x - 0.0969	0.9995
BKK_FS0584	03 Apr 23	Y = 1.0025x + 2.25	0.9999
BKK_FS0585	03 Apr 23	Y = 0.9881x + 5.4452	0.9993
BKK_FS0586	03 Apr 23	Y = 0.9915x + 4.7452	1.0000
BKK_FS0588	03 Apr 23	Y = 1.0067x + 0.6738	0.9998
BKK_FS0589	03 Apr 23	Y = 0.9823x + 0.3286	0.9936
BKK_FS0590	03 Apr 23	Y = 0.9961x + 2.8786	0.9999
BKK_FS0591	03 Apr 23	Y = 0.9985x + 4.579	1.0000
BKK_FS0592	03 Apr 23	Y = 0.9975x + 3.6419	1.0000
BKK_FS0593	03 Apr 23	Y = 0.9966x + 16.005	1.0000
BKK_FS0595	03 Apr 23	Y = 0.9957x + 5.1368	0.9999
BKK_FS0596	03 Apr 23	Y = 1.017x - 14.044	0.9967
BKK_FS0597	03 Apr 23	Y = 1.0063x - 10.787	1.0000
BKK_FS1004	01 Apr 23	Y = 0.9943x + 7.1533	0.9996
BKK_FS1005	01 Apr 23	Y = 1.0035x + 3.1167	0.9998
BKK_FS1006	01 Apr 23	Y = 1.0273x - 0.4922	0.9998
BKK_FS1007	03 Apr 23	Y = 1.0452x - 1.5374	0.9998
BKK_FS1009	03 Apr 23	Y = 1.0351x - 1.3224	0.9999
BKK_FS1010	03 Apr 23	Y = 1.0108x - 0.0888	1.0000
BKK_FS1011	03 Apr 23	Y = 1.2946x - 6.6325	0.9861
BKK_FS1012	03 Apr 23	Y = 1.0976x - 27.969	0.9996
BKK_FS1013	03 Apr 23	Y = 1.0821x - 200.52	0.9998
BKK_FS1017	03 Apr 23	Y = 1.0333x + 7.0584	0.9694
BKK_FS1018	03 Apr 23	Y = 0.9551x - 18.832	0.9997
BKK_FS1019	03 Apr 23	Y = 1.0649x - 156.67	0.9976
BKK_FS1020	03 Apr 23	Y = 0.9911x + 0.0364	0.9994
BKK_FS1021	03 Apr 23	Y = 0.979x + 8.2333	0.9992
BKK_FS1022	03 Apr 23	Y = 0.9988x - 2.4905	0.9997
BKK_FS1023	03 Apr 23	Y = 1.0245x - 1.3878	0.9996
BKK_FS1024	03 Apr 23	Y = 0.7414x + 47.3	0.9923
BKK_FS1025	03 Apr 23	Y = 0.9997x + 5.4438	1.0000
BKK_FS1026	03 Apr 23	Y = 1.0172x - 0.9531	1.0000
BKK_FS1027	03 Apr 23	Y = 0.7331x + 49.317	0.9921
BKK_FS1028	03 Apr 23	Y = 0.9995x + 0.2124	1.0000
BKK_FS1039	01 Apr 23	Y = 1.025x - 3.795	0.9994
BKK_FS1040	01 Apr 23	Y = 1.0035x - 2.4295	0.9998



ROTA METER CALIBRATION RESULT APRIL 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS1041	01 Apr 23	Y = 1.0329x - 0.6769	0.9999
BKK_FS1042	01 Apr 23	Y = 1.0144x + 1.94	0.9997
BKK_FS1043	01 Apr 23	Y = 1.0038x - 1.539	0.9999
BKK_FS1044	01 Apr 23	Y = 1.0273x - 1.6922	0.9998
BKK_FS1164	03 Apr 23	Y = 0.9913x + 0.8537	0.9997
BKK_FS1165	03 Apr 23	Y = 1.0005x + 2.0857	1.0000
BKK_FS1166	03 Apr 23	Y = 1.0842x - 169.6	0.9987
BKK_FS1200	03 Apr 23	Y = 0.9452x + 5.2959	0.9981
BKK_FS1201	03 Apr 23	Y = 1.0045x - 1.8786	1.0000
BKK_FS1202	03 Apr 23	Y = 0.9768x + 26.572	0.9973
RYG_FS0197	01 Apr 23	Y = 1.0042x + 15.442	0.9999
RYG_FS0198	01 Apr 23	Y = 1.0081x - 13.26	0.9999
RYG_FS0199	01 Apr 23	Y = 1.0255x - 1.2364	0.9999

Review By :

(Mr. Wichan Choonharat)
Enviro Field Services Manager

Approved By :

(Mr. Sarayuth Jittrantont)
Assistant General Manager



SARTORIUS

Certificate of Calibration

REVIEW BY: *Siriporn P.*
APPROVED BY: *KL AL*
NEXT CAL. DATE: *8/2/24*

Model Number: XP105DU
Description: Semi-micro Balance
Serial Number: 1123091884
ID No: BKK_EN0004
Manufacturer: Mettler Toledo

Certificate No.: 23BCI0071
Issued Date: Monday, February 13, 2023
Reference No.: 203245
Page No.: 1 of 3

Customer Name: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthakan 40 Phatthakan Rd., Khwaeng Phatthakan, Khet Suan Luang, Bangkok 10250.

Calibrated Place: Balance Room.

Calibrated By: Mr. Chonchai Inthana
Calibration Date: Wednesday, February 08, 2023

Calibration Procedure No.: This calibration was conducted by Using in-house calibration procedure number (WH-003). Based on UKAS LAB 14: 2019

Metrological data:
Capacity: 31/120 g Readability: 0.0001 g
Reasons for calibration:
☐ New Installation ☐ Service / Repair ☒ Recalibration / Maintenance
Ambient Conditions:
Temperature: 21.0 °C ± 3.0 °C
Humidity: 65.0 % RH ± 5.0 % RH
Pressure: ±
Equipment Condition: ☒ Good Operator ☐ Fair

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

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 1kg E2 s/n 37929119	SPC-RT	C02212565	14-Sep-2023
MHB-382SD	Humidity/Balometer/Temp. Lutron MHB-382SD	DKSH	C19220444	5-Sep-2023

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

Chonchai Inthana

Mr. Chonchai Inthana (Technical Manager)

SOP FM 33 03 February 2023



SARTORIUS

Certificate of Calibration

Model Number: XP105DU
Description: Semi-micro Balance
Serial Number: 1123091884
ID No: BKK_EN0004
Manufacturer: Mettler Toledo

Certificate No.: 23BCI0071
Issued Date: Monday, February 13, 2023
Reference No.: 203245
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 series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.		The off-center loading error is yielded by the difference between the result of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R111).	
Nominal Value : (Low Load)	20.00002	20.00002	
2 g	2.00001	20.00001	
Tolerance	2.00002	20.00001	
N/A g	2.00002	20.00001	
Nominal Value : (High Load)	2.00002	20.00000	
20 g	2.00002	20.00001	
Tolerance	2.00002	20.00000	
N/A g	2.00001	20.00000	
	2.00001	20.00001	
Standard Deviation	0.000005	0.000007	

Linearity

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

Tolerance	N/A	g
Nominal Value	Conventional Mass Value	Displayed Value
(g)	(g)	(g)
0.1	0.10000	0.10000
0.5	0.50001	0.50000
1	1.00000	1.00000
2	2.00002	2.00001
5	5.00002	5.00002
10	10.00002	10.00002
15	15.00004	15.00004
20	20.00000	20.00000
25	25.00002	25.00002
30	30.00002	30.00004

SOP FM 33 03 February 2023

SARTORIUS

Certificate of Calibration

Model Number: XS105DU
Description: Semi-micro Balance
Serial Number: 1123091884
ID No: BKK_EN0004
Manufacturer: Mettler Toledo

Certificate No.: 23BCI0071
Issued Date: Monday, February 13, 2023
Reference No.: 203245
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 series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.		The off-center loading error is yielded by the difference between the result of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R111).	
Nominal Value : (Low Load)	100.0000	100.0000	
100 g	100.0000	100.0000	
Tolerance	100.0000	100.0000	
N/A g	100.0000	100.0000	
Nominal Value : (High Load)	100.0000	100.0000	
100 g	99.9999	100.0000	
Tolerance	100.0000	100.0000	
N/A g	100.0000	100.0000	
Standard Deviation	0.00003		

Linearity

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

Tolerance	N/A	g
Nominal Value	Conventional Mass Value	Displayed Value
(g)	(g)	(g)
50	50.0000	50.0000
55	55.0000	55.0000
60	60.0000	60.0000
65	65.0001	65.0001
70	70.0000	70.0000
80	80.0000	80.0000
90	90.0001	90.0001
100	100.0000	100.0000
110	110.0000	110.0000
120	120.0000	120.0000

End of Report

SOP FM 33 03 February 2023

BKK_EL0037



Agilent CrossLab Start Up Services

Agilent 5100 5110 ICP-OES Preventive Maintenance

REVIEW BY: *Charath L.*
APPROVED BY: *Sunthorn M.*
NEXT CAL. DATE: 01/01/24

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides what you need to reduce unplanned downtime and keep your systems operating at their peak performance.

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.



Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative.
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.
- For customers using HF applications, the instrument should be returned to its standard sample introduction system.

Important Customer Web Links

- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
 - Sample Prep and Containment
 - Chemical Standards
 - Analysis
 - Service and Support
 - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- Need to place a service call?** Flexible Repair Options | Agilent

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check **"Service not applicable"** check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the **Service Review** section together with the customer.
- Complete the fields for page numbers at the foot of each selected page.
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Completion section.
- Ask the customer to sign the Service Verification section including the customer's and your signature.

Instrument Maintenance

System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	G9010A ; M416010005
Instrument System Site and Location	AL5 (BLK)

List System Component Product Numbers	List the Serial Numbers of each Component
1. G9010A	M416010005
2. G9410A	AU15440964
3. G7212	8005-00189
4. G9455	AU16040115
5.	
6.	
7.	
8.	
9.	

ICP-OES Configuration Table	Circle the type or write in the type if other
Nebulizer Type	SeaSpray OneNeb Conikall Other
Spray Chamber	Cyclonic Single Pass Cyclonic Double Pass Other
Torch	Radial Dual View Other
Torch Type	One Piece Semi Demountable Fully Demountable Other
Injector Diameter	2.4mm 1.8mm 1.4mm 0.8mm Other
Injector Material	Quartz Ceramic Other

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and implementation of Service Notes
- ☒ Check for required firmware/software updates and verify with customers if they would like them installed.
- ☒ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it.
- ☐ Ask the customer to remove any samples from the ICP-OES sample introduction area, auto sampler or around the ICP-OES.

Preventive Maintenance Procedures

Record Pre-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table – Pre-PM.

Clean and inspect ICP-OES system

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☒ Replace high capacity air inlet dust filter element if installed.
- ☒ Remove and clean instrument water inlet filter.

Agilent Water Recirculator

- ☐ Service not applicable
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter if present.
- ☒ Re fill with Agilent Cool Clear cooling fluid.
- ☒ Clean the cooling system Air filter and the condenser.

SPS 3 Auto Sampler

- ☒ Service not applicable
- ☐ Power cycle the autosampler and verify successful initialization.
- ☐ Inspect X and Z axis belts for wear. Replace is necessary.
- ☐ Clean X and Z axis slide shafts.
- ☐ Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and rinse port, ensure that the probe is approximately centered in the vial.

SPS 4 Auto sampler

- ☐ Service not applicable
- ☒ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☒ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner.
- ☒ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☒ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☒ Pump Tubing Replacement. Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles
- ☒ Test using customer's tray and move the sample probe to the sample vial 1, wash vial and rinse port and ensure that the probe is centered in the vial. If not use calibration wizard and calibrate the position.

AVS 4, 6, 7 Advanced Valve System

- ☐ Service not applicable
- ☒ Replace valve rotor seal *- inspect*
- ☒ Check fittings for signs of leaks
- ☒ Check tubing including autosampler tubing for kinks or excessive wear
- ☒ Check high flow pump for signs of leaks

ICP-OES adjustment

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.

Record Post-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above, run the following instrument tests
 - ☒ Subsystem Communications Test
 - ☒ Air Flow
 - ☒ Water Flow
 - ☒ Gas Flows
 - ☒ RF Generator
 - ☒ Camera Test
 - ☒ Optics Test
 - ☒ Nebulizer Test

- ☒ Record the result in the Instrument Test Results Table

Restore Instrument

- ☐ For HF applications, ask the customer to reinstall their sample introduction system.
- ☒ Leave system in an idle state: on and purging.
- ☒ Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☐ Complete the Signature Page with both Service Engineer and Customer signatures.

Test Results

Instrument Performance Test Results Table

Note: These measurements do not form part of any specification and are for reference only.

	Pre PM Sensitivity Check		Post PM Sensitivity Check	
	Radial	Axial *	Radial	Axial*
Zn 213.857 nm SRBR	39603.8	146365.1	39,349.9	144,359.5
Mn 257.610 nm SRBR	153698.7	670560.3	159,250.0	713,496.1
Al 396.152 nm SBR	29883.5	200,141.7	29,985.9	196,807.0
K 766.491 nm SBR	99616.9	315122.8	99,398.4	286,8954.9

* Axial result is not applicable for G8016AA, G8012AA Radial View instruments.

Instrument Test Results Table

Note: The Instrument Test results are for systems using ICP Expert version 7.3 and above only.

Instrument Test	Result
Subsystem Communications Test	Pass
Air Flow	Pass
Water Flow	Pass
Gas Flows	Pass
RF Generator	Pass
Camera Test	Pass
Optics Test	Pass
Nebulizer test	Pass

ICP-OES Status Results Table

Note: These measurements do not form part of any specification and are for reference only.

Measurement	Standby Mode		Plasma On	
Mains Voltage	215.578	VAC	215.135	VAC
Mains Current	0.217	A	0.116	A
Instrument Temperature	24.4	°C	24.3	°C
RF Air Flow (sensor speed)	16.0	Hz	20.0	Hz
Plasma Exhaust Temperature	No measurement		47.3	°C
Water Flow Oscillator	No measurement		1.20	L/min
Water Flow Detector	1.12	L/min	1.09	L/min
Water Inlet Temperature	20.0	°C	23.5	°C
Polychromator Temperature	35.0	°C	35.0	°C
CCD Temperature	-40.0	°C	-40.0	°C
Thermal Stabilizer	34.8	°C	35.0	°C
Argon Supply Pressure	619.33	kPa	541.92	kPa
Purge Gas Supply Pressure*1	609.58	kPa	567.77	kPa
Option Gas Supply Pressure*1	—	kPa	—	kPa
Nebulizer Flow	No measurement		0.70	L/min
Nebulizer Back Pressure	No measurement		255.76	kPa
Plasma Gas Flow	No measurement		11.98	L/min
Auxiliary Gas Flow	No measurement		1.0	L/min
RF Power	No measurement		1199.9	W
RF Supply Current	No measurement		8.224	A
RF Supply Voltage	No measurement		194.422	V

*1 If option installed

Consumed PM Parts

Part Description	Part Number	Product or Model# where used	Quantity consumed
Axial Pre-Optic Window	G8010-68014	G8010A, G8011A, G8014A/G8015A	1
Radial Pre-Optic Window	G8010-68015	All	1
Agilent Cool Clear Coolant Fluid	5799-0037	Agilent Water Recirculator	—
Purge Gas Filter	G8010-60136	All	1
Air inlet filter	G8000-68002	All	1
High Capacity Air Filter	G8010-60189	Optional	—
Rotor seal for 6-7 port valve for AVS6/7	G8494-60002	G8494A/G8495	—
Rotor seal for 4 port valve for AVS4	G8493-60002	G8493A	—
Rinse solution to rinse station 2.5mm id x 1m	G8410-80123	SPS 4	1
Barb connector 2.5mm-1.5mm ID	G8410-80124	SPS 4	1
PVC waste tubing 8mm od x 5mm id, 2m	G8410-80122	SPS 4	1
Additional Parts may be required from engineer's stock:			
X axis drive belt	5410047500	SPS 3	—
Z axis drive belt	5410047400	SPS 3	—
Peristaltic pump tubing, PVC SolvaFlex, 3 bridged,	3710049000	SPS 4	—

Consumed Parts Reference (Purchased by customer, not included as part of PM)

☐ Section Not Applicable

Part Description	Part Number	Product or Model# where used	Quantity consumed
------------------	-------------	------------------------------	-------------------

Signature Page

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

- During PM found water tubing in instrument broken then water leaking inside instrument.
- Replace all water tube inside instrument, after replace found water flow sensor water leak also.
- Replace water module and continue pm without deviation.

Service Verification

Service Request Number: 60058354374 Date Service Completed: 2 - May - 2023

Service Engineer Name: Burin Ngamvijit Customer Name: Thiti Boonpeng

Service Engineer Signature: Burin Ng. Customer Signature: Thiti Boonpeng

Total number of pages in this document:

 SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY

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



Cert. No. : ACC22012
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No.: 34178117
ID No.: BKK_FS0630

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 : 22 APRIL 2022
Calibration Date : 26 APRIL 2022
Date of Issue : 29 APRIL 2022



Calibrated by : Nathakorn Pisutpaisan

Approved by : T. Petchurai
(Thanakul Petchurai)

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QF-TS12-04-04-020664

 SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACC22012
Job No. : VC65AC0055
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	33461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23
Audio Analyzer	AVR-3360A	V744B6069	EF-0010-22	07-Feb-23

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

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

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

T. Petchurai

 SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACC22012
Job No. : VC65AC0055
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	94.13	0.13	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1001.7	0.2	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
1.73	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

T. Petchurai

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

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



Cert. No. : ACL22177
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00658241 / 158767 / 58769
ID No.: BKK_FS0098

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 : 25 JULY 2022
Calibration Date : 15-18 AUGUST 2022
Date of Issue : 19 AUGUST 2022

REVIEW BY: *Nathakorn P.*
APPROVED BY: *T. Petchur*
NEXT CAL. DATE: 15/8/23

Calibrated by : Nathakorn Pisutpaisan

Approved by : *T. Petchur*
(Thanakul Petchurai)

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SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22177
Job No. : VC65AC0071
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

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SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22177
Job No. : VC65AC0071
Pages : 3 of 8

Summary of Measurement Result :

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

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SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22177
Job No. : VC65AC0071
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
16.1

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	18.0
Flat	23.7

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.5	0.5	0.6	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	-1.7	-1.7	-1.7	±5.0

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22177
Job No. : VC65AC0071
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.1	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.1	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	94.1	0.1	± 0.3

QF-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL22177
Job No. : VC65AC0071
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	119.1	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	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

QF-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL22177
Job No. : VC65AC0071
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	107.9	-0.1	1.5 ; -5.0
	200	800	127.6	127.5	-0.1	±1.0
	0.25	1	99.0	98.8	-0.2	1.5 ; -5.0
SEL	2	8	108.0	107.9	-0.1	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	132.9	-0.1	-
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. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL22177
Job No. : VC65AC0071
Pages : 8 of 8

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-04-020664

T. Petch.

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

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



Cert. No. : ACL22167
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00658242 / 157782 / 48097
ID No.: BKK_FS0099

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 : 06 JULY 2022
Calibration Date : 11-18 JULY 2022
Date of Issue : 19 JULY 2022



Calibrated by : Nathakorn Pisutpaisan

Approved by : (Thanakul Petchurni)

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SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22167
Job No. : VC65AC0069
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22167
Job No. : VC65AC0069
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

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22167
Job No. : VC65AC0069
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
17.7

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

Frequency Weighting	Measured value (dB)
A - weight	16.1
C - weight	21.7
Flat	27.4

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	-1.4	-1.3	-1.3	±5.0

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22167
Job No. : VC65AC0069
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

Continuation of Calibration Certificate

Cert. No. : ACL22167
Job No. : VC65AC0069
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	27.9	-0.1	± 1.1
27.0	27.1	0.1	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.1	0.1	± 1.1

QF-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL22167
Job No. : VC65AC0069
Pages : 7 of 8

8. Level linearity including the level range control

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

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.6	-0.8	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
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. Petch

Continuation of Calibration Certificate

Cert. No. : ACL22167
Job No. : VC65AC0069
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

QF-TS12-04-04-020664

T. Petch

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

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



Cert. No. : ACL22252
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00858517 / 157784 / 48099
ID No.: BKK_FSD107

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 : 01 NOVEMBER 2022
Calibration Date : 02-03 NOVEMBER 2022
Date of Issue : 04 NOVEMBER 2022



Calibrated by : Nathakorn Pisutpaisan

Approved by : *T. Petchur*
(Thanakul Petchurai)

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QF-TS12-04-04-020664

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22252
Job No. : VC66AC0004
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL_BP_04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL_BP_03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL_BP_05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KA1	34560495	AA-3005-22	22-Feb-23

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

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

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22252
Job No. : VC66AC0004
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

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22252
Job No. : VC66AC0004
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
16.3

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

Frequency Weighting	Measured value (dB)
A - weight	12.6
C - weight	18.7
Flat	24.4

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	-1.2	-1.1	-1.1	±5.0

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22252
Job No. : VC66AC0004
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

Continuation of Calibration Certificate

Cert. No. : ACL22252
Job No. : VC66AC0004
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	63.9	-0.1	± 1.1
59.0	59.0	0.0	± 1.1
54.0	53.9	-0.1	± 1.1
49.0	48.9	-0.1	± 1.1
44.0	43.9	-0.1	± 1.1
39.0	38.9	-0.1	± 1.1
34.0	33.9	-0.1	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

QF-TS12-04-04-020664

T. Peth

Continuation of Calibration Certificate

Cert. No. : ACL22252
Job No. : VC66AC0004
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, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.3	-0.1	±3.0

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

QF-TS12-04-04-020664

T. Peth

Continuation of Calibration Certificate

Cert. No. : ACL22252
Job No. : VC66AC0004
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	89.7	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. Peth

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

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



Cert. No. : ACL22302
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00838521 / 158765 / 58767
ID No.: BKK_FS0111

Condition As Found : GOOD

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

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

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

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchurui
(Thanakul Petchurui)

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QF-TS12-04-04-020664

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22302
Job No. : VC66AC0016
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22302
Job No. : VC66AC0016
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

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22302
Job No. : VC66AC0016
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.8

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

Frequency Weighting	Measured value (dB)
A - weight	11.6
C - weight	18.1
Flat	23.8

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.4	± 1.5
1000	0.1	0.0	0.0	± 1.0
8000	-1.9	-1.8	-1.8	±5.0

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22302
Job No. : VC66AC0016
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

Continuation of Calibration Certificate

Cert. No. : ACL22302
Job No. : VC66AC0016
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	59.1	0.1	± 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	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

QF-TS12-04-04-020664

T. Petch...

Continuation of Calibration Certificate

Cert. No. : ACL22302
Job No. : VC66AC0016
Pages : 7 of 8

8. Level linearity including the level range control

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

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.4	-1.0	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.1	-0.3	±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. : ACL22302
Job No. : VC66AC0016
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	89.7	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. Petch...

Cert. No. : ACL22168
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00658243 / 157783 / 48098
ID No.: BKK_FS0100

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 : 06 JULY 2022
Calibration Date : 11-18 JULY 2022
Date of Issue : 19 JULY 2022



Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur
(Thanakul Petchurai)

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other than in full, except with the prior written approval of the head of Calibration Laboratory.

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22168
Job No. : VC65AC0069
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL-BP_04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL-BP_03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL-BP_05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL22168
Job No. : VC65AC0069
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. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL22168
Job No. : VC65AC0069
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.7

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

Frequency Weighting	Measured value (dB)
A - weight	13.1
C - weight	19.1
Flat	25.0

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.3	± 1.5
1000	0.0	-0.1	0.0	± 1.0
8000	-1.4	-1.4	-1.4	±5.0

QF-TS12-04-04-020664

T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL22168
Job No. : VC65AC0069
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

Continuation of Calibration Certificate

Cert. No. : ACL22168
Job No. : VC65AC0069
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	132.9	-0.1	± 1.1
132.0	131.9	-0.1	± 1.1
131.0	130.9	-0.1	± 1.1
129.0	128.9	-0.1	± 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	30.1	0.1	± 1.1
29.0	29.1	0.1	± 1.1
28.0	28.0	0.0	± 1.1
27.0	27.1	0.1	± 1.1
26.0	26.2	0.2	± 1.1
25.0	25.2	0.2	± 1.1

QF-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL22168
Job No. : VC65AC0069
Pages : 7 of 8

8. Level linearity including the level range control

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

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.6	-0.8	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
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. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL22168
Job No. : VC65AC0069
Pages : 8 of 8

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-04-020664

T. Petch.

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00858516 / 158777 / 58778
ID No.: BKK_FS0106

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 : 01 NOVEMBER 2022
Calibration Date : 02-03 NOVEMBER 2022
Date of Issue : 04 NOVEMBER 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchurai
(Thanakul Petchurai)

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other than in full, except with the prior written approval of the head of Calibration Laboratory.

QF-TS12-04-04-020664

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL_BP_04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL_BP_03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL_BP_05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

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

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
16.8

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	16.6
Flat	22.5

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.8	0.8	0.8	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	-2.6	-2.5	-2.5	±5.0

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22251
Job No. : VC66AC0004
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighing network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

QF-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL22251
Job No. : VC66AC0004
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	132.9	-0.1	± 1.1
132.0	131.9	-0.1	± 1.1
131.0	130.9	-0.1	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.0	0.0	± 1.1
27.0	27.0	0.0	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.0	0.0	± 1.1

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T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL22251
Job No. : VC66AC0004
Pages : 7 of 8

8. Level linearity including the level range control

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

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
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

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T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL22251
Job No. : VC66AC0004
Pages : 8 of 8

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-04-020664

T. Petch.

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

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



Cert. No. : ACC22043
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No.: 34178118
ID No.: BKK_FS0631

Condition As Found : GOOD

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

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

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



Calibrated by : Nathakorn Pisutpaisan

Approved by : T. Petchurai
(Thanakul Petchurai)

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SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACC22043
Job No. : VC66AC0016
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	33461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23
Audio Analyzer	AVR-3360A	V744B6069	EF-0010-22	07-Feb-23

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

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

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

T. Petchurai

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACC22043
Job No. : VC66AC0016
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	94.13	0.13	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1001.7	0.2	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
2.13	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

T. Petchurai

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

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



Cert. No. : ACL22246
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00597155 / 180398 / 88168
ID No.: BKK_FS0993

Condition As Found : GOOD

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

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

Received Date : 11 OCTOBER 2022
Calibration Date : 25-26 OCTOBER 2022
Date of Issue : 27 OCTOBER 2022



Calibrated by : Nathakorn Pisutpaisan

Approved by : T. Petchurai
(Thanakul Petchurai)

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Continuation of Calibration Certificate

Cert. No. : ACL22246
Job No. : VC65AC0090
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22246
Job No. : VC65AC0090
Pages : 3 of 8

Summary of Measurement Result :

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

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Continuation of Calibration Certificate

Cert. No. : ACL22246
Job No. : VC65AC0090
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
16.4

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

Frequency Weighting	Measured value (dB)
A - weight	11.6
C - weight	17.6
Flat	23.2

3. Acoustical signal tests of frequency weightings

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

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

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22246
Job No. : VC65AC0090
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.0	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. : ACL22246
Job No. : VC65AC0090
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	27.0	0.0	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.0	0.0	± 1.1

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Continuation of Calibration Certificate

Cert. No. : ACL22246
Job No. : VC65AC0090
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, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.9	-0.5	±3.0

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

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Continuation of Calibration Certificate

Cert. No. : ACL22246
Job No. : VC65AC0090
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

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



Cert. No. : ACL22191
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00597156 / 170403 / 72904
ID No.: BKK_FS0994

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 : 06 SEPTEMBER 2022
Calibration Date : 07-09 SEPTEMBER 2022
Date of Issue : 14 SEPTEMBER 2022

REVIEW BY	<i>Nathakorn P</i>
APPROVED BY	<i>T. Petchum</i>
NEXT CAL. DATE	9/9/23

Calibrated by : Nathakorn Pisutpaisan

Approved by : *T. Petchum*
(Thanakul Petchumai)

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Continuation of Calibration Certificate

Cert. No. : ACL22191
Job No. : VC65AC0081
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL_BP_04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL_BP_03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL_BP_05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KA1	34560495	AA-3005-22	22-Feb-23

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL22191
Job No. : VC65AC0081
Pages : 3 of 8

Summary of Measurement Result :

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

QF-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL22191
Job No. : VC65AC0081
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.3

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	18.0
Flat	23.5

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.6	0.7	0.7	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	-2.7	-2.7	-2.6	±5.0

QF-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL22191
Job No. : VC65AC0081
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	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	94.1	0.1	± 0.3

QF-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL22191
Job No. : VC65AC0081
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	26.0	0.0	±1.1
25.0	24.9	-0.1	±1.1

QF-TS12-04-04-020664

T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL22191
Job No. : VC65AC0081
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	107.9	-0.1	1.5 ; -5.0
	200	800	127.6	127.5	-0.1	±1.0
SEL	0.25	1	99.0	98.8	-0.2	1.5 ; -5.0
	2	8	108.0	107.9	-0.1	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

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

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
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. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL22191
Job No. : VC65AC0081
Pages : 8 of 8

11. Overload indication

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

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.1	137.0	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. Petchur

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



Cert. No. : ACL22197
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00597163 / 180406 / 88176
ID No.: BKK_FS0998

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHUWAENG 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 : 15 SEPTEMBER 2022
Calibration Date : 19-21 SEPTEMBER 2022
Date of Issue : 27 SEPTEMBER 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by : T. Petchur
(Thanakul Petchurai)

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QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22197
Job No. : VC65AC0083
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

T. Retan

Continuation of Calibration Certificate

Cert. No. : ACL22197
Job No. : VC65AC0083
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. Retan

Continuation of Calibration Certificate

Cert. No. : ACL22197
Job No. : VC65AC0083
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.8

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

Frequency Weighting	Measured value (dB)
A - weight	12.9
C - weight	19.3
Flat	24.7

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	0.0	0.0	0.0	± 1.0
8000	0.1	0.2	0.2	±5.0

QF-TS12-04-04-020664

T. Retan

Continuation of Calibration Certificate

Cert. No. : ACL22197
Job No. : VC65AC0083
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	-0.1	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

QF-TS12-04-04-020664

T. Retan

Cert. No. : ACL22197
Job No. : VC65AC0083
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	63.9	-0.1	± 1.1
59.0	59.0	0.0	± 1.1
54.0	53.9	-0.1	± 1.1
49.0	48.9	-0.1	± 1.1
44.0	43.9	-0.1	± 1.1
39.0	38.9	-0.1	± 1.1
34.0	33.9	-0.1	± 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	26.0	0.0	± 1.1
25.0	25.1	0.1	± 1.1

QF-TS12-04-04-020664

T. Petchurai

Cert. No. : ACL22197
Job No. : VC65AC0083
Pages : 7 of 8

8. Level linearity including the level range control

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

9. Tone burst response

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

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.6	-0.8	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
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. Petchurai

Cert. No. : ACL22197
Job No. : VC65AC0083
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle	0.0	±1.5
89.6	89.6		

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-04-020664

T. Petchurai

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



Cert. No. : ACC22042
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No. : 34425567
ID No. : BKK_FS0618

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 : 30 NOVEMBER 2022
Calibration Date : 07 DECEMBER 2022
Date of Issue : 12 DECEMBER 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by : T. Petchurai
(Thanakul Petchurai)

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Continuation of Calibration Certificate

Cert. No. : ACC22042
Job No. : VC66AC0015
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	33461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KA1	34560495	AA-3005-22	22-Feb-23
Audio Analyzer	AVR-3360A	V744B6069	EF-0010-22	07-Feb-23

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

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

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACC22042
Job No. : VC66AC0015
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	94.05	0.05	0.15	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1003.7	0.4	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
1.70	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

T. Petchur

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY

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



Cert. No. : ACL23054
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00597162 / 180405 / 88175
ID No. : BKK_FS0997

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 : 17 JANUARY 2023
Calibration Date : 19-20 JANUARY 2023
Date of Issue : 23 JANUARY 2023

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur
(Thanakul Petchur)

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Continuation of Calibration Certificate

Cert. No. : ACL23054
Job No. : VC66AC0026
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

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

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KA1	34560495	AA-3005-22	22-Feb-23

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

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

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL23054
Job No. : VC66AC0026
Pages : 3 of 8

Summary of Measurement Result :

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

QF-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23054
Job No. : VC66AC0026
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

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

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.8

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	18.3
Flat	24.1

3. Acoustical signal tests of frequency weightings

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

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

QF-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23054
Job No. : VC66AC0026
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	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

QF-TS12-04-04-020664

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Continuation of Calibration Certificate

Cert. No. : ACL23054
Job No. : VC66AC0026
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	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

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Continuation of Calibration Certificate

Cert. No. : ACL23054
Job No. : VC66AC0026
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, L _{peak} (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	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

QF-TS12-04-04-020664

P. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23054
Job No. : VC66AC0026
Pages : 8 of 8

11. Overload indication

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

12. High level stability

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

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

End of Calibration Certificate

QF-TS12-04-04-020664

P. Petch

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CERTIFICATE OF CALIBRATION

Certificate No. : CL-079-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: DeltaOHM
Model: HD32.2
Serial No: 13024785
ID No: BKA_FSD641

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

Received date: 25 May 2022
Calibration date: 26 May 2022
Issue date: 02 Jun 2022

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500, Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000A 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-0034-22, Certificate number: ER-0032-21

REVIEW BY: *Manakorn P.*
APPROVED BY: *[Signature]*
NEXT CAL DATE: 26/5/23

Calibrated by
□ Mr. Sorawit Thachalad
□ Miss Jitraporn Lertsomphol



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

63/14-15,67/35-36, Soi Petchkasem 7,7/1, Petchkasem Rd,
Wattapra, Bangkokkhyai, Bangkok 10600 Thailand.

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Certificate No. : CL-079-65
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: 13030282.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.056	20.8	0.7	0.099
30	25.049	25.8	0.8	0.099
30	30.040	30.8	0.8	0.099
30	35.035	35.8	0.8	0.099
30	40.029	40.9	0.9	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 13023259.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.056	20.4	0.3	0.099
70	25.049	25.3	0.3	0.099
70	30.040	30.4	0.4	0.099
70	35.035	35.3	0.3	0.099
70	40.029	40.1	0.1	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 13044157.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.056	20.7	0.6	0.099
110	25.049	25.8	0.8	0.099
110	30.040	30.8	0.8	0.099
110	35.035	35.8	0.8	0.099
110	40.029	40.8	0.8	0.099

UUC* : Unit Under Calibration

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

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-012-65
Page 1 of 2

Equipment Name: Heat Stress Monitor with Sensor
Manufacturer: DeltaOHM
Model: H032.2
Serial No: 13024797
ID No: BKK_FS0642

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: 10 JAN 2022
Calibration date: 14 FEB 2022
Issue date: 17 FEB 2022

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 *Phanpim P.*
APPROVED BY *[Signature]*
NEXT CAL DATE *14/2/23*

Calibrated by
☐ Mr. Sorawit Thachalead
☒ Miss Orathai Wiwatwittaya

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



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Certificate No.: CL-012-65
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: 13035038.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.055	20.0	-0.1	0.099
30	25.037	25.0	0.0	0.099
30	30.019	30.0	0.0	0.099
30	35.006	35.0	0.0	0.099
30	40.002	40.0	0.0	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 13033291.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.051	20.0	-0.1	0.099
70	24.990	24.7	-0.3	0.099
70	29.917	29.5	-0.4	0.099
70	34.873	34.4	-0.5	0.099
70	39.864	39.4	-0.5	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 13042466.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.053	20.1	0.0	0.099
110	25.036	25.1	0.1	0.099
110	30.026	30.1	0.1	0.099
110	35.020	35.0	0.0	0.099
110	40.009	40.0	0.0	0.099

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

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-052-65
Page 1 of 2

Equipment Name: Digital thermometer with RTD
Manufacturer: DeltaOHM
Model: H032.2
Serial No: 13032240
ID No: BKK_FS0649

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: 15 MAR 2022
Calibration date: 17 MAR 2022
Issue date: 18 MAR 2022

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 *Phanpim P.*
APPROVED BY *[Signature]*
NEXT CAL DATE *17/3/23*

Calibrated by
☐ Mr. Sorawit Thachalead
☒ Miss Orathai Wiwatwittaya

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



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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: 13035023.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.082	20.1	0.0	0.099
30	25.075	25.1	0.0	0.099
30	30.068	30.1	0.0	0.099
30	35.064	35.1	0.0	0.099
30	40.056	40.1	0.0	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 13044776.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.082	20.2	0.1	0.099
70	25.076	25.0	-0.1	0.099
70	30.068	29.9	-0.3	0.099
70	35.062	34.8	-0.6	0.099
70	40.031	39.7	-0.3	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 13023215.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.082	20.0	-0.1	0.099
110	25.075	25.0	-0.1	0.099
110	30.068	30.0	-0.1	0.099
110	35.064	35.0	-0.1	0.099
110	40.056	40.0	-0.1	0.099

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

★ End of Certificate ★





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Walthapra, Bangkokkhyai, Bangkok 10600 Thailand.
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CERTIFICATE OF CALIBRATION

Certificate No. : CL-127-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: DeltaOHM
Model: HD32.2
Serial No: 15006298
ID No: BKK_FS0659

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

Received date: 04 Jul 2022
Calibration date: 11 Jul 2022
Issue date: 12 Jul 2022

Reference Used During Calibration

1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 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-0034-22, Certificate number: ER-0032-
21



Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol

Approved Signatory:
Mr. Parinya Booncharoen
Calibration Department Manager



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Certificate No. : CL-127-65
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: 14039057.
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	25.039	25.0	0.0	0.099
30	30.030	30.0	0.0	0.099
30	35.022	35.0	0.0	0.099
30	40.019	40.0	0.0	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15008015.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.049	20.3	0.3	0.099
70	25.039	25.0	0.0	0.099
70	30.031	29.8	-0.2	0.099
70	35.022	34.6	-0.4	0.099
70	40.019	39.5	-0.5	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15003260.
Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.049	20.1	0.1	0.099
110	25.039	25.1	0.1	0.099
110	30.031	30.1	0.1	0.099
110	35.022	35.1	0.1	0.099
110	40.019	40.1	0.1	0.099

UUC* : Unit Under Calibration

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

★ End of Certificate ★



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CERTIFICATE OF CALIBRATION

Certificate No. : CL-125-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: DeltaOHM
Model: HD32.2
Serial No: 15006698
ID No: BKK_FS0669

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

Received date: 04 Jul 2022
Calibration date: 08 Jul 2022
Issue date: 12 Jul 2022

Reference Used During Calibration

1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 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-0034-22, Certificate number: ER-0032-
21



Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol

Approved Signatory:
Mr. Parinya Booncharoen
Calibration Department Manager



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Certificate No. : CL-125-65
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: 15015840.
Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.035	20.2	0.2	0.099
30	25.039	25.2	0.2	0.099
30	30.035	30.2	0.2	0.099
30	35.027	35.2	0.2	0.099
30	40.017	40.2	0.2	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015490.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.034	20.4	0.4	0.099
70	25.039	25.2	0.2	0.099
70	30.035	30.0	0.0	0.099
70	35.027	34.9	-0.1	0.099
70	40.018	39.7	-0.3	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 20019644.
Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.034	20.1	0.1	0.099
110	25.038	25.1	0.1	0.099
110	30.035	30.2	0.2	0.099
110	35.027	35.2	0.2	0.099
110	40.017	40.2	0.2	0.099

UUC* : Unit Under Calibration

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

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-147-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: DeltaOHM
Model: HD32.2
Serial No: 15001968
ID No: BKK_FS0655

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

Received date: 12 Sep 2022
Calibration date: 28 Sep 2022
Issue date: 03 Oct 2022

Reference Used During Calibration

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

Calibration Condition

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

Calibration Procedure

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

Traceability

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

REVIEW BY: *Mr. Parinya Booncharoen*
APPROVED BY: *Mr. Parinya Booncharoen*
NEXT CAL DATE: 28/9/23

Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jittrapon Lertsomphol



Approved Signatory: *Mr. Parinya Booncharoen*
Calibration Department Manager

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

Certificate No.: CL-147-65
Page 2 of 2

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Functions:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 15003283.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.060	20.1	0.0	0.099
30	25.056	25.1	0.0	0.099
30	30.054	30.1	0.0	0.099
30	35.047	35.1	0.1	0.099
30	40.041	40.1	0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15008014.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.059	20.2	-0.1	0.099
70	25.056	25.0	-0.1	0.099
70	30.054	29.9	-0.2	0.099
70	35.047	34.8	-0.2	0.099
70	40.041	39.6	-0.4	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 20029734.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.060	20.0	-0.1	0.099
110	25.056	25.0	0.0	0.14
110	30.054	30.0	-0.1	0.099
110	35.045	35.0	0.0	0.099
110	40.041	40.0	0.0	0.099

UUC*: Unit Under Calibration

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

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-123-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: DeltaOHM
Model: HD32.2
Serial No: 15002056
ID No: BKK_FS0658

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

Received date: 04 Jul 2022
Calibration date: 08 Jul 2022
Issue date: 12 Jul 2022

Reference Used During Calibration

1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 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-0034-22, Certificate number: ER-0032-
21

REVIEW BY: *Mr. Parinya Booncharoen*
APPROVED BY: *Mr. Parinya Booncharoen*
NEXT CAL DATE: 8/7/23

Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jittrapon Lertsomphol



Approved Signatory: *Mr. Parinya Booncharoen*
Calibration Department Manager

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Certificate No.: CL-123-65
Page 2 of 2

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 ~ 40 °C

Functions:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 15009687.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.047	19.9	-0.1	0.099
30	25.041	24.9	-0.1	0.099
30	30.034	29.9	-0.1	0.099
30	35.028	34.9	-0.1	0.099
30	40.022	39.9	-0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15003274.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.047	20.5	0.5	0.099
70	25.041	24.9	-0.1	0.099
70	30.034	29.8	-0.2	0.099
70	35.029	34.7	-0.3	0.099
70	40.021	39.6	-0.4	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 18009534.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.047	19.9	-0.1	0.099
110	25.041	24.9	-0.1	0.099
110	30.035	29.9	-0.1	0.099
110	35.029	34.9	-0.1	0.099
110	40.022	39.9	-0.1	0.099

UUC*: Unit Under Calibration

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

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-124-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: DeltaOHM
Model: HD32.2
Serial No: 15006299
ID No: BKK_FS0660

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: 04 Jul 2022
Calibration date: 08 Jul 2022
Issue date: 12 Jul 2022

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667862-09, Due date: 23 Mar 2023
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-0034-22, Certificate number: ER-0032-
21

REVIEW BY: *Amphorn P.*
APPROVED BY: *5/6*
NEXT CAL DATE: 8/7/23

Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol

Approved Signatory: *25/07/22*
Mr. Parinya Booncharoen
Calibration Department Manager



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HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

Certificate No.: CL-124-65
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: 15003277.
Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.048	20.1	0.1	0.099
30	25.040	25.1	0.1	0.099
30	30.035	30.1	0.1	0.099
30	35.029	35.1	0.1	0.099
30	40.022	40.1	0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15008017.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.047	20.3	0.3	0.099
70	25.041	25.1	0.1	0.099
70	30.035	30.0	0.0	0.099
70	35.029	34.9	-0.1	0.099
70	40.022	39.8	-0.2	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15008173.
Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.047	20.3	0.3	0.099
110	25.041	25.3	0.3	0.099
110	30.035	30.3	0.3	0.099
110	35.029	35.3	0.3	0.099
110	40.022	40.3	0.3	0.099

UUC*: Unit Under Calibration

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

★ End of Certificate ★



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 19, SUAN LUANG, SUAN LUANG BANGKOK 10250
TEL: 0-2717-3000-27 FAX: 0-2719-0444



Cert. No.: 22CH1222
Page: 1 of 2

Certificate of Calibration

Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: Seven Compact S220
Serial No.: B520948426
ID No.: BKK_EN0072
Condition As-Received: Used Item
Received Date: 09 September 2022
Calibration Date: 12 September 2022
Reference: 2209-0312DSC-1
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanasak 40, Phatthanasak Rd.,
Khwaeng Phatthanasak, Khet Suan Luang,
Bangkok 10250 Thailand

Ambient Temperature: (25 ± 2.5) °C
Relative Humidity: (50 ± 15) %
Calibration Procedure: In-house method:
- CP-CH5 by direct measurement with standard
voltage calibrator and direct measurement
with certified reference material (CRM)

Calibrated by: Warakorn Lemgagrakul

Approved by: *Malee*
Approved Signatory

(✓) Malee Buksua
() Sathip Moangmai
() Warakorn Lemgagrakul

Issue Date: 15 September 2022

The Uncertainties are for a confidence probability of approximately 95%

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Cert. No.: 22CH1222
Page: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument: -

Instrument: Document Process Calibrator
Serial No.: 54030049 ID No.: 130RC116 Cert. No.: 22E2789 Due Date: 24 Aug 2023
This certification is traceable to the International System of Unit maintained at:-
- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials: - The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	823320	20 June 2024
pH 6.985	CPA chem	794122	14 Feb 2023
pH 10.008	CPA chem	823323	20 June 2023

3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration Results

Function: mV Measurement

Performing standard curve by Fluke at pH (4.7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement	Coverage factor
	pH	mV	mV	pH	(mV)	k
pH Meter S/N: B520948426	4.000	177.48	177.4	4.000	0.058	2.00
	7.000	0.00	0.0	7.000	0.058	2.00
	10.000	-177.48	-177.5	10.000	0.058	2.00

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 pH Reading (mV)	Uncertainty of pH measurement (±)	Coverage factor k
pH Electrode	4.008	3.999	153.9	0.0055	2.00
S/N: PCE-66-EX1001	6.985	7.017	-13.7	0.0084	2.00
	10.008	9.996	-179.0	0.0078	2.00

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%.

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Malee

Certificate of Calibration

Represent to Certificate of Calibration :PTC/07/22071

Certificate No.: PTC/07/22071 Page: 1 of 2
Equipment: Digital Balance Condition: Normal
Manufacturer: Sartorius Serial No: 26207042
Model: MSE224-100-DU ID No: BKK_EN0002
Type of Balance: Single interval



Customer: ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakarn 40 Phatthanakarn Rd.,
Khwaeng Phatthanakarn, Khet Suan Luang, Bangkok 10250.

Environment Condition: Temperature 21.5 °C ± 0.7 °C
Humidity 61.8 %RH ± 4.7 %RH
Air density 1.19 kg/m³

REVIEW BY: *[Signature]*
APPROVED BY: *[Signature]*
NEXT CAL. DATE: 8/5/2023

Calibration Place: ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakarn 40 Phatthanakarn Rd.,
Khwaeng Phatthanakarn, Khet Suan Luang, Bangkok 10250.

The Method used: In house method, PTC-WI-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: February 25, 2022

Calibration Date: February 25, 2022

Issued Date: March 01, 2022

Calibration By: Mr. Rungroj Metakul



PENTA CALIBRATION CO., LTD.

[Signature]
(Mr. Kriangsak Kalasin)
Reviewed by

Approved By: *[Signature]*
(Mr. Keattisak Kerdti)
Laboratory Manager

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognised 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-FMD-07-02-3 Feb, 2020

Represent to Certificate of Calibration :PTC/07/22071

Certificate No.: PTC/07/22071

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	-0.0002	-0.0001	0.0001	-0.0001
Maximum deviation: 0.0002				

Repeatability Test : Weight to be 1/2 ≤ L, ≤ Maximum capacity

Determination of the standard deviation of weighing balance., Readability 0.0001 (g)

Nominal test value (g)	Standard Deviation
200	0.00005

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	0.00016	2.52
0.1	0.10000	0.1000	0.0000	0.00017	2.20
0.5	0.50000	0.5000	0.0000	0.00016	2.28
1	1.00001	1.0000	0.0000	0.00016	2.28
2	2.00001	2.0000	0.0000	0.00016	2.28
5	5.00001	5.0000	0.0000	0.00016	2.28
10	10.00002	10.0000	0.0000	0.00016	2.28
20	20.00002	20.0000	0.0000	0.00016	2.23
50	50.00001	50.0000	0.0000	0.00017	2.15
100	100.00002	99.9999	0.0001	0.00020	2.06
120	120.00004	120.0000	0.0000	0.00023	2.03
150	150.00003	150.0000	0.0000	0.00026	2.00
200	200.00003	199.9999	0.0001	0.00030	2.00

Note: Weight of adjust (g)

The End of Certificate

PTC-FMD-07-02-3 Feb, 2020

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



SARTORIUS

REVIEW BY: *[Signature]*
APPROVED BY: *[Signature]*
NEXT CAL. DATE: 8/5/24

Certificate of Calibration

Model Number: MSE224S-100-DU Certificate No.: 23BCI0072
Description: Analytical Balance Issued Date: Monday, February 13, 2023
Serial Number: 26207042 Reference No.: 203245
ID No.: BKK_EN0002
Manufacturer: Sartorius Page No.: 1 of 2

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

104 Phatthanakarn 40 Phatthanakarn Rd., Khwaeng Phatthanakarn, Khet Suan Luang, Bangkok 10250.

Calibrated Place: Balance Room

Calibrated By: Mr. Chonchai Inthana

Calibration Date: Wednesday, February 08, 2023

Metrological data:

Capacity: 220 g Readability: 0.0001 g

Reasons for calibration

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

Calibration Procedure No.: This calibration was conducted by Using in-house calibration procedure number (WI-003) Based on UKAS LAB 14 : 2019

Ambients Conditions:

Temperature: 23.2 °C ± 5.0 °C

Humidity: 60.0 % RH ± 10.0 % RH

Pressure: ±

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 - 5000g E2, YCS011-522-00	SPC-RT	C02212595	14-Sep-2023
MHB-382SD	Humidity/Balance/Temp. Lubron MHB-382SD	DKSH	C19220444	6-Sep-2023

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

[Signature]

Mr. Chonchai Inthana (Technical Manager)



SOP FM 33 03 February 2022

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

SARTORIUS

Certificate of Calibration

Model Number: MSE224S-100-DU Certificate No.: 23BCI0072
Description: Analytical Balance Issued Date: Monday, February 13, 2023
Serial Number: 26207042 Reference No.: 203245
ID No.: BKK_EN0002
Manufacturer: Sartorius Page No.: 2 of 2

Calibration Results : Without Adjustment

Repeatability			Eccentricity (Off-center loading error)		
The reproducibility is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.			The off-center loading error is yielded by the difference between the reading of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to GUM, R78).		
Nominal Value : (Low Load)	20.0000	200.0000	Nominal value:	50	g
20 g	20.0000	199.9999	Tolerance	0.0004	g
Tolerance	0.0001 g	0.0001 g	Difference		
	20.0000	199.9999		1	-
	20.0001	200.0000		2	-0.0001
Nominal Value : (High Load)	20.0000	200.0000		3	0.0000
200 g	20.0000	199.9999		4	0.0001
Tolerance	0.0001 g	0.0001 g		5	0.0000
	20.0000	200.0000		6	-
	20.0001	199.9999	Standard Deviation		
	0.00004	0.00005			

Linearity

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

Tolerance 0.0002 g				
Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
0.01	0.0100	0.0100	0.0000	0.00014
0.1	0.1000	0.1000	0.0000	0.00014
1	1.0000	1.0000	0.0000	0.00014
2	2.0000	2.0000	0.0000	0.00014
5	5.0000	5.0000	0.0000	0.00014
10	10.0000	10.0000	0.0000	0.00014
20	20.0000	20.0000	0.0000	0.00014
50	50.0000	50.0000	0.0000	0.00015
100	100.0000	100.0000	0.0000	0.00019
200	200.0000	199.9999	-0.0001	0.00030

End of Report

SOP FM 33 03 February 2022



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhloi, Saraburi 18110, Thailand.
Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100
Bangkok Tel : +668 9205 6851 , +669 8247 2380
Website : www.scieco.co.th E-Mail : calibrate@sci.co.th



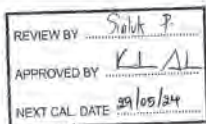
NSC-TIS-17025
CALIBRATION 5244

Certificate No. T222502

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Oven)
Manufacturer : Memmert
Model : UF 450
Serial No. : B7170531
Customer Code : BKK_EN0273
ID No. : T8042A4
Customer : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Kluweng Phatthanakan,
Khet Suan Luang, Bangkok 10250
Customer Location : Oven Room
Date of Receipt : 23 November 2022
Calibrated By : Sujjar Naknakred (Site Calibration Manager)
Approved By : Bunlorn /Boonchai Suriyawong (Site Calibration Manager)
Date of Issue : 9 DEC 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.

FM-L15 (17)15-05-64



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhloi, Saraburi 18110, Thailand.



NSC-TIS-17025
CALIBRATION 5244

Certificate No. T222502

Page 2 of 4

Calibration Report

Equipment : Chamber (Oven)
Date of Calibration : 29 November 2022
Environment : Temperature : 29.1-29.6 °C
Line Voltage : 221.3-223.2 V
Relative Humidity : 55-65 %RH

Condition of this results of calibration :

- This equipment was calibrated by insert nine resistance thermometer detectors and nine standard thermocouples type T into its chamber , the other one resistance thermometer detector use for ambient temperature measurement .
The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986).
All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .
- Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
RTD	100 ohm	27-CH1-10	T210004	30 December 2022
TC	TYPE T	TN261-TN270	T210010	30 December 2022
DATA LOGGER	34970A	T149	T210004	30 December 2022
- This certificate is traceable to :
National Institute of Metrology (Thailand) through Metrological Center (NSC-TIS-TIS 17025 CALIBRATION 0244).
- Condition of calibrated item : good
Equipment Description :
Time Constant : 1 Hour 49 Minute At 104 °C
Fresh Air Damper : ☒ Open ☐ Min ☐ Medium ☒ Max
☐ Close
☐ Not Available
- Adjustment :
() without adjustment (X) after adjustment

Approved By : Bunlorn

FM-L15 (17)15-05-64



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhloi, Saraburi 18110, Thailand.

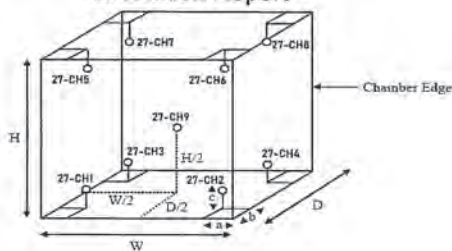


NSC-TIS-17025
CALIBRATION 5244

Certificate No. T222502

Page 3 of 4

Calibration Report



Remark :

Internal Dimensions of Chamber : W (Width) = 104 cm , H (Height) = 72 cm and D (Depth) = 60 cm.
Size of Installed Standard sensor number 27-CH1 to number 27-CH9 : a = 5 cm, b = 5 cm and c = 5 cm.
Size of Installed Standard sensor number 27-CH9 : W/2 = 104 cm/2 , H/2 = 72 cm/2 and D/2 = 60cm/2

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)								
	27-CH1	27-CH2	27-CH3	27-CH4	27-CH5	27-CH6	27-CH7	27-CH8	27-CH9
104	104.07	103.63	103.45	104.02	104.47	102.57	104.59	103.78	104.15

Chamber (Oven)		Temperature Distribution					
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage Factor k
	Min , Max	Average					
104.0	-	104.0	103.97	0.97	0.70	0.42	2.00

* The quoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and piece of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a distribution, providing

a level of confidence of approximately 95 %.

Approved By : Bunlorn

FM-L15 (17)15-05-64



Metrological Center

SCI ECO Services Company Limited

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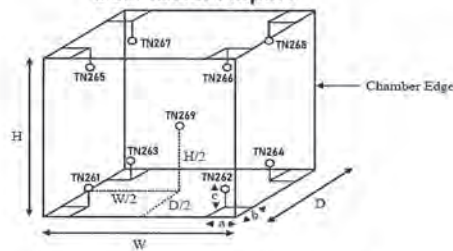


NSC-TIS-17025
CALIBRATION 5244

Certificate No. T222502

Page 4 of 4

Calibration Report



Remark :

Internal Dimensions of Chamber : W (Width) = 104 cm , H (Height) = 72 cm and D (Depth) = 60 cm.
Size of Installed Standard sensor number TN261 to number TN268 : a = 5 cm, b = 5 cm and c = 5 cm.
Size of Installed Standard sensor number TN269 : W/2 = 104 cm/2 , H/2 = 72 cm/2 and D/2 = 60cm/2

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)								
	TN261	TN262	TN263	TN264	TN265	TN266	TN267	TN268	TN269
180	179.14	179.17	179.65	179.26	180.41	179.64	181.18	180.59	180.36

Chamber (Oven)		Temperature Distribution					
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage Factor k
	Min , Max	Average					
180.0	-	180.0	179.98	0.38	1.78	1.10	2.00

* The quoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and piece of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a distribution, providing

a level of confidence of approximately 95 %.

Approved By : Bunlorn

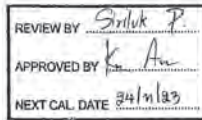
FM-L15 (17)15-05-64



Cert.No.: 22TW122
Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : 5000-230V
Serial No. : 09J101147
ID No. : BKK_EN0017
Received Date : 20 May 2022
Test Date : 24 May 2022
Reference : 2205-0638DSC-8
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand
Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In - house method : CP-CH9
by Comparison Technique with Azide Modification Method
Tested by : Warakorn Lemgagrakul
Approved by :
Approved Signatory
(/) Malee Butkrua
(/) Sathip Meangmai
(/) Warakorn Lemgagrakul
Issue Date : 31 May 2022



B 0285244



Cert.No.: 22TW122
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :
This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1) Burette	-	130BU10	21CG1389	25 Mar 2023
2) Balance	1126143764	140RC004	21MM430	21 Sep 2022

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: 16K100498

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.12	8.13	0.015

This report was certified only for the instrument we tested. It is allowable to use for study the system efficiency. The environmental impact control and present to organization it may concerned. Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced other in full, without written approval of the laboratory.

-o0o-

a 1110482



Cert. No.: 22LM83
Page.: 1 of 2

Certificate of Calibration

Equipment : DO Meter with Sensor
Manufacturer : YSI
Model : 5000-230V
Serial No. : 09J 101147
ID No. : BKK_EN0017
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand
Location : TPA On Site Calibration Laboratory
Received Order : 20 May 2022
Calibrated Date : 30 May 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Tawatchai Pama
Approved by :
Approved Signatory
(/) Pornthippa Taneyakul
(/) Malee Butkrua
(/) Suwit Imjai
Issue Date : 31 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 0039957



Equipment : DO Meter with Sensor
Condition As-Received : Used Item
Reference : 2205-0638DSC-10

Cert. No.: 22LM83
Page.: 2 of 2

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPT) into Temperature Bath.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-
Instrument Model Serial No. Cert. No. Due Date
1) Digital Thermometer 1502A A09204 2218 04 Jan 2023

2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function : Temperature measurement

This instrument was connected with thermistor sensor, ID No.: 16K100498

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
20.00	60	20.003	20.01	0.007	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 %.

-o0o-

Mali -

a 1090806



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.
Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100.
Bangkok Tel : +668 9205 6651 , +669 8247 2360
Website : www.sci-eco.co.th E-Mail : calibrate@scg.co.th



NSC-TIS-175 17025
CALIBRATION 0244

Certificate No.T221081

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Incubator)

Manufacturer : MEMMERT

Model : ICP 750

Serial No. : F818.0033

Customer Code : BKK_EN0272

ID No. : T8041A4

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok 10250



Customer Location : Wet Chemistry Lab 2

Date of Receipt : 12 May 2022

Calibrated By : Watcharapon Sangtong (Technician)

Approved By :  / Sujjar Naknakred (Assistant Calibration Manager)

Date of Issue : 20 MAY 2022

REVIEW BY	
APPROVED BY	
NEXT CAL. DATE	17/5/23

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 this 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 (17/01-02/04)



Metrological Center

SCI ECO Services Company Limited

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NSC-TIS-175 17025
CALIBRATION 0244

Certificate No.T221081

Calibration Report

Page 2 of 4

Equipment : Chamber (Incubator)

Date of Calibration : 17 May 2022 (Finished Time 3:30 PM)

Environment : Temperature 24.0-24.9 °C

Line Voltage 221.7-224.9 V

Condition of this results of test. :

1. This instrument was calibrated by insert 12 standard resistance thermometer into its chamber and test 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 may be obtained upon request.

The temperature scale used was based on ITS - 90.

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
RTD	100 ohm	29-(CH1-10)	T220274	28 February 2023
RTD	100 ohm	30-(CH1-10)	T220274	28 February 2023
DATA LOGGER	34970A	T47	T220274	28 February 2023

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TIS-175 17025 CALIBRATION 0244.)

4. Condition of calibrated item : good

UUC Description :

Time Constant 2 Hour 9 Minute At 20 °C

Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max

☐ Close

☒ Not Available

5. Result of test :

() without adjustment

(X) after adjustment

Approved By. 

FM-L15 (17/15-05-06)



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.

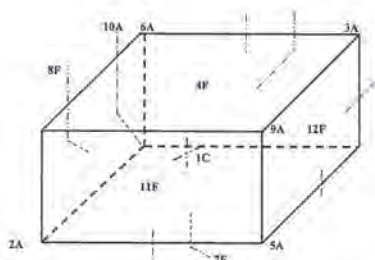


NSC-TIS-175 17025
CALIBRATION 0244

Certificate No T221081

Calibration Report

Page 3 of 4



C = Centre, F = Centre of Face, A = Corner, E = Centre of Edge

1C = 29-CH1
2A = 29-CH2
3A = 29-CH3
4F = 29-CH4
5A = 29-CH5
6A = 29-CH6
7F = 29-CH7
8F = 29-CH8
9A = 29-CH9
10A = 29-CH10

11F = 30-CH1
12F = 30-CH2

Approved By. 

FM-L15 (17/15-05-06)



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.



NSC-TIS-175 17025
CALIBRATION 0244

Certificate No. T221081

Calibration Report

Page 4 of 4

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)									
	19-CH1	29-CH2	29-CH3	29-CH4	29-CH5	29-CH6	29-CH7	29-CH8	29-CH9	29-CH10
20.0	19.77	20.10	19.53	20.48	20.24	20.46	19.97	19.49	20.14	19.62
	30-CH1	30-CH2								
	19.73	19.56								

Chamber (Incubator)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (± °C)	Uniformity (°C)	Uncertainty (± °C)	Coverage Factor k
	Min	Max					
20.0	20.20	20.1	19.98	0.05	0.36	0.38	2.00

* The quoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By. 

FM-L15 (17/15-05-06)



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.
Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100
Bangkok Tel : +668 9205 6851 , +669 8247 2360
Website : www.scieco.co.th E-Mail : calibration@scg.com

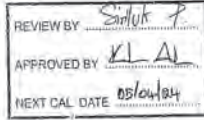


Certificate No. T230683

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Incubator)
Manufacturer : MEMMERT
Model : ICP 750
Serial No. : F818.0075
Customer Code : BKK_EN0305
ID No. : T9571A4
Customer : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok 10250
Customer Location : Wet Chemistry Lab 2
Date of Receipt : 30 March 2023
Calibrated By : Sujjar Nakhakred (Site Calibration Manager)
Approved By : / Boonchai Suriyawong (Assistant Calibration Manager)
Date of Issue : 10 APR 2023



The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-L1411/15-05-03



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.



Certificate No. T230683

Page 2 of 4

Calibration Report

Equipment : Chamber (Incubator)
Date of Calibration : 5 April 2023 (Finished Time 4:30 PM)
Environment : Temperature 22.9-28.6 °C
Line Voltage 221.7-225.5 V

Condition of this results of test :

- This instrument was calibrated by insert 12 standard resistance thermometer into its chamber and test 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 may be obtained upon request.
The temperature scale used was based on ITS - 90.
- Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
RTD	100 ohm	37-(CH1-10)	T222493	28 November 2023
RTD	100 ohm	36-(CH1-10)	T222493	28 November 2023
DATA LOGGER	34970A	T193	T222493	28 November 2023
- This certificate is traceable to :
National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)
- Condition of calibrated item : good
IUC Description :

Time Constant	2	Hour	24	Minute	At	20	°C
Fresh Air Damper	<input type="checkbox"/> Open	<input type="checkbox"/> Min	<input type="checkbox"/> Medium	<input type="checkbox"/> Max			
	<input type="checkbox"/> Close						
	<input checked="" type="checkbox"/> Not Available						
- Result of test :
() without adjustment (X) after adjustment

Approved By:

FM-L1511/15-05-03



Metrological Center

SCI ECO Services Company Limited

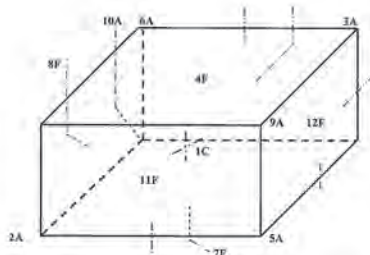
33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.



Certificate No T230683

Calibration Report

Page 3 of 4



C = Centre , F = Centre of Face , A = Corner , E = Centre of Edge

1C	=	37CH1
2A	=	37CH2
3A	=	37CH3
4F	=	37CH4
5A	=	37CH5
6A	=	37CH6
7F	=	37CH7
8F	=	37CH8
9A	=	37CH9
10A	=	37CH10

11F	=	36CH1
12F	=	36CH2

Approved By:

FM-L1511/15-05-03



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.



Certificate No. T230683

Page 4 of 4

Calibration Report

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)									
	37CH1	37CH2	37CH3	37CH4	37CH5	37CH6	37CH7	37CH8	37CH9	37CH10
20.0	20.32	20.28	20.17	20.22	20.22	20.04	20.17	19.74	20.31	19.93
	36CH1	36CH2								
	20.14	20.20								
25	25.28	25.15	25.13	25.13	25.20	25.02	25.11	24.79	25.20	25.26
	36CH1	36CH2								
	25.13	24.94								

Chamber (Incubator)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage Factor k
	Min.	Max.					
20.0	19.9	20.1	20.0	20.02	0.09	0.54	2.00
25.0	24.9	25.1	25.0	25.03	0.03	0.51	2.00

* The quoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 %.

Approved By:

FM-L1511/15-05-03



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110
Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T220630

Page 1 of 5

Certificate of Calibration

Equipment : HOT BLOCK

Manufacturer : Environmental Express

Model : B3000-240

Serial No. : 2017CODW116

Customer Code : BKK_EN0222

ID No. : T6769A4

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok 10250

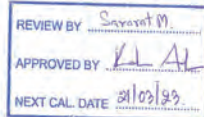
Customer Location : Wet Chemistry Lab2

Date of Receipt : 21 March 2022

Calibrated By : Watcharapon Sangtong (Technician)

Approved By :  / Suffar Naknakred (Site Calibration Manager)

Date of Issue : 03 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.

FM-L13 108/30-05-57



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110
Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T220630

Page 2 of 5

Calibration Report

Equipment : HOT BLOCK

Date of Calibration : 21 March 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	TN51-TN60	T220275	28 February 2023
TC	TYPE T	TN61-TN70	T220275	28 February 2023
DATA LOGGER	34970A	T47	T220275	28 February 2023

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 150 °C

Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max

☐ Close

☒ Not Available

5. Adjustment :

() without adjustment (X) after adjustment

Approved By: 

FM-L13 108/30-05-57



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110
Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T220630

Page 3 of 5

Calibration Report

R7	49	50	51	52	53	54	55	56
R6	41	42	43	44	45	46	47	48
R5	33	34	35	36	37	38	39	40
R4	25	26	27	28	29	30	31	32
R3	17	18	19	20	21	22	23	24
R2	9	10	11	12	13	14	15	16
R1	1	2	3	4	5	6	7	8

Controller

○ STANDARD THERMOCOUPLE TYPE T

No.1 = TN51	No.13 = TN63	No.25 = TN55	No.37 = TN67	No.49 = TN59
No.2 = TN52	No.14 = TN64	No.26 = TN56	No.38 = TN68	No.50 = TN60
No.3 = TN53	No.15 = TN65	No.27 = TN57	No.39 = TN69	No.51 = TN61
No.4 = TN54	No.16 = TN66	No.28 = TN58	No.40 = TN70	No.52 = TN62
No.5 = TN55	No.17 = TN67	No.29 = TN59	No.41 = TN51	No.53 = TN63
No.6 = TN56	No.18 = TN68	No.30 = TN60	No.42 = TN52	No.54 = TN64
No.7 = TN57	No.19 = TN69	No.31 = TN61	No.43 = TN53	No.55 = TN65
No.8 = TN58	No.20 = TN70	No.32 = TN62	No.44 = TN54	No.56 = TN66
No.9 = TN59	No.21 = TN51	No.33 = TN63	No.45 = TN55	
No.10 = TN60	No.22 = TN52	No.34 = TN64	No.46 = TN56	
No.11 = TN61	No.23 = TN53	No.35 = TN65	No.47 = TN57	
No.12 = TN62	No.24 = TN54	No.36 = TN66	No.48 = TN58	

Approved By: 

FM-L13 108/30-05-57



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110
Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th


Certificate No. T220630

Page 4 of 5

Calibration Report

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)							
R1	TN51	TN52	TN53	TN54	TN55	TN56	TN57	TN58
CAL POINT 150	Max	149.42	150.39	149.10	149.91	150.93	151.54	150.13
	Min	149.27	150.15	148.51	149.65	150.72	150.39	149.97
	Average	149.35	150.27	148.81	149.78	150.83	150.48	151.49
R2	TN59	TN60	TN61	TN62	TN63	TN64	TN65	TN66
	Max	150.66	150.45	151.00	151.76	150.66	150.67	150.73
	Min	150.46	150.16	150.74	151.51	150.48	150.48	149.40
	Average	150.56	150.31	150.87	151.63	150.57	150.58	149.52
R3	TN67	TN68	TN69	TN70	TN51	TN52	TN53	TN54
	Max	150.90	151.18	151.10	151.05	150.16	150.55	149.86
	Min	150.68	151.00	150.84	150.75	149.36	149.17	148.95
	Average	150.79	151.09	150.97	150.90	149.76	149.86	149.41
R4	TN55	TN56	TN57	TN58	TN59	TN60	TN61	TN62
	Max	150.82	150.07	151.63	150.72	150.35	149.78	150.24
	Min	149.53	149.71	149.57	148.67	148.46	148.86	149.55
	Average	150.17	149.89	150.60	149.70	149.41	149.32	149.90
R5	TN63	TN64	TN65	TN66	TN67	TN68	TN69	TN70
	Max	150.00	149.68	150.31	149.66	150.34	150.48	150.09
	Min	149.81	149.58	149.49	149.42	149.20	149.60	149.48
	Average	149.90	149.63	149.90	149.54	149.77	150.04	149.44
R6	TN51	TN52	TN53	TN54	TN55	TN56	TN57	TN58
	Max	149.25	150.37	148.53	149.06	150.91	150.04	151.13
	Min	149.07	150.18	148.28	148.78	150.69	149.83	150.95
	Average	149.16	150.28	148.41	148.92	150.80	149.94	151.04
R7	TN59	TN60	TN61	TN62	TN63	TN64	TN65	TN66
	Max	149.38	149.24	149.88	150.17	149.72	149.45	149.51
	Min	149.22	149.05	149.68	149.99	149.61	149.34	149.48
	Average	149.30	149.15	149.78	150.08	149.67	149.40	149.43

Approved By: 

FM-L13 108/30-05-57



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. T220630

Page 5 of 5

Calibration Report

Measurement Results:

HOT BLOCK		Temperature Distribution	
Setting (°C)	Reading (°C)		Stability (±°C)
	Min, Max	Average	
150.0	149.9, 150.1	150.0	1.04
			Uncertainty (±°C)
			1.44

* 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=2 which for a t-distribution, providing a level of confidence of approximately 95 %.

Approved By:

FM-L13 100/50-05-57



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. T230352

Page 1 of 5

Certificate of Calibration

Equipment : HOT BLOCK

Manufacturer : Environmental Express

Model : B3000- 240

Serial No. : 2017CODW116

Customer Code : BKK_EN0222

ID No. : T6769A4

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : Wet Chemistry Lab2

Date of Receipt : 21 February 2023

Calibrated By : Watchararak Pottarat (Technician)

Approved By : / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 20 MAR 2023

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-L12 100/50-05-51



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. T230352

Page 2 of 5

Calibration Report

Equipment : HOT BLOCK
Date of Calibration : 1 March 2023
Environment : Temperature : 22.9-24.4 °C
Line Voltage : 222.7-227.8 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert 20 standard thermocouples type T into its chamber, the other one standard thermocouples type T use for ambient temperature measurement. The calibration was done in according to WI-T20. All data show below were final values and the initial data from customer request.
The temperature scale used was based on ITS - 90.

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN121-TN130	T222122	5 October 2023
TC	TYPE T	TN131-TN140	T222122	5 October 2023
DATA LOGGER	34970A	T150	T222122	5 October 2023

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 22 Minute At 150 °C

Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max

☐ Close

☒ Not Available

5. Adjustment :

(X) without adjustment

() after adjustment

Approved By:

FM-L13 100/50-05-57



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110

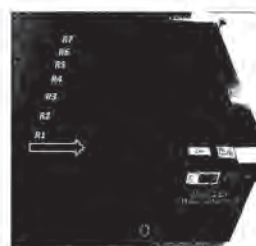
Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

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Certificate No. T230352

Page 3 of 5

Calibration Report



Row	Hole															
R7	H49	H50	H51	H52	H53	H54	H55	H56								
R6	H41	H42	H43	H44	H45	H46	H47	H48								
R5	H33	H34	H35	H36	H37	H38	H39	H40								
R4	H25	H26	H27	H28	H29	H30	H31	H32								
R3	H17	H18	H19	H20	H21	H22	H23	H24								
R2	H9	H10	H11	H12	H13	H14	H15	H16								
R1	H1	H2	H3	H4	H5	H6	H7	H8								

H: STANDARD THERMOCOUPLE TYPE T

H1	=	TN121	H9	=	TN129	H17	=	TN137	H25	=	TN145	H33	=	TN133	H41	=	TN121	H49	=	TN129
H2	=	TN122	H10	=	TN130	H18	=	TN138	H26	=	TN126	H34	=	TN134	H42	=	TN122	H50	=	TN130
H3	=	TN123	H11	=	TN131	H19	=	TN139	H27	=	TN127	H35	=	TN135	H43	=	TN123	H51	=	TN131
H4	=	TN124	H12	=	TN132	H20	=	TN140	H28	=	TN128	H36	=	TN136	H44	=	TN124	H52	=	TN132
H5	=	TN125	H13	=	TN133	H21	=	TN141	H29	=	TN129	H37	=	TN137	H45	=	TN125	H53	=	TN133
H6	=	TN126	H14	=	TN134	H22	=	TN142	H30	=	TN130	H38	=	TN138	H46	=	TN126	H54	=	TN134
H7	=	TN127	H15	=	TN135	H23	=	TN143	H31	=	TN131	H39	=	TN139	H47	=	TN127	H55	=	TN135
H8	=	TN128	H16	=	TN136	H24	=	TN144	H32	=	TN132	H40	=	TN140	H48	=	TN128	H56	=	TN136

Approved By:

FM-L13 100/50-05-57



Certificate No. T230352

Page 4 of 5

Calibration Report

Measurement Results

Average Standard Reading at each position (°C)										
Calibration Point	TN121	TN122	TN123	TN124	TN125	TN126	TN127	TN128	TN129	TN130
150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
Max	152.61	150.49	150.10	148.27	149.85	151.19	149.99	149.29	149.97	150.03
Min	152.15	149.87	149.73	147.75	149.26	150.78	149.49	148.56	149.15	149.15
Average	152.41	150.22	149.90	147.99	149.48	150.97	149.71	148.92	149.51	149.67
Calibration Point	TN131	TN132	TN133	TN134	TN135	TN136	TN137	TN138	TN139	TN140
Max	149.84	148.34	148.34	149.88	152.39	149.73	149.66	149.16	149.76	151.18
Min	149.35	147.85	148.40	148.94	152.39	149.19	148.83	148.68	149.51	150.92
Average	149.67	148.10	148.39	149.33	152.39	149.36	149.25	148.90	149.64	151.05
Calibration Point	TN121	TN122	TN123	TN124	TN125	TN126	TN127	TN128	TN129	TN130
Max	152.91	150.56	149.20	148.63	149.78	151.28	150.09	148.83	148.16	148.33
Min	152.72	150.04	148.59	147.96	149.42	150.96	149.83	148.20	147.62	147.29
Average	152.80	150.29	148.89	148.30	149.60	151.08	149.97	148.52	147.90	147.80
Calibration Point	TN131	TN132	TN133	TN134	TN135	TN136	TN137	TN138	TN139	TN140
Max	148.81	148.04	148.56	148.11	149.07	149.06	148.58	149.85	149.07	150.89
Min	148.08	147.63	148.07	147.63	148.81	148.62	148.18	149.60	148.86	150.63
Average	148.45	147.84	148.36	147.81	148.94	148.84	148.37	149.74	148.96	150.78
Calibration Point	TN121	TN122	TN123	TN124	TN125	TN126	TN127	TN128	TN129	TN130
Max	150.76	152.63	151.14	150.47	151.07	150.93	149.35	150.31	149.28	149.81
Min	150.59	152.40	150.69	150.17	150.77	150.54	148.80	149.03	148.84	148.23
Average	150.69	152.52	150.92	150.33	150.94	150.73	149.18	150.18	149.04	149.56
Calibration Point	TN131	TN132	TN133	TN134	TN135	TN136				
Max	150.97	150.34	151.70	149.10	153.13	150.74				
Min	150.77	149.94	151.36	148.83	152.91	150.61				
Average	150.87	150.13	151.53	148.97	153.05	150.66				

Approved By:

FM-L13 J0870-05-57

Certificate No. T230352

Page 5 of 5

Calibration Report

Measurement Results

HOT BLOCK			Temperature Distribution	
Setting (°C)	Reading (°C)		Stability (± °C)	Uncertainty (± °C)
	Min , Max	Average		
150.0	150.0, 150.1	150.0	0.60	1.01

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=2, providing a level of confidence of approximately 95 %.

Approved By:

FM-L13 J0870-05-57



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 15, SUANLUANG, SUANLUANG BANGKOK 10250
TEL: 0-2777-3000-27 FAX: 0-2719-9226



Cert.No.: 22CG3154
Page: 1 of 2

Certificate of Calibration

Equipment :	Burette	<div>REVIEW BY </div> <div>APPROVED BY </div> <div>NEXT CAL DATE </div>
Capacity :	50 mL	
Serial No. :	-	
ID. No. :	BKK_END171	
Manufacturer :	Witeg	
Made in :	Germany	
Submitted by :	ALS Laboratory Group (Thailand) Co., Ltd. 104 Phatthanakan 40, Phatthanakan Rd. Khwaeng Phatthanakan, Khol Suan Luang Bangkok 10250 Thailand	
Ambient Temperature :	(20 ± 2.5) °C	
Relative Humidity :	(50 ± 10) %	
Barometric Pressure :	758 mmHg	
Calibration Procedure :	ASTM E 542 - 01	
Calibrated by :	Panward Pramkiam	
Approved by :		Approved Signatory
<div><input type="checkbox"/> Pornthippa Tameyakul</div> <div><input type="checkbox"/> Malee Butkruea</div> <div><input checked="" type="checkbox"/> Panpan Paipim</div> <div><input type="checkbox"/> Srisuda Khamtha</div>		
Issue Date :	31 August 2022	

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced either in full, except with the prior written
Approval of the Issuer of Corporate Services & Equipment Calibration and Testing Services

A 0044607



Equipment : Burette
Received Date : 26 August 2022
Condition As-Received : Used Item
Calibration Date : 30 August 2022
Reference : 2208-0918DSC-2

Cert.No.: 22CG3154
Page: 2 of 2

Condition of this result of calibration

- Reference Standard Instruments :

Instruments	Model	Serial No.	ID. No.	Certificate No.	Traceability	Due date
1) Balance	AE200S	N03879	140RC001	21MM429	NIST	22 Sep 2022
2) Thermo-Hygrograph	THDX-CE	00016540	140EC001	22H1243	NIST, NIST	09 June 2023
3) Thermometer	-	1594592	140EC010	22I181	NIST	10 Feb 2023
- The certificate is valid only to the item calibrated on date and place of calibration.
- 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	49.9959	0.010	2.00

Remark mL = cm³

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

-000-

a 1123908



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.
Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100
Bangkok Tel : +668 9205 8851 , +669 8247 2360
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Certificate No. T221644

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 : Environmental Laboratory

Date of Receipt : 27 June 2022

Calibrated By : Sujjar Nakhakred (Site Calibration Manager)

Approved By : [Signature] / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 8 JUL 2022

REVIEW BY [Signature]

APPROVED BY [Signature]

NEXT CAL DATE 30/12/23

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 117/01-02-04



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.



Certificate No. T221644

Page 2 of 4

Calibration Report

Equipment : Chamber (Cold Room)

Date of Calibration : 30 June - 1 July 2022

Environment : Temperature : 18.9-23.7 °C
Line Voltage : 222.9-226.5 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

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 (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	30 July 2022
TC	TYPE T	TN171-TN180	T210009	30 July 2022
DATA LOGGER	34970A	T149	T210009	30 July 2022

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TIS-TIS 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

Equipment Description :

Time Constant 3 Hour - Minute At 3 °C

Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max

☐ Close

☒ Not Available

5. Adjustment :

() without adjustment (X) after adjustment.

Approved By [Signature]

FM-L15 117/15-05-61



Metrological Center

SCI ECO Services Company Limited

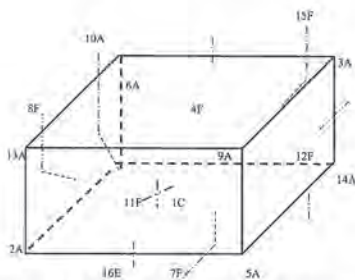
33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.



Certificate No. T221644

Page 3 of 4

Calibration Report



C = Centre, F = Centre of Face, A = Corner, E = Centre of Edge

1C =	TN161
2A =	TN162
3A =	TN163
4F =	TN164
5A =	TN165
6A =	TN166
7F =	TN167
8F =	TN168
9A =	TN169
10A =	TN170

11F =	TN171
12F =	TN172
13A =	TN173
14A =	TN174
15F =	TN175
16E =	TN176

Approved By [Signature]

FM-L15 117/15-05-61



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.



Certificate No. T221644

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	2.71	2.82	2.75	2.89	2.95	3.68	3.02	2.96	3.03	2.85
	TN171	TN172	TN173	TN174	TN175	TN176				
	2.97	3.02	2.89	3.04	2.97	3.33				

Chamber (Cold Room)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage Factor k
	Min, Max	Average					
3.0	2.9, 4.0	3.2	2.99	1.05	1.50	1.66	2.00

* The quoted uncertainty exclude " uniformity "

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By [Signature]

FM-L15 117/15-05-61



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.
Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100
Bangkok Tel : +668 9205 6851 , +669 8247 2360
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.



Certificate No. T220139

Page 2 of 3

Calibration Report

Equipment : Liquid Bath (Water)
Date of Calibration : 31 January 2022
Environment : Temperature : 22.4-23.9 °C
Line Voltage : 221.4-225.4 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

- This equipment was calibrated by insert five resistance thermometer detectors into its water bath , the other one thermocouple type T use for ambient temperature measurement . The calibration was done in according to WFT36 (based on ASTM E715-80 (Reapproved 2001)). All data show below were final values and the initial data from customer request , The temperature scale used was based on ITS - 90 .
- Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
RTD	100 OHM	M34 (CH1-CH5)	T210115	2 February 2022
DATA LOGGER	34970A	T47	T210115	2 February 2022
- This certificate is traceable to : National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS-17025 CALIBRATION 0244)
- Condition of calibrated item : good
Equipment Description :
Time Constant : 1 Hour : Minute : At 60 °C
5. Adjustment :
(X) without adjustment () after adjustment

Approved By:

Certificate No. T220139

Page 1 of 3

Certificate of Calibration

Equipment : Liquid Bath (Water)

Manufacturer : MEMMERT

Model : WNB29

Serial No. : L611.0135

Customer Code : BKK_EN0148

ID No. : T6455A4

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : ORGANIC PREPARATION LAB

Date of Receipt : 26 January 2022

Calibrated By : Watcharapon Sangtong (Technician)

Approved By : / Sujjar Naknakred (Site Calibration Manager)

Date of Issue : 08 FEB 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.

FM-L14 117/01-02-64

FM-L15 117/15-05-62



Metrological Center

SCI ECO Services Company Limited

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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 5108

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T221642

Page 1 of 5

Certificate of Calibration

Equipment : Digestion Unit

Manufacturer : SCP Science

Model : DigiPRER HT

Serial No. : HTC1120480658

Customer Code : BKK_EN0366

ID No. : T2635A5

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

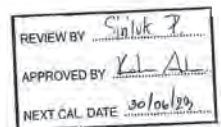
Customer Location : Wet Chemistry Lab 1

Date of Receipt : 27 June 2022

Calibrated By : Sujjar Naknakred (Site Calibration Manager)

Approved By : / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 04 JUL 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.

FM-L12 109/00-05-61



Metrological Center

SCI ECO Services Company Limited

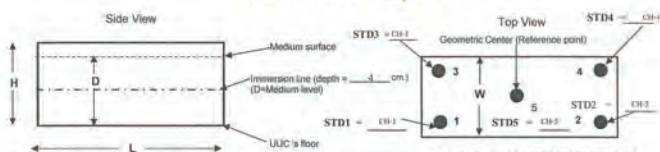
33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.



Certificate No. T220139

Page 3 of 3

Calibration Report



- D = Medium level : 8 cm.
- UUC's medium : Water
- Working standards are located at 2.5 cm. away from each corner and walls.

Measurement Results:

Calibration Point	Average Standard Reading at each position (°C)				
	CH-1	CH-2	CH-3	CH-4	CH-5
60	59.95	60.04	60.12	60.01	59.89
85	85.17	84.89	85.34	84.78	84.93
95	93.46	93.14	93.81	93.05	93.28

Liquid Bath (Water)			Temperature Distribution			
Setting (°C)	Reading (°C)		Stability (± °C)	Uniformity (± °C)	Uncertainty (± °C)	Coverage Factor k
	Min.	Max.				
61.0	60.9	61	0.10	0.19	0.25	2.09
86.0	85.9	86.1	0.12	0.39	0.32	2.06
95.0	94.8	95.1	0.14	0.51	0.38	2.11

* The quoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By:

FM-L15 117/15-05-62



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. T221642

Page 2 of 5

Calibration Report

Equipment : Digestion Unit
Date of Calibration : 30 June 2022
Environment : Temperature : 23.9 - 26.3 °C
Line Voltage : 221.4 - 225.1 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

- This equipment was calibrated by insert four standard thermocouples type S into its chamber, the other one thermocouple type T use for ambient temperature measurement. The calibration was done in according to WI-T10.
- Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	Type 8	M7-(CH16-17,CH19-CH20)	T212004	15 October 2022
DATA LOGGER	34970A	T121	T212004	15 October 2022
- This certificate is traceable to :
National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244).
- Condition of calibrated item : good
Equipment Description :
Time Constant : - Hour 26 Minute At 380 °C
Fresh Air Damper : ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available
- Adjustment :
(X) without adjustment () after adjustment

Approved By:

FM-L13 10820-05-57



Metrological Center

SCI ECO Services Company Limited

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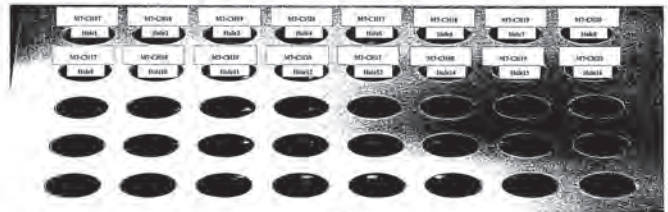
Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T221642

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Calibration Report



FRONT

Measurement Results

Cal. Point	Setting	Reading	STD.	Position of Standards at Block							
				Hole1	Hole2	Hole3	Hole4	Hole5	Hole6	Hole7	Hole8
°C	°C	°C	Reading	M7-CH17	M7-CH18	M7-CH19	M7-CH20	M7-CH17	M7-CH18	M7-CH19	M7-CH20
380.0	380.0	379.4 - 380.7	Max °C	379.1	379.8	379.3	377.4	377.6	379.3	379.6	377.9
			Min °C	378.7	379.4	378.9	377.0	377.3	378.8	379.1	377.3
			Average °C	378.9	379.6	379.1	377.2	377.4	379.1	379.3	377.6
			Stability ± °C	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3

Cal. Point	Setting	Reading	STD.	Position of Standards at Block							
				Hole9	Hole10	Hole11	Hole12	Hole13	Hole14	Hole15	Hole16
°C	°C	°C	Reading	M7-CH17	M7-CH18	M7-CH19	M7-CH20	M7-CH17	M7-CH18	M7-CH19	M7-CH20
380.0	380.0	379.4 - 380.7	Max °C	378.5	378.8	378.1	379.0	380.3	381.6	381.0	379.3
			Min °C	377.8	378.2	377.6	378.8	379.9	381.2	380.9	379.9
			Average °C	378.2	378.5	377.8	378.8	380.1	381.4	380.7	379.2
			Stability ± °C	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3

Approved By:

FM-L13 10820-05-57



Metrological Center

SCI ECO Services Company Limited

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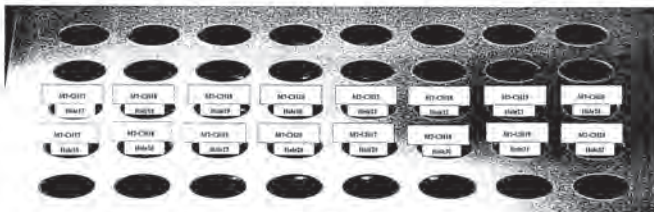
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Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T221642

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Calibration Report



FRONT

Measurement Results

Cal. Point	Setting	Reading	STD.	Position of Standards at Block							
				Hole17	Hole18	Hole19	Hole20	Hole21	Hole22	Hole23	Hole24
°C	°C	°C	Reading	M7-CH17	M7-CH18	M7-CH19	M7-CH20	M7-CH17	M7-CH18	M7-CH19	M7-CH20
380.0	380.0	379.4 - 380.7	Max °C	378.4	378.8	378.0	379.2	379.0	382.0	381.5	380.3
			Min °C	377.6	378.2	377.7	378.8	378.7	381.5	381.1	379.6
			Average °C	378.1	378.5	377.9	379.0	378.9	381.8	381.3	379.9
			Stability ± °C	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.4

Cal. Point	Setting	Reading	STD.	Position of Standards at Block							
				Hole25	Hole26	Hole27	Hole28	Hole29	Hole30	Hole31	Hole32
°C	°C	°C	Reading	M7-CH17	M7-CH18	M7-CH19	M7-CH20	M7-CH17	M7-CH18	M7-CH19	M7-CH20
380.0	380.0	379.4 - 380.7	Max °C	378.3	378.7	378.4	378.8	379.6	382.6	382.0	380.8
			Min °C	377.6	378.3	377.9	378.4	379.3	382.2	381.4	380.0
			Average °C	378.0	378.5	378.1	378.6	379.5	382.4	381.7	380.4
			Stability ± °C	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.4

Approved By:

FM-L13 10820-05-57



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110

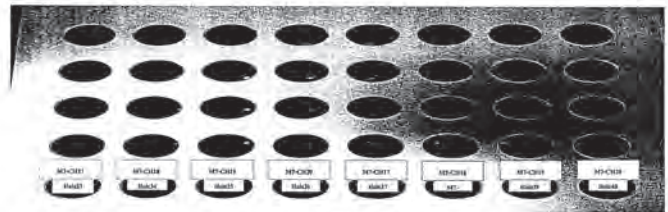
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Certificate No. T221642

Page 5 of 5

Calibration Report



FRONT

Measurement Results

Cal. Point	Setting	Reading	STD.	Position of Standards at Block							
				Hole33	Hole34	Hole35	Hole36	Hole37	Hole38	Hole39	Hole40
°C	°C	°C	Reading	M7-CH17	M7-CH18	M7-CH19	M7-CH20	M7-CH17	M7-CH18	M7-CH19	M7-CH20
380.0	380.0	379.4 - 380.7	Max °C	378.6	378.7	377.2	378.0	380.0	382.2	381.5	379.7
			Min °C	378.1	378.2	376.7	377.5	379.5	381.7	380.9	379.1
			Average °C	378.3	378.5	377.0	377.7	379.8	381.9	381.2	379.4
			Stability ± °C	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3

The expanded uncertainty of temperature measurement was ± 2.49 °C

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=2, providing a level of confidence of approximately 95 %.

Approved By:

FM-L13 10820-05-57


บริษัท ดับเบิล เอส ไดแอกโนสติกส์ จำกัด
DOUBLE S DIAGNOSTICS CO., LTD.

 4 ซอยสุขุมวิท 14 (ซอยสุขุมวิท 14) กรุงเทพฯ 10250 โทร: (02) 747-7000 โทรสาร: (02) 747-7000
 4 Soi Sukhumvit 14, Bangkok, Thailand 10250 Tel: (02) 747-7000 Fax: (02) 747-7000

Maintenance Plan YEAR : ๒๕๖๖

เดือน	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Jan	PM 12 OK											

Periodical maintenance check list for Konelab

	6M	12M	Note
1.Diluent-wash tubing change	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2.ISE tubing change	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	None
3.Syringe check/change	<input type="checkbox"/>	<input type="checkbox"/>	
4.Dispensing check/ change	<input type="checkbox"/>	<input type="checkbox"/>	
5.Waste tubing change when necessary	<input type="checkbox"/>	<input type="checkbox"/>	
6.Lamp check/change	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7.Mixer paddle/paddle change(not Konelab20)	<input type="checkbox"/>	<input type="checkbox"/>	
8.ISE needles check/change	<input type="checkbox"/>	<input type="checkbox"/>	
9.Pump tubing check/ change	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10.Broken/worn out part check /change	<input type="checkbox"/>	<input type="checkbox"/>	
11.Peristaltic pump check /cleaning/ lubrication	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
12.Heating check	<input type="checkbox"/>	<input type="checkbox"/>	
13.Cooling check	<input type="checkbox"/>	<input type="checkbox"/>	
14.Dispenser mechanic check/adjustment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
15.Ouvette transfer mechanic check/adjustment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
16.Dispenser movement check/adjustment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
17.Sample/reagent register check/adjustment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
18.Dispensing tubing tightness check	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
19.Photometer and optics cleaning/check/adjustment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
20.Workstation PC cleaning if necessary	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
21.Mechanic cleaning/lubrication	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
22.Instrument cleaning if necessary	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
23.Complete analyzer testing with waterblank/QC or sample	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
24.Test parameters/Adjustment/config. Save to USB key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
25.UPS Test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

 Place: ALS Laboratory Instrument: Konelab 350
 Date/Time: 05-01-22 Serial no: 89981
 Service done by: K.P.S. Install date:
 Signature of customer: K.P.S. Date/Time:

Agilent CrossLab Compliance

 Qualification Type: ICPMS-QQ
 System ID: JP12091612
 EQP Name: AgilentRecommended
 EQP Revision: ICPMS.02.50
 EQP Publish Date: March 2020
 Date: June 14, 2022 10:32:16 AM
 Report Type: Report
 Org. Name: ALS Laboratory Group (Thailand) Co.,Ltd.
 Org. Location: 104 Phatthanakarn 40, Suan Luang, Bangkok 10250 Thailand.

 REVIEW BY: Tattaporn C.
 APPROVED BY: Santana N.
 NEXT CAL. DATE: 11/12/23

 Date: June 14, 2022 10:32:16 AM
 System ID: JP12091612

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 Date: June 14, 2022 10:32:16 AM
 System ID: JP12091612

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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 : ASX-520	Pass	1
Integrated Sample Introduction System (ISIS) Check : ISIS2	Pass	1
Autolune : G3281A	Pass	1
Background (No Gas Mode) : G3281A	Pass	1
Background (Gas Modes) : G3281A	Pass	1
20-Minute Stability (No Gas Mode) : G3281A	Pass	1
Overall Qualification Status	Pass	

 Date: June 14, 2022 10:32:16 AM
 System ID: JP12091612

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Service Details

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

General Details	
Service Order No./Request:	6005218484
EQP Name:	AgilentRecommended
EQP Revision:	ICPMS.02.50
Report Type:	Report
Organization Details	
Name:	ALS Laboratory Group (Thailand) Co.,Ltd.
Location:	104 Phatthanakarn 40, Suon Luang, Bangkok 10250 Thailand.
Local Contact Details	
Name:	Khan Chatchanal
Job Title:	Lab Manager
Qualification Location:	Spectro Room
Operator Details	
Name:	Panluep Krasathain
Job Title:	Field Service Engineer
Data Acquisition Details	
Acquisition Software Name:	MassHunter
Acquisition Software Revision:	D.01.01
Customer Data System (CDS):	icpMs: MassHunter

Instrument Details

Purpose
This section describes the as found system configuration.

Details	
ICP-MS 1	
Manufacturer	Agilent Technologies
Name	7700x
Model Number	G3261A
Detector Type	SQ
Nebulizer	Mira Mist (G3161)
Spray Chamber	Quartz
Torch	Quartz
Sampling Cone	Ni
Skinmer Cone	Ni
Serial Number	JP12091612
Firmware Revision	D.01.01
ISIS 1	
Manufacturer	Agilent Technologies
Name	ISIS2
Model Number	G4911A
Installed Options	#003; 2 pumps, 1 valve, auto dilution and discrete sampling
Type	Peristaltic pump system
Autosampler 1	
Manufacturer	Agilent Technologies
Name	ASX-520
Model Number	G3265A
Serial Number	G31403AB20
Chiller 1	
Manufacturer	Agilent Technologies
Name	Chiller
Model Number	G3292A
Serial Number	4N1220700

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.

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 Mode)
ICPMS.02.50	Background (No Gas Mode)
ICPMS.02.50	Integrated Sample Introduction System (ISIS) Check

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 probe in the home position?		Yes	Yes	Pass
As commanded, is the probe positioned at vial 2?		Yes	Yes	Pass
Setpoint Status:	Pass			Runs: 1

Overall Autosampler Check Test Status

Pass

Date: June 14, 2022 10:32:16 AM
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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			Runs: 1

Overall Integrated Sample Introduction System (ISIS) Check Test Status

Pass

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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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	Criteria	Observed Result	Expected Result	Status
Peakwidth Mass 7		0.735	AMU	
Agilent Recommended:		>= 0.85	<= 0.80	
Status:	Pass			
Peakwidth Mass 89		0.732	AMU	
Agilent Recommended:		>= 0.65	<= 0.80	
Status:	Pass			
Peakwidth Mass 205		0.746	AMU	
Agilent Recommended:		>= 0.65	<= 0.80	
Status:	Pass			
Mass Axis 7		7.00	AMU	
Agilent Recommended:		>= 6.9	<= 7.1	
Status:	Pass			
Mass Axis 89		89.00	AMU	
Agilent Recommended:		>= 88.9	<= 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	81.18	Mcps/ppm
Agilent Recommended:	>= 25.5	
Status:	Pass	
Mass 89 Sensitivity No Gas	247.61	Mcps/ppm
Agilent Recommended:	>= 85	
Status:	Pass	
Mass 205 Sensitivity No Gas	164.87	Mcps/ppm
Agilent Recommended:	>= 51	
Status:	Pass	
Mass 59 Sensitivity He	84.86	Mcps/ppm
Agilent Recommended:	>= 20.4	
Status:	Pass	
Oxide Ratio 156/140	1.118	%
Agilent Recommended:	<= 1.38	
Status:	Pass	
Doubly Charged Species Ratio 70/140	1.140	%
Agilent Recommended:	<= 2.3	
Status:	Pass	

Setpoint Status: Pass

Runs: 1

Overall Autotune Test Status

Pass

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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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:

7	89	205
4,900	7,100	18,400
≤ 10	≤ 10	≤ 30
Pass	Pass	Pass

Setpoint Status: Pass

Runs: 1

Overall Background (No Gas Mode) Test Status

Pass

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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:	78	AMU
Integration Time:	1,0	sec
Cycles:	20	

Measurements and Results

Mass (AMU):

Measured Value:

Agilent Recommended:

Status:

78
21,100 cps
≤ 480
Pass

Setpoint Status: Pass

Runs: 1

Overall Background (Gas Mode) Test Status

Pass

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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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:	Spectrum
Masses:	7, 9, 89, 140, 205
Integration Time:	9.99 sec
Peak Pattern:	3 points/peak
Repetitions:	20
Sweeps/Replicates:	100

Measurements and Results

Masses (AMU):

Stability RSD:

Agilent Recommended:

Status:

7	89	205
0.2	0.6	0.6
≤ 3.45	≤ 3.45	≤ 3.45
Pass	Pass	Pass

Setpoint Status: Pass

Runs: 1

Overall 20-Minute Stability (No Gas Mode) Test Status

Pass

Date: June 14, 2022 10:32:16 AM
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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: June 14, 2022 10:32:16 AM
System ID: JP12091612

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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-requisite trainings 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-requisite trainings as documented in the Agilent Learning Management System called Success Factors.


Location	Category	Document Name	Page
EQR	General	Certificate of System Qualification	17
EQR	General	Operator's training certificate and qualifications	18
EQR	General	Certificate of Qualification for ACE	19
EQR	General	Certificate of Qualification for ACE	20
EQR	General	Tune reports	21
EQR	General	Test Report	24
EQR	General	Test Report	25

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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General

Document Name: Certificate of System Qualification

 Agilent Technologies

Agilent Compliance Engine Self Qualification

Date: September 16, 2021 4:58:15 PM
Drive Serial #: AGA29508 Platform Revision: ACE 3.1.1

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

Technique Type	Tests Completed	Result
Atomic Absorption	7	Confirms
Capillary Electrophoresis	10	Confirms
Distillation	6	Confirms
Emission Spectroscopy	5	Confirms
Gas Chromatography - GC/MS	17	Confirms
Gas Chromatography	29	Confirms
Gas Permeation Chromatography	8	Confirms
ICP-MS	6	Confirms
Infrared Spectroscopy	7	Confirms
Liquid Chromatography	17	Confirms
Liquid Chromatography - LC/MS	9	Confirms
Monofluoride	18	Confirms
Sample Preparation - Gas Chromatography	3	Confirms
Sample Preparation - Liquid Chromatography	6	Confirms
Supercritical Fluid Chromatography	15	Confirms
Software	6	Confirms
UV-Vis Spectrophotometer	13	Confirms

Overall Qualification Status:
Confirms

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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General

Document Name: Operator's training certificate and qualifications

 Agilent Technologies

Certificate of Completion

Learnr Name: Prashant Bhatnagar

Title Of Course: AN-CE-4/CPMS-2-017-B/7800/7800s ICP-MS Instr., OpenJLW.S/W & OQ/PV

Completion Date: November 22, 2012

Certified By Company: Learning at Agilent

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

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Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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General

Document Name: Certificate of Qualification for ACE

 Agilent Technologies

Certificate of Completion

Learnr Name: Prashant Bhatnagar

Title Of Course: AN-CE-SS-1-010-A: ACE 3.X User Update Training

Completion Date: July 7, 2020

Certified By Company: Learning at Agilent

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Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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General

Document Name: Certificate of Qualification for ACE

Certificate of Completion

Agilent Technologies

Course Name: Pauliney Kurstain

Title Of Course: AN-CE-CPMS-2-015-IF: CrossLab Compliance Hardware Specific Delivery for Agilent ICP-MS Systems

Completion Date: October 31, 2020

Certified By Courseway: Learning at Agilent

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

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Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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General

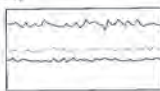
Document Name: Tune reports

Tune Report

Operator Name: Supriya Mah
Any/Gen Sets: C:\Agilent\CPMS\11\Users\Tula.B
Acq. Date-Time: 6/14/2022 9:53:15 AM
Report Comment: PMOD 14 June 2022
Instrument Name: G2201A-SP12091612

[No Gen]

Sensitivity

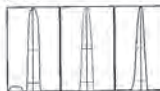


Time	Height	Area	Height	Height
1	10000	6116	15950	18880
10	10000	7470	11120	11180
20	10000	12450	15850	15450

Sampling Period (sec): 0.211
Integration Time (sec): 0.1

Global/Global Charged Ratio:
Global: 158 / 146 = 1.15 %
Global Charged: 75 / 140 = 1.54 %

Headspace/Headspace



Time	Peak Height	Area	Height	Height
1	10000	11	10000	10000
10	10000	11	10000	10000
20	10000	11	10000	10000

Integration Time (sec): 0.1
Acquisition Time (sec): 22.75
Y Axis: Linear

Tune Parameters

Parameter	Value	Parameter	Value	Parameter	Value
Plasma Mode	—	Residual Gas	1.05 L/min	Misture Gas	0.05 L/min
RF Power	150 W	Oxygen Gas	—	Auxiliary Gas	0.05 L/min
RF Matching	1.60 V	Intensifier Temp	0.16 °C	Plasma Gas	15.0 L/min
Sample Depth	0.0 mm	SIG Temp	2 °C		
Line Parameters					
Exhaust 1	0.0 V	Direct Line	3.8 V	Defect	0.2 V
Exhaust 2	-100.0 V	Cell Entrance	-0.0 V	Plate Bias	40 V
Output Bias	-0.0 V	Cell Exit	-0.0 V		
Cell Parameters					
Unit Gas	0.0 mL/min	3rd Gas Flow	—	Energy Discrimination	0.0 V
He Flow	0.0 mL/min	QOP Bias	-21.0 V		
		QOP RF	150 V		
CP Parameters					
Mass Gain	150	Any/Gen	-1.032	CP Bias	-15.0 V
Mass Offset	120	Any Offset	0.12		
Hardware Settings					
Touch					
Touch H	-0.4 mm	Touch V	0.0 mm		

1 of 5 6/14/2022 9:53 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Document Name: Tune reports

Tune Report

IC Flow: —
QOP Parameters: —
Mass Gain: 150
Mass Offset: 120


Hardware Settings

Touch: —
Touch H: -0.4 mm
Touch V: 0.0 mm

EM: —
Electrode: 4.5 nV
Amplifier: 1.10 V
Pulse: 0.05 V

[No Gen]

Sensitivity



Time	Height	Area	Height	Height
1	10000	6116	15950	18880
10	10000	7470	11120	11180
20	10000	12450	15850	15450

Sampling Period (sec): 0.211
Integration Time (sec): 0.1

Global/Global Charged Ratio:
Global: 158 / 146 = 1.15 %
Global Charged: 75 / 140 = 1.54 %

Tune Parameters

Parameter	Value	Parameter	Value	Parameter	Value
Plasma Mode	—	Residual Gas	1.05 L/min	Misture Gas	0.05 L/min
RF Power	150 W	Oxygen Gas	—	Auxiliary Gas	0.05 L/min
RF Matching	1.60 V	Intensifier Temp	0.16 °C	Plasma Gas	15.0 L/min
Sample Depth	0.0 mm	SIG Temp	2 °C		
Line Parameters					
Exhaust 1	0.0 V	Direct Line	3.8 V	Defect	0.2 V
Exhaust 2	-100.0 V	Cell Entrance	-0.0 V	Plate Bias	40 V
Output Bias	-0.0 V	Cell Exit	-0.0 V		
Cell Parameters					
Unit Gas	0.0 mL/min	3rd Gas Flow	—	Energy Discrimination	0.0 V
He Flow	0.0 mL/min	QOP Bias	-21.0 V		
IC Flow	—	QOP RF	150 V		
CP Parameters					
Mass Gain	150	Any/Gen	-1.032	CP Bias	-15.0 V
Mass Offset	120	Any Offset	0.12		
Hardware Settings					
Touch					
Touch H	-0.4 mm	Touch V	0.0 mm		

2 of 5 6/14/2022 9:53 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Document Name: Tune reports

Tune Report

EM: —
Electrode: 4.5 nV
Amplifier: 1.10 V
Pulse: 0.05 V

1 of 5 6/14/2022 9:53 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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General

Document Name: Test Report

Batch Summary Report							
Batch Folder:		D:\Agilent\Monitor\MSDC\15-6-22\00-16-16					
Analysis File:		B07440033016					
Test Step:		#1 Top					
Run	Analysis Time	Sample Name	Time	Level	Stability		
1	6/14/2022 10:32:16 AM	B07440033016	1.00 min	Sample		1.0000	

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6/14/2022 10:32:16 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Document Name: Test Report

Batch Summary Report							
Analysis Folder:		D:\Agilent\Monitor\MSDC\15-6-22\00-16-16					
Sample Name:		CPS					
Analysis Time:		1.00 min					

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6/14/2022 10:32:16 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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General

Document Name: Test Report

Batch Summary Report							
Batch Folder:		D:\Agilent\Monitor\MSDC\15-6-22\00-16-16					
Analysis File:		B07440033016					
Test Step:		#1 Top					
Run	Analysis Time	Sample Name	Time	Level	Stability		
1	6/14/2022 9:53:29 AM	B07440033016	1.00 min	Sample		1.0000	

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6/14/2022 9:53:29 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Document Name: Test Report

Batch Summary Report							
Analysis Folder:		D:\Agilent\Monitor\MSDC\15-6-22\00-16-16					
Sample Name:		CPS					
Analysis Time:		1.00 min					

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6/14/2022 9:53:29 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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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 Kumasthain
Logged On User Name: panthep_kumasthain@agilent.com
Signature Creation Date: June 14, 2022
Reason for Signature: Executed protocol and published this original version of document

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Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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User Name: panthep_kumasthain

Username: ASB00007212

System ID: JP12091612

Print Date: June 14, 2022 10:32:20 AM

ALS OQHW 7708 14Jun2022 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 14, 2022 10:14:43 AM Audit		Session Created	Session	None
June 14, 2022 10:14:43 AM Start		Configuration	Session	None
June 14, 2022 10:14:43 AM Audit		Exit/Logout	Linking	User is Field Engineer and does not require an unlock code
June 14, 2022 10:19:18 AM Audit		Sign/Logout	Session	EQP data is for primary technique (ICPMS) - File path: [Protocol\Records\Signatures\Configurations\22_0614_10_19_18_00_00_00] EQP File Name: [Sign_02_50_00], EQP Name: [AgilentRecommended]
June 14, 2022 10:19:20 AM End		Configuration	Session	None
June 14, 2022 10:19:24 AM Start		Qualification	Session	IQ
June 14, 2022 10:19:24 AM Start		Execution	Autosampler Check : ASD-500	None (Autosampler Check)
June 14, 2022 10:19:42 AM End		Execution	Autosampler Check : ASD-500	Run Count : 1 (Autosampler Check)
June 14, 2022 10:19:43 AM Start		Execution	Integrated Sample Introduction System (ISIS) Check : ISIS2-Integrated Sample Introduction System (ISIS) Check	None
June 14, 2022 10:19:47 AM End		Execution	Integrated Sample Introduction System (ISIS) Check : ISIS2-Integrated Sample Introduction System (ISIS) Check	Run Count : 1
June 14, 2022 10:19:59 AM Start		Execution	Autotune : Q3281A: Autotune 1	None
June 14, 2022 10:22:22 AM End		Execution	Autotune : Q3281A: Autotune 1	Run Count : 1

Page 1/2

Page 1 / 2

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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User Name: panthep_kumasthain
Username: ASB00007212

System ID: JP12091612
Print Date: June 14, 2022 10:32:20 AM

ALS OQHW 7708 14Jun2022 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 14, 2022 10:22:24 AM Start		Execution	Background (No Gas Mode) : Q3281A: No Gas Mode Background 1	None
June 14, 2022 10:22:49 AM End		Execution	Background (No Gas Mode) : Q3281A: No Gas Mode Background 1	Run Count : 1
June 14, 2022 10:22:49 AM Start		Execution	Background (Gas Mode) : Q3281A: Gas Mode Background Helium	None
June 14, 2022 10:23:35 AM End		Execution	Background (Gas Mode) : Q3281A: Gas Mode Background Helium	Run Count : 1
June 14, 2022 10:23:37 AM Start		Execution	20-Minute Stability (No Gas Mode) : Q3281A: 20-Minute Stability (No Gas Mode) 1	None
June 14, 2022 10:24:08 AM End		Execution	20-Minute Stability (No Gas Mode) : Q3281A: 20-Minute Stability (No Gas Mode) 1	Run Count : 1
June 14, 2022 10:24:08 AM End		Qualification	Session	IQ
June 14, 2022 10:24:08 AM Start		Reporting	Session	None
June 14, 2022 10:30:26 AM Audit		Reporting	Session	Report Generated : CellBase
June 14, 2022 10:30:38 AM Audit		Reporting	Session	Report Generated : Report

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Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Certificate of System Qualification

ICPMS-QQ

System ID: JP12091612
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Phatthanakarn 40, Suan Luang, Bangkok 10250 Thailand.

Date: June 14, 2022 10:32:51 AM
EQP Name: AgilentRecommended
EQP Revision: ICPMS.02.50
Overall Qualification Status: Pass

Autosampler Check

Overall Autosampler Check Test Status

Pass

Integrated Sample Introduction System (ISIS) Check

Overall Integrated Sample Introduction System (ISIS) Check Test Status

Pass

Autotune

Peakwidth Mass 7	Pass
Peakwidth Mass 89	Pass
Peakwidth Mass 205	Pass
Mass Axis 7	Pass
Mass Axis 89	Pass
Mass Axis 205	Pass
Mass 7 Sensitivity No Gas	Pass
Mass 89 Sensitivity No Gas	Pass
Mass 205 Sensitivity No Gas	Pass
Mass 59 Sensitivity He	Pass
Oxide Ratio 156/140	Pass
Doubly Charged Species Ratio 70/140	Pass

Overall Autotune Test Status

Pass

Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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Background (No Gas Mode)

Setpoint Status: Pass

Masses (AMU):	7	89	205
Measured Value:	4,900	7,100	18,400 cps
Agilent Recommended:	10	10	30
Status:	Pass	Pass	Pass

Overall Background (No Gas Mode) Test Status

Pass

Background (Gas Mode)

Gas Mode: Helium

Setpoint Status: Pass

Mass (AMU):	78
Measured Value:	21,100 cps
Agilent Recommended:	480
Status:	Pass

Overall Background (Gas Mode) Test Status

Pass

20-Minute Stability (No Gas Mode)

Masses (AMU):	7	89	205
Stability RSD:	0.2	0.6	0.6 %
Agilent Recommended:	3.45	3.45	3.45
Status:	Pass	Pass	Pass

Overall 20-Minute Stability (No Gas Mode) Test Status

Pass

Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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Instrument Details

Purpose

This section describes the as found system configuration.

Details

ICP-MS 1

Manufacturer:	Agilent Technologies
Name:	7700x
Model Number:	G3281A
Detector Type:	SQ
Nebulizer:	Mira Mist (G3101)
Spray Chamber:	Quartz
Torch:	Quartz
Sampling Cone:	Ni
Skinner Cone:	Ni
Serial Number:	JP12091612
Firmware Revision:	D.01.01

ISIS 1

Manufacturer:	Agilent Technologies
Name:	ISIS2
Model Number:	G4911A
Installed Options:	#003: 2 pumps, 1 valve, auto dilution and discrete sampling
Type:	Peristaltic pump system

Autosampler 1

Manufacturer:	Agilent Technologies
Name:	ASX-520
Model Number:	G3286A
Serial Number:	031403A520

Chiller 1

Manufacturer:	Agilent Technologies
Name:	Chiller
Model Number:	G3292A
Serial Number:	4N1229700

Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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Electronic Signature

Purpose

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Details

Full Name of Signer:	Panthep Kurasthai
Logged On User Name:	panthep_kurasthai@agilent.com
Signature Creation Date:	June 14, 2022
Reason for Signature:	Executed protocol and published this original version of document

Regulatory Disclaimer

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Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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User Name: panthep_kurasthai
Username: ASXXXXX213
System ID: JP12091612
Print Date: June 14, 2022 10:32:51 AM

ALS QGRY FREQ 14Jun2022 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 14, 2022 10:14:43 AM Audit	SessionCreated	Session	Session	None
June 14, 2022 10:14:43 AM End	Configuration	Session	Session	None
June 14, 2022 10:14:43 AM Audit	Entered	Loading	Session	User is PantEngineer and status not require pin, simply code
June 14, 2022 10:18:18 AM Audit	Entered	Session	Session	EQP details for primary exclusive (Profile) - File path: Protocol\Protocol\MuConfig\autosam\02.10\right\02.10.e ig\ EQP File Name: (ICM) 02.10.1000 EQP Name: (AgilentRecommended)
June 14, 2022 10:19:20 AM End	Configuration	Session	Session	None
June 14, 2022 10:19:24 AM Start	Qualification	Session	Session	OD
June 14, 2022 10:19:24 AM End	Execution	Autosampler Check: ASX-520	Session	None
June 14, 2022 10:19:42 AM End	Execution	Autosampler Check: ASX-520	Session	None
June 14, 2022 10:19:43 AM Start	Execution	Autosampler Check: ASX-520	Session	None
June 14, 2022 10:19:47 AM End	Execution	Integrated Sample Introduction System (ISIS) Check: ISIS	Session	None
June 14, 2022 10:19:50 AM Start	Execution	Integrated Sample Introduction System (ISIS) Check: ISIS	Session	None
June 14, 2022 10:20:02 AM End	Execution	Autosampler Check: ASX-520	Session	None
June 14, 2022 10:20:02 AM End	Execution	Autosampler Check: ASX-520	Session	None

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Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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User Name: paritad_koravithorn
Hostname: ASBKKW0313
System ID: JP12001812
Print Date: June 14, 2022 10:32:51 AM

ALS QGRW 7706 14Jun2022 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 14, 2022 10:22:24 AM Start	Execution	Background (No Gas Mode)	None	
June 14, 2022 10:22:49 AM End	Execution	Background (No Gas Mode)	Run Count: 1	
June 14, 2022 10:22:49 AM Start	Execution	Background (Gas Mode)	None	
June 14, 2022 10:23:35 AM End	Execution	Background (Gas Mode)	Run Count: 1	
June 14, 2022 10:23:37 AM Start	Execution	20-Minute Stability (No Gas Mode)	None	
June 14, 2022 10:24:09 AM End	Execution	20-Minute Stability (No Gas Mode)	Run Count: 1	
June 14, 2022 10:24:09 AM End	Quiescence	Session	OK	
June 14, 2022 10:24:09 AM Start	Reporting	Session	None	
June 14, 2022 10:30:29 AM Audit	Reporting	Session	Report Generated: Certificate	
June 14, 2022 10:30:30 AM Audit	Reporting	Session	Report Generated: Report	

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Date: June 14, 2022 10:32:51 AM
System ID: JP12001812

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User Name: paritad_koravithorn
Hostname: ASBKKW0313
System ID: JP12001812
Print Date: June 14, 2022 10:32:51 AM

ALS QGRW 7706 14Jun2022 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 14, 2022 10:32:29 AM Audit	Reporting	Session		Report signed: Present PDF Name: ALS QGRW-7706 14Jun2022_20220614_OC Report_1.pdf User Name: paritad_koravithorn@agilent.com Full Name of Signer: Paritad Koravithorn Reason for signature: Extended protocol test published into original version of document

Page 3 / 3

Date: June 14, 2022 10:32:51 AM
System ID: JP12001812

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Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhloi, 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. : TS306A3
Customer : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok 10250
Customer Location : Acid Digestion Lab
Date of Receipt : 30 March 2022
Calibrated By : Watcharapong Sangtong (Technician)
Approved By : / Sujar Nakhakred (Site Calibration Manager)
Date of Issue : 12 APR 2022

REVIEW BY
APPROVED BY
NEXT CAL. DATE 7/10/23

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-L12 109/30-05-57



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhloi, 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 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 :

- 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.
- Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN221-TN230	T210008	08 June 2022
TC	TYPE T	TN231-TN240	T210008	08 June 2022
DATA LOGGER	34970A	T149	T210008	08 June 2022
- This certificate is traceable to : National Institute of Metrology (Thailand) through Metrological Center (NSC-TIS-TIS 17025 CALIBRATION 0244.)
- 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
- Adjustment :
() without adjustment (X) after adjustment

Approved By:

FM-L13 108/30-05-57



Metrological Center

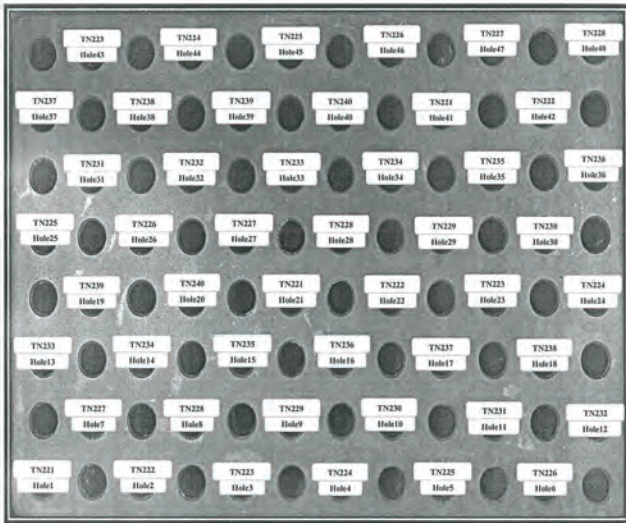
SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.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 3 of 6

Calibration Report



FRONT CONTROL

Approved By.

FM-L13 108/30-05-57



Metrological Center

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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 4 of 6

Calibration Report

Measurement Results

Calibration Point		Average Standard Reading at each position (°C)					
R1 Hole1-Hole6		TN221	TN222	TN223	TN224	TN225	TN226
CAL. POINT	Max	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
	Min	94.05	94.25	94.08	93.97	94.26	94.44
	Average	94.32	94.52	94.36	94.26	94.54	94.72
R3 Hole13-Hole18		TN233	TN234	TN235	TN236	TN237	TN238
	Max	95.03	94.54	94.76	94.84	95.06	94.73
	Min	94.46	93.98	94.20	94.28	94.49	94.18
	Average	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
	Min	94.33	94.26	95.51	95.62	95.51	95.85
	Average	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	96.04
	Min	96.01	96.10	96.02	96.20	95.89	95.71
	Average	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
	Min	96.53	96.65	96.71	96.08	95.98	95.43
	Average	96.68	96.81	96.87	96.28	96.16	95.60
R7 Hole37-Hole42		TN237	TN238	TN239	TN240	TN221	TN222
	Max	96.46	96.15	96.19	96.06	96.95	97.09
	Min	96.13	95.84	95.85	95.72	96.64	96.78
	Average	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
	Min	96.55	96.21	95.80	95.87	96.03	95.88
	Average	96.73	96.40	95.96	96.03	96.18	96.03

Approved By.

FM-L13 108/30-05-57



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

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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	104.65	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
	Min	105.28	105.43	105.35	105.52	105.68	105.83
	Average	105.42	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
	Min	105.85	105.81	105.55	105.80	105.53	105.64
	Average	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
	Min	105.61	105.37	104.27	104.35	104.12	104.61
	Average	105.74	105.48	104.35	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
	Min	104.77	104.75	104.76	104.90	104.51	104.49
	Average	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
	Min	105.27	105.27	105.44	104.76	104.66	104.25
	Average	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
	Min	105.00	104.53	104.41	104.35	105.04	105.37
	Average	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
	Min	105.44	105.28	104.92	104.60	104.70	104.85
	Average	105.53	105.37	105.01	104.69	104.79	104.93

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Calibration Report

Measurement Results:

HEATING BLOCK			Temperature Distribution	
Setting (°C)	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 108/30-05-57

ภาคผนวก จ

สำเนาหนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

ที่ อก ๐๓๑๐(๑)/ ๑๐๖๙



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ เขตราชเทวี
กรุงเทพมหานคร ๑๐๔๐๐

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 ว-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 ๕๙ รายการ น้ำใต้ดิน
จำนวน ๑๒๖ รายการ อากาศเสีย ๑๖ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว 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

(นายศิริะ จันทรเจต)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๒๐๒ ๔๑๔๖ ๐ ๒๒๐๒ ๔๐๐๒

โทรสาร ๐ ๒๓๕๔ ๓๒๐๘ ๐ ๒๓๕๔ ๓๔๑๕

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ว-๒๐๔

ที่ อก ๐๓๑๐(๑)/

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย

๑) นางสาวยุพาพร จันทร์เปล่ง

ทะเบียนเลขที่ ว-๒๐๔-ค-๔๗๐๐

๒) นางสาวชัชชัย โกมารกุล ณ นคร

ทะเบียนเลขที่ ว-๒๐๔-ค-๔๗๐๑

๓) นายศรายุทธ จิตรานนท์

ทะเบียนเลขที่ ว-๒๐๔-ค-๔๗๐๒

๔) นางสาวกนกกร เอนก

ทะเบียนเลขที่ ว-๒๐๔-ค-๖๑๑๑

๕) นายสุริยา สอนแก้ว

ทะเบียนเลขที่ ว-๒๐๔-ค-๖๑๑๒

๖) นายวิชาญ ชูณหะวัณ

ทะเบียนเลขที่ ว-๒๐๔-ค-๖๑๑๓



(นายศิริระ จันทร์เจิด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ว-๒๐๔

ที่ อก ๐๓๑๐(๑)/ ๑๐๖๙

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๖๒ ราย

๑) นางสาวจินดา ไชจุลธรรม	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๐๘
๒) นางสาวสาวิตรี น้อยเสงี่ยม	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๐๙
๓) นางสาวชนัญกาญจน์ อัมมขม	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๐
๔) นางสาวนรินทร์ สายเส็ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๕
๕) นางสาวนันทวดี สมบูรณ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๖
๖) นางสาวศรัณยา เฉลิมธำรงค์	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๗
๗) นางสาวสรารักษ์ มงคลจิรวุฒิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๙
๘) นางสาวศิริลักษณ์ พึ่งแพง	ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๒๐
๙) นายณพพงศ์ จันทรพันธุ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๐๘
๑๐) นายนรเศรษฐ์ โกมลาลัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๑
๑๑) นายธันวา 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-๕๔๒๑
๑๕) นางสาวเบมิกา ชัยเดชธนกุล	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๓
๑๖) นางสาวศศิธร หมูสวัสดิ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๔
๑๗) นางสาวเสาวลักษณ์ ภู่นภาอำพร	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๕
๑๘) นายอภิสิทธิ์ สิงหา	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๖
๑๙) นายศักดิ์สิทธิ์ ไพศาลพิสุทธิ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๗
๒๐) ว่าที่ร้อยตรีหญิง พรรณิภา ขำเจริญ	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 ร้องคำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๑
๒๖) นายนคร สุขเจริญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๒
๒๗) นายบัญชา นามเขตต์	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๓
๒๘) นายพรมมี ศรีปัดเนตร	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๕
๒๙) นายอุทิศ อุ่นสิม	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๖
๓๐) ว่าที่ร้อยตรี เฉลิมเกียรติ อมรศรีเสริม	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๘
๓๑) นางสาววริยา สร้างนา	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๙
๓๒) นายอนุพงศ์ รัตนศรีประเสริฐ	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๓๐
๓๓) นางสาวจุฑารัตน์ โอนสันเทียะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๔๒
๓๔) นางสาวจรรวรรณ พิมพ์อริกฤติยา	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๗๖

(นายศิริะ จันทร์เจิด)

๓๕) นางสาวปรารค์ทิพย์...

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

สำนักงานคณะกรรมการอาหารและยา

๓๕) นางสาวปรางค์ทิพย์ กิจไพศาลศักดิ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๗๙
๓๖) นางสาวเดือนใจ ทางกลาง	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๐
๓๗) นางสาวจิราพร ศิริเวช	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๑
๓๘) นายวรกร ผุ้รักษ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๒
๓๙) นายทอง วิริยะสทกิจ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๓
๔๐) นายธนิต เจนจบ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๔
๔๑) นายคณิศร ขำเพชร	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๕
๔๒) นายอรรคพล นิยมวิทยาพันธ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๖
๔๓) นายภูวิช พรหมสะอาด	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๗
๔๔) นายธนเดช โภคาพิพัฒน์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๘
๔๕) นายชวฤทธิ์ วงษ์จันทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๙
๔๖) นายอาทิตย์ ศรีแสน	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๐
๔๗) นายเจษฎินทร์ คงศักดิ์ไทย	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๑
๔๘) นายจรัส บุญยั้ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๒
๔๙) นายธนาณัติ เอนก	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๓
๕๐) นายอภิวัฒน์ ทุมหนู	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๔
๕๑) นางสาวสุภาขวัญ มาก	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๕
๕๒) นางสาวทัตพร ขวาลสมบุรณ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๐
๕๓) นางสาวธิดิมา บุญเพ็ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๑
๕๔) นางสาวกนกอร เข้มเพ็ชร	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๒
๕๕) นางสาวพัชรียา หงษ์สมดี	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๓
๕๖) นางสาวภาวนิดา สุรวงศ์ตระกูล	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๔
๕๗) นางสาวภาณุมาศ นามวัฒน์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๕
๕๘) นางสาวอุไรรัตน์ ทิงสร้างแป้น	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๖
๕๙) นายธีรวัฒน์ ปวงสุข	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๗
๖๐) นายอิทธิพล ยะโส	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๘
๖๑) นายประพจน์ วรรณชูชัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๙
๖๒) นายชยธร พวงทิพย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๐
๖๓) นางสาวกนกวรรณ จันทบาล	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๑
๖๔) นางสาวเกษร หลักบุญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๒
๖๕) นายสิทธิโชค ธงเงิน	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๓
๖๖) นางศิลปวรรณ ใจบุญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๕
๖๗) นางสาวพรรณธิดา พุ่มคง	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๘
๖๘) นางสาวศรณีย์ ยิ่งดี	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๙
๖๙) นายนวกัทร ศรีวิริยะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๐
๗๐) นายสุวิชา ทองอ่อน	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๑
๗๑) นายวิญญู บุญตะนัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๓

(นายศิระ จันทรเจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

กระทรวงอุตสาหกรรม

๗๒) นายสมบุรณ์...

๑๐๙) นายนนทชัย...

๑๐๙) นายพนนพชัย อุปถัมภ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๔
๑๑๐) นายนิรุฬพล คุณสุทธิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๕
๑๑๑) นายนิพนธ์วัฒน์ สาริน	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๖
๑๑๒) นายปิยะนัฐ พลมะศรี	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๗
๑๑๓) นายพงศ์สิริ โสมเขียว	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๘
๑๑๔) นายพีรพัฒน์ กำคำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๙
๑๑๕) นายภาณุพงศ์ มานิตย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๐
๑๑๖) นายมงคล ผลาทิพย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๑
๑๑๗) นายมนูรินทร์ พูลศิริ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๒
๑๑๘) นายสิรินันท์ ทองอ้น	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๓
๑๑๙) นายอเนชา ทันสมัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๔
๑๒๐) นายอดิศักดิ์ ผมไผ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๕
๑๒๑) นายอนันตชัย วิสุม	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๖
๑๒๒) นายณัฐดนัย เจือละออง	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๗
๑๒๓) นายวรวิธ ดินัก	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๘
๑๒๔) นายแสงตะวัน นະตะສັດ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๙
๑๒๕) นายยุทธพงศ์ รัตนะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๐
๑๒๖) นายชัยวุฒิ ไชยชนะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๑
๑๒๗) นายวิศรุต ศรีธรรมมา	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๒
๑๒๘) นายพนนทกร เผือกผ่อง	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๓
๑๒๙) นายกำชัย สุทธะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๔
๑๓๐) นางสาวณัฐภรณ์ รักทะเล	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๑๙
๑๓๑) นางสาวประภาภรณ์ บุตรพรม	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๐
๑๓๒) นางสาวนิลาวัลย์ นามพรม	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๑
๑๓๓) นางสาวพัชรินทร์ แสนสร้อย	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๒
๑๓๔) นายไพโรจน์ เปี่ยมพิมาย	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๓
๑๓๕) นางสาวศุภมาศ ทองมาก	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๔
๑๓๖) นางสาวลลิตา จิตรสว่าง	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๕
๑๓๗) นางสาวชไมพร เสิกภูเขียว	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๖
๑๓๘) นางสาวกฤติมาพร คำมีแก่น	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๗
๑๓๙) นางสาวสกลรัตน์ ภาควุฒิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๘
๑๔๐) นางสาวกาญจนา คงคุณ	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๙
๑๔๑) นางสาวไพรินทร์ ศรีรูปี	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๐
๑๔๒) นางสาวทิพนันดา ฝูญปัญญา	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๑
๑๔๓) นางสาวสาธิตา ปานทอง	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๒
๑๔๔) นางสาวอริสา ทองนวล	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๓
๑๔๕) นางสาวอริยา คำคลอง	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๔

(นายศิริ จันทรเจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

๑๔๖) นางสาวบุษดาภรณ์...

๑๔๖) นางสาวชุตากรณ์ สุนทรสนาน	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๕
๑๔๗) นางสาวสุภารัตน์ นนท์ประสาท	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) นางสาวพาฤดี คุณน่าน	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๓
๑๕๕) นางสาวจิราเจต พองดา	ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๔
๑๕๖) นางสาวกนกภรณ์ อุระ	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 จันทรเจติ)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ว-๒๐๔

ที่ อก ๐๓๑๐(๑)/ ๑๐๖๕

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๖๑ รายการ

น้ำเสีย จำนวน 59 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldicarb	High-Performance Liquid Chromatographic Method ^[4]
2	Aldicarb Sulfone	High-Performance Liquid Chromatographic Method ^[4]
3	Aldicarb Sulfoxide	High-Performance Liquid Chromatographic Method ^[4]
4	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
5	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
6	Barium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
7	α -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
8	β -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
9	δ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
10	γ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
11	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method ^[4] 2) 5-Day BOD Test, Membrane Electrode Method ^[4]
12	Carbaryl	High-Performance Liquid Chromatographic Method ^[4]
13	Carbofuran	High-Performance Liquid Chromatographic Method ^[4]
14	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
15	Chemical Oxygen Demand	1) Closed Reflux, Colorimetric Method ^[4] 2) Closed Reflux, Titrimetric Method ^[4]
16	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
17	Chromium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[4]
18	Color	ADMI Weighted-Ordinate Spectrophotometric Method

(นางริกาญจน์ จันทรกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และทะเบียนห้องปฏิบัติการ

19 Copper...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Copper	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
20	Cyanide	Distillation, Colorimetric Method ^[4]
21	2,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
22	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
23	2,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
24	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
25	2,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
26	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
27	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
28	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
29	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
30	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
31	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
32	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
33	Formaldehyde	Distillation, Colorimetric Method ^[3]
34	Free Chlorine	1) DPD Ferrous Titrimetric Method ^[4] 2) Iodometric Method ^[4]
35	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
36	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
37	Hexavalent Chromium	Filtration, Colorimetric Method ^[4]
38	3-Hydroxycarbofuran	High-Performance Liquid Chromatographic Method ^[4]
39	Lead	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
40	Manganese	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
41	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma/Mass spectrometric Method ^[4]
42	Methiocarb	High-Performance Liquid Chromatographic Method ^[4]
43	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]

วิมล

44 Methomyl...

(นางริกาญจน์ อัครสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

กรมส่งเสริมการค้าระหว่างประเทศ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
44	Methomyl	High-Performance Liquid Chromatographic Method ^[4]
45	Nickel	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
46	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ^[4] 2) Soxhlet Extraction Method ^[4]
47	Oxamyl	High-Performance Liquid Chromatographic Method ^[4]
48	Propoxur	High-Performance Liquid Chromatographic Method ^[4]
49	pH	Electrometric Method ^[4]
50	Phenols	1) Distillation, Chloroform Extraction Method ^[4] 2) Distillation, Direct Photometric Method ^[4]
51	Selenium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
52	Sulfide	Iodometric Method ^[4]
53	Temperature	Laboratory and Field Methods ^[4]
54	Total Dissolved Solids	Dried at 180 °C ^[4]
55	Total Kjeldahl Nitrogen	Semi-Micro Kjeldahl Method ^[4]
56	Total Suspended Solids	Dried at 103-105 °C ^[4]
57	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
58	Trivalent Chromium	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ^[4]
59	Zinc	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[4]

น้ำใต้ดิน จำนวน 126 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]

วิมล

3 Aldrin...

(นางริภาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
และทะเบียนห้องปฏิบัติการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
8	Barium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
9	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
13	Benzoic Acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
15	Benzo[g,h,i]perylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]

วิธีทาง)

18 Bis(2-ethylhexyl)phthalate...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
และทะเบียนห้องปฏิบัติการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
		Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^[4]
22	Butyl Benzyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
27	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]

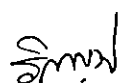


34 Chromium (III)...

(นางริกาญจน์ จิตรสกุลไธ)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
57	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
58	Diethyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
63	Di-n-Octyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
64	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
65	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
67	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]



(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
และทะเบียนห้องปฏิบัติการ

68 Fluorene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
68	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
69	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
70	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
74	α -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
75	β -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
76	γ -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
81	Lead	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
83	Mercury	1) Cold Vapor Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]

รฟท

84 Methanol...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิชาการวิเคราะห์ทดสอบมลพิษ

แบบฟอร์มรายงานผลการวิเคราะห์

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^[4]
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
89	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
91	Naphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
95	N-Nitrosodi-n-Propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB 1242 - PCB 1248 - PCB 1254 - PCB 1260	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]

วิมล

97 Pentachlorophenol...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และทะเบียนห้องปฏิบัติการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
98	pH	Electrometric Method ^[4]
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
100	Phenol	1) Distillation, Direct Photometric Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
102	Selenium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
103	Silver	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
104	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
105	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
106	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
107	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
108	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
109	TPH (C ₅ -C ₉)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,24]
110	TPH (C ₈ -C ₁₆)	Solvent Extraction, Gas Chromatographic Method ^[9,21]
111	TPH (C ₁₆ -C ₃₅)	Solvent Extraction, Gas Chromatographic Method ^[9,21]
112	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
113	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]

วิมล

114 1,1,2-Trichloroethane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
114	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
115	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
118	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
119	Vanadium	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]
120	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
121	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
122	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
123	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
124	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
125	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4]
126	Zinc	1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4]

อากาศเสีย (ปล่อยระบาย) จำนวน 16 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic, Digestion, Inductively Coupled Plasma Method ^[5]
2	Arsenic	Isokinetic, Digestion, Inductively Coupled Plasma Method ^[5]

วิทย์

3 Carbon Monoxide...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิชาการวิเคราะห์ทดสอบมลพิษ

และหน่วยงานที่เกี่ยวข้อง

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Carbon Monoxide	1) Sampling Bag Non-Dispersive Infrared Method ^[5] 2) Non-Dispersive Infrared Method ^[5] 3) Instrumental Analyzer Method ^[5]
4	Chlorine	1) Absorption Sampling, Ion Chromatographic Method ^[5] 2) Isokinetic Sampling, Ion Chromatographic Method ^[5]
5	Copper	Isokinetic, Digestion, Inductively Coupled Plasma Method ^[5]
6	Dioxins	Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory or Analysis by Department of Industrial Works Registered Laboratory (Dioxins/Furans Analysis Approved) ^[5]
7	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method ^[5] 2) Isokinetic Sampling, Ion Chromatographic Method ^[5]
8	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ^[5]
9	Lead	Isokinetic, Digestion, Inductively Coupled Plasma Method ^[5]
10	Mercury	1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[5] 2) Isokinetic, Digestion, Inductively Coupled Plasma Method ^[5]
11	Opacity	Ringelmann's Method ^[2]
12	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method ^[5] 2) Chemiluminescence Method ^[5] 3) Instrumental Analyzer Method ^[5]
13	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method ^[5] 2) UV Fluorescence Method ^[5] 3) Instrumental Analyzer Method ^[5]
14	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method ^[5]
15	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ^[5]
16	Xylene	Adsorption Sampling, Gas Chromatographic Method ^[5]

วิมล

สิ่งปลูก...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิชาการวิเคราะห์ทดสอบมลพิษ

กรมควบคุมมลพิษ

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31]
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]

วิมล

6 Cadmium...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และทะเบียนห้องปฏิบัติการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,19,25] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31]
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]
9	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method ^[1,6,15,17] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method ^[1,6,16,17] 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[7,8,15,17] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[7,8, 16,17]
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^[1,6,17] 2) Alkaline Digestion, Colorimetric Method ^[8,17]



(นางริกาญจน์ จิตรสกุลไธ)

11 Cobalt...

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

.....เรียน...../.....

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31]
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31]
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31]
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25]

จิราพร

2) Soxhlet...

(นางริกาญจน์ จัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และทะเบียนห้องปฏิบัติการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Dieldrin	2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31] 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25]
18	Endrin	2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31] 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25]
19	Heptachlor	2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31] 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25]
20	Lead	2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31] 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16]
21	Lindane	3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16] 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22]
22	Mercury	3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31] 1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[1,6,18]

วิมล

2) Waste Extraction...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
23	Methoxychlor	2) Waste Extraction, Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^[1,6,19] 3) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^[1,6,20] 4) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[18] 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^[19] 6) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^[20]
24	Mirex	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31]
25	Molybdenum	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31]
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]
		1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]

วิมล

27 Polychlorinated...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	<p>Polychlorinated biphenyls (PCBs)</p> <ul style="list-style-type: none"> - 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',5,5',6-Nonachlorobiphenyl 	<p>1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method^[1,9,23]</p> <p>2) Soxhlet Extraction, Gas Chromatographic Method^[10,23]</p> <p>3) Automated Soxhlet Extraction, Gas Chromatographic Method^[22,31]</p>

วิมล

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

28 Pentachlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31]
29	pH	Electrometric Method ^[29,30]
30	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16]
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31]
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15]

วิมล

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิชาการวิเคราะห์ทดสอบมลพิษ

4) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
35	Zinc	4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16] 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16]

ดิน จำนวน 125 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
4	Anthracene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16]
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16]
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
8	Barium	1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16]

วิมล

(นางริกาณจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

9 Benz(a)anthracene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Benz(a)anthracene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
11	Benzo(b)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
12	Benzo(k)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
13	Benzoic acid	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
14	Benzo(a)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
15	Benzo(g,h,i)perylene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16]
17	Bis(2-chloroethyl)ether	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
18	Bis(2-ethylhexyl)phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
21	Butanol	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^[12,24]
22	Butyl Benzyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16]
24	Carbazole	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]

วิกรม

26 Carbon tetrachloride...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
28	p-Chloroaniline	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
32	2-Chlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16]
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[7,8,15,17] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[7,8,16,17]
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^[8,17]
36	Chrysene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
37	Cyanide	Extraction, Distillation, Colorimetric Method ^[26,27,28]
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
39	DDD	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
40	DDE	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
41	DDT	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
42	Dibenz(a,h)anthracene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
43	Di-n-Butyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
47	3,3-Dichlorobenzidine	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
53	2,4-Dichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]

วิภาณี

57 Dieldrin...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
58	Diethyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
59	2,4-Dimethylphenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
60	2,4-Dinitrophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
61	2,4-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
62	2,6-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
63	Di-n-Octyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
67	Fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
68	Fluorene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
70	Heptachlor Epoxide	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
73	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
74	α -HCH	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
75	β -HCH	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
76	γ -HCH	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
77	Hexachlorocyclopentadiene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
78	Hexachloroethane	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
79	Indeno(1,2,3-cd)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
80	Isophorone	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
81	Lead	1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[18]

วิฑูรย์

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และหน่วยงานบังคับปฏิบัติการ

2) Thermal...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry ^[19] 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^[20] Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^[12,24]
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
88	2-methylphenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
89	2-Methylnaphthalene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24]
91	Naphthalene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16]
93	Nitrobenzene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
94	N-Nitrosodiphenylamine	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
95	N-Nitrosodi-n-propylamine	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,23] 2) Automated Soxhlet Extraction, Gas Chromatographic Method ^[23,32]

วิฑูรย์

(นางริกาญจน์ ฉัตรสกุลวิไล)

- Aroclor 1242...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
	<ul style="list-style-type: none"> - 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 ^[25,31]
98	Phenanthrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
99	Phenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]
100	Pyrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
101	Selenium	1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16]
102	Silver	1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16]
103	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
106	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
108	TPH (C ₅ -C ₈)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
109	TPH (C ₈ - C ₁₆)	1) Solvent Extraction, Gas Chromatographic Method ^[11,21] 2) Automated Soxhlet Extraction, Gas Chromatographic Method ^[21,31]
110	TPH (C ₁₆ - C ₃₅)	1) Solvent Extraction, Gas Chromatographic Method ^[11,21] 2) Automated Soxhlet Extraction, Gas Chromatographic Method ^[21,31]
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
115	2,4,5-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]

วิมล

116 2,4,6-Trichlorophenol...

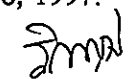
(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
116	2,4,6-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31]
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
118	Vanadium	1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16]
119	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
120	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
121	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
122	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
123	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24]
125	Zinc	1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16]

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(นางริกาญจน์ ฉัตรสกุลไธ)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
และทะเบียนห้องปฏิบัติการ



ที่ อก ๐๓๑๐(๑)/ ๕ ๓ ๗ ๙

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐ ๙ มีนาคม ๒๕๖๖

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๔ กุมภาพันธ์ ๒๕๖๖

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๙ ราย

- | | |
|---------------------------------|----------------------------|
| ๑) นายนคร สุขเจริญ | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๒ |
| ๒) นายบัญชา นามเขตต์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๓ |
| ๓) นายอรรคพล นิยมวิทย์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๗ |
| ๔) นางสาวพัชรียา หงษ์สมดี | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๓ |
| ๕) นางสาวภาณิดา สุรวงศ์ตระกูล | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๔ |
| ๖) นางสาวศรณีย์ ยิ่งดี | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๙ |
| ๗) นายสมโภช วันสา | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๙ |
| ๘) นายณัฐนันท์ ปานประเสริฐ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๘๑๙ |
| ๙) ว่าที่ร้อยตรีภาณุพงศ์ แสนศรี | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๘๓๖ |
| ๑๐) นายมนินทร์ พูลศิริ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๒ |
| ๑๑) นายณัฐดนัย เจือละออง | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๗ |
| ๑๒) นางสาวกาญจนา คงคุณ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๙ |
| ๑๓) นางสาวรัชนิกร เนียมกลาง | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๗ |
| ๑๔) นางสาวกัญญารัตน์ ศรีนิลทา | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๘ |
| ๑๕) นายศิริวัฒน์ พานิชย์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๑ |
| ๑๖) นางสาวกนกภรณ์ อูระ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๕ |
| ๑๗) นางสาวจิตสุภา ประเทืองสุข | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๗ |
| ๑๘) นางสาวอริสา วิริยขันติธรรม | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๘ |
| ๑๙) นางสาวพนิดา ยอดอินทร์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๕๐ |

๒. ให้เพิ่มเจ้าหน้าที่...

๒. ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ ราย

- | | |
|---------------------------------|----------------------------|
| ๑) นายกาจบัณฑิต กิตติสุขภวณิชย์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๑ |
| ๒) นายภัทรพล สว่างใจธรรม์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๒ |
| ๓) นายนราธิป เทือกชัยคำ | ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๓ |
| ๔) นายศิริโชค พงษ์ประสม | ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๔ |
| ๕) นายณัฐวุฒิ ดั่งแพง | ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๕ |

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ที่ อก ๐๓๑๐(๑)/๑๐๖๔ ลงวันที่ ๒๘ มกราคม ๒๕๖๔ คือในวันที่ ๒ กันยายน ๒๕๖๖ ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ทำหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



(นางริกาญจน์ นัตรสกุลวิไล)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



ที่ อก ๐๓๑๐(๑)/ ๖ ๑ ๒ ๕



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒ ๓ มีนาคม ๒๕๖๖

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑๐ มีนาคม ๒๕๖๖

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐
ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการ
วิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้เปลี่ยนแปลงชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการ
วิเคราะห์ จากเดิม นางสาวสรารค์มี มงคลจิรวุฒิ ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๙ เป็น นางสาวธัญญธร มงคลจิรวุฒิ
ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๙

ทั้งนี้ หากท่านมีความประสงค์จะยื่นคำขอใดๆ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์
ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ท้ายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

-(นายประสม ดำรงพงษ์)

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”

