

เอกสารแนบ จ  
เอกสารสอบเทียบเครื่องมือตรวจวัดและเครื่องมือวิเคราะห์

---

### List of Instruments Certification for Air & Noise Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
<b>Ambient</b>									
1	Orifice Transfer Standard Calibrator	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Tisch Environmental, Inc.	TE-5025A 3383	Jirantee Associates Co., Ltd.	COF-039-67	27 Sep 24	26 Sep 25	-
2	U-Tube Manometer	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Dwyer	121-36-W/M -	Technology Promotion Association (Thailand-Japan)	25P112	19 Feb 25	18 Feb 26	-
3	Aneroid Barometer	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	24P1856	4 Jun 24	3 Jun 25	-
4	Digital Thermo - Hygrometer	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Digicon	TH-02 435031148	Technology Promotion Association (Thailand-Japan)	24H1487	15 Jul 24	14 Jul 25	-
5	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Scientific	42i 1180540064	UAE Consultant Co., Ltd.	11102024	11 Oct 24	10 Oct 25	-
6	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Scientific	42i 1182920005	UAE Consultant Co., Ltd.	20092024	20 Sep 24	19 Sep 25	-
7	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Scientific	42i 1182920007	UAE Consultant Co., Ltd.	17102024	17 Oct 24	16 Oct 25	-
8	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Scientific	42i 1182920008	UAE Consultant Co., Ltd.	04102024	4 Oct 24	3 Oct 25	-
9	Standard Gases (Mixture)	Nitrogen Dioxide	Airgas	EB0162121 2016PSIG	Airgas an Air Liquide company	E05NI91E15A0014	6 Jun 23	6 Jun 31	-
10	Sulphur Dioxide Analyzer	Sulphur Dioxide	Thermo Scientific	43i 1182920017	UAE Consultant Co., Ltd.	09042024	4 Sep 24	3 Sep 25	-
11	Sulphur Dioxide Analyzer	Sulphur Dioxide	Thermo Scientific	43i 1180540065	UAE Consultant Co., Ltd.	04092024	4 Sep 24	3 Sep 25	-
12	Sulphur Dioxide Analyzer	Sulphur Dioxide	Thermo Scientific	43i 1182920012	UAE Consultant Co., Ltd.	04092024	4 Sep 24	3 Sep 25	-
13	Sulphur Dioxide Analyzer	Sulphur Dioxide	Thermo Scientific	43i 1182920014	UAE Consultant Co., Ltd.	04092024	4 Sep 24	3 Sep 25	-
14	Standard Gases (Mixture)	Sulphur Dioxide	Airgas	EB0162121 2016PSIG	Airgas an Air Liquide company	E05NI91E15A0014	6 Jun 23	6 Jun 31	-

List of Instruments Certification for Air & Noise Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Ambient									
15	Wind Speed/Wind Direction	WS/WD	Scarlet Tech Ltd.	WL-21 2205DT0113	Thai Meteorological Department	002/25	3 Jan 25	2 Jan 26	-
16	Sound Level Calibrator (Acoustic Calibrator)	Calibrate Sound Level Meter	Larson Davis	CAL150 6171	Innovative Instrument Co.,Ltd.	24-ACT-086	25 Jun 24	24 Jun 25	-
17	Sound Level Meter	$L_{Aeq\ 24\ hrs}$ , $L_{Aeq\ 1\ hr}$ , $L_{Amax}$ , $L_{A90}$ , $L_{Adn}$	Larson Davis	LxT2 0005290	Innovative Instrument Co.,Ltd.	24-SLM-238	11 Jul 24	10 Jul 25	-
18	Sound Level Meter	$L_{Aeq\ 24\ hrs}$ , $L_{Aeq\ 1\ hr}$ , $L_{Amax}$ , $L_{A90}$ , $L_{Adn}$	Larson Davis	LxT2 0005293	Innovative Instrument Co.,Ltd.	24-SLM-231	10 Jul 24	9 Jul 25	-
19	Sound Level Meter	$L_{Aeq\ 24\ hrs}$ , $L_{Aeq\ 1\ hr}$ , $L_{Amax}$ , $L_{A90}$ , $L_{Adn}$	Larson Davis	LxT2 0005299	Innovative Instrument Co.,Ltd.	24-SLM-240	11 Jul 24	10 Jul 25	-
20	Sound Level Meter	$L_{Aeq\ 24\ hrs}$ , $L_{Aeq\ 1\ hr}$ , $L_{Amax}$ , $L_{A90}$ , $L_{Adn}$	Larson Davis	LxT2 0006691	Innovative Instrument Co.,Ltd.	24-SLM-236	10 Jul 24	9 Jul 25	-
21	Sound Level Meter	$L_{Aeq\ 24\ hrs}$ , $L_{Aeq\ 1\ hr}$ , $L_{Amax}$ , $L_{A90}$ , $L_{Adn}$	Larson Davis	LxT1	Electrical And Electronics Institute	CP20240290EA	5 Aug 24	4 Aug 25	-
		Annoyance Noise		0007306	Foundation For Industrial Development				
22	Sound Level Meter	$L_{Aeq\ 24\ hrs}$ , $L_{Aeq\ 1\ hr}$ , $L_{Amax}$ , $L_{A90}$ , $L_{Adn}$	Larson Davis	LxT1	Electrical And Electronics Institute	CP20240322EA	22 Aug 24	21 Aug 25	-
		Annoyance Noise		0007308	Foundation For Industrial Development				

## List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*
1	Atomic Absorption Spectrometer	CADMIUM CHROMIUM HEXVALENT COPPER LEAD MANGANESE NICKEL ZINC	Agilent Technologies	AA240FS / MY13160001	Agilent Technologies (Thailand) Co.,Ltd.	Preventive Maintenance Checklist	30/1/2025	29/1/2026
2	Atomic Absorption Spectrometer	ARSENIC	Perkin Elmer	PinAAcle 900F / PFB20031902	Perkin Elmer Co.,Ltd.	Preventive Maintenance Report	29/4/2025	28/4/2026
3	Analytical Balance	TOTAL DISSOLVED SOLIDS	Mettler Toledo	XSR205DU / C009071872	National Food Institute,Ministry of Industry, Thailand	2502226-001-01	20/3/2025	19/3/2026
4	Mercury Analyzer	MERCURY	NIC. Japan	RA-4500 / 17780278	Coax Group Corporation Ltd.	Preventive Maintenance Report	9/7/2024	8/7/2025
5	Kjeltec Distillation Unit	TOTAL KJELDAHL NITROGEN	FOSS	KT9 / 91905393	FOSS South East Asia	12875	5/7/2024	4/7/2025
6	pH Meter	pH	Horiba	LAQUA-PH210 / HA1M0036	technology promotion association (thailand-japan	25CH52	15/1/2025	14/1/2026

**Due Date of Calibration\*** : Based on the annual calibration plan. At least 1 time per year.



## List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*
1	Atomic Absorption Spectrometer	CADMIUM CHROMIUM HEXAVALENT COPPER LEAD NICKEL ZINC	Agilent Technologies	AA240FS / MY13160001	Agilent Technologies (Thailand) Co.,Ltd.	Preventive Maintenance Checklist	30/1/2025	29/1/2026
2	Atomic Absorption Spectrometer	ARSENIC	Perkin Elmer	PinAAcle 900F / PFB20031902	Perkin Elmer Co.,Ltd.	Preventive Maintenance Report	29/4/2025	28/4/2026
3	BOD Incubator	BIOCHEMICAL OXYGEN DEMAND	ARCO	UC4-1320 / 1021	Technology Promotion Association (Thailand-Japan)	24TM1113	11/7/2024	16/7/2025
4	Continuous Flow Analyzer(CFA)	CYANIDE	Skalar Analytical B.V., the Netherlands	San++5000-02 / 182688	DKSH (Thailand) Ltd.	WO-00074079	23/5/2025	22/5/2026
5	DO Meter	BIOCHEMICAL OXYGEN DEMAND	YSI	5100 / 11B 101863	Technology Promotion Association (Thailand-Japan)	25TW29	18/2/2025	16/2/2026
6	Mercury Analyzer	TOTAL MERCURY	NIC. Japan	RA-4500 / 17780278	Coax Group Corporation Ltd.	Preventive Maintenance Report	9/7/2024	8/7/2025
7	Cooled Incubator	TOTAL COLIFORM BACTERIA	Binder	KB400 / WTB20200000015535	National Food Institute, Ministry of Industry, Thailand	2502229-006-01	19/3/2025	18/3/2026
8	pH Meter	pH	YSI Environmental	pH 100A / JC03335	Technology Promotion Association (Thailand-Japan)	25CH163	5/2/2025	3/2/2026
9	UV-VIS Spectrophotometer	NITRATE	Hitachi	U-2900 / 21E22-009	DQE Services Co.,Ltd.	SP25-001	3/1/2025	2/1/2026

**Due Date of Calibration\*** : Based on the annual calibration plan. At least 1 time per year.

## List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*
1	Atomic Absorption Spectrometer	CADMIUM CHROMIUM TRIVALENT COPPER LEAD MANGANESE MERCURY NICKEL ZINC	Agilent Technologies	AA240FS / MY13160001	Agilent Technologies (Thailand) Co.,Ltd.	Preventive Maintenance Checklist	30/1/2025	29/1/2026
2	Atomic Absorption Spectrometer	ARSENIC	Perkin Elmer	PinAAcle 900F / PFB20031902	Perkin Elmer Co.,Ltd.	Preventive Maintenance Report	29/4/2025	28/4/2026
3	Analytical Balance	FAT OIL AND GREASE	Mettler Toledo	AB204-S/FACT / 1129361010	United Analyst and Engineering Consultant Co., Ltd.	250422 1 BL002 25	23/4/2025	22/4/2026
4	Analytical Balance	TOTAL DISSOLVED SOLIDS	Mettler Toledo	XSR205DU / C210685394	National Food Institute,Ministry of Industry, Thailand	2502226-002-01	20/3/2025	19/3/2026
5	Analytical Balance	TOTAL SUSPENDED SOLIDS	Mettler Toledo	XSR205DU / C009071872	National Food Institute,Ministry of Industry, Thailand	2502226-001-01	20/3/2025	19/3/2026
6	Continuous Flow Analyzer(CFA)	CYANIDE	Skalar Analytical B.V., the Netherlands	San++5000-02 / 182688	DKSH (Thailand) Ltd.	WO-00074079	23/5/2025	22/5/2026
7	DO Meter	BIOCHEMICAL OXYGEN DEMAND	YSI	5100 / 11B 101863	Technology Promotion Association (Thailand-Japan)	25TW29	18/2/2025	16/2/2026
8	Kjeltec Distillation Unit	TOTAL KJELDAHL NITROGEN	FOSS	KT9 / 91905393	FOSS South East Asia	12875	5/7/2024	4/7/2025
9	pH Meter	pH	YSI Environmental	pH 100A / JC03335	Technology Promotion Association (Thailand-Japan)	25CH163	5/2/2025	3/2/2026

List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*
10	Spectrophotometer	CHROMIUM HEXAVALENT COLOUR (pH 7.0) COLOUR (pH Sample)	Agilent	Cary 60 G6860A / MY15410009	DQE Services Co.,Ltd.	SP25-019	26/5/2025	25/5/2026
11	UV-VIS Spectrophotometer	FLUORIDE	Hitachi	U-2900 / 21E22-009	DQE Services Co.,Ltd.	SP25-001	3/1/2025	2/1/2026
12	UV/VIS Spectrophotometer	CHEMICAL OXYGEN DEMAND FORMALDEHYDE PHENOLS COMPOUND	Hitachi	U-5100 / 23A4-008	DQE Services Co.,Ltd.	SP24-028	11/9/2024	9/9/2025

Due Date of Calibration\* : Based on the annual calibration plan. At least 1 time per year.

## Certificate of Calibration

### Customer

Name : UNITED ANALYST AND ENGINEERING  
CONSULTANT CO.,LTD.  
Address : 81 Soi Udomsuk 41, Sukhumvit Road, Bangchak,  
Prakanong, Bangkok 10260

Certificate No : 24-ACT-086  
Request No : Req-2024-1364

### Unit Under Calibration Details

Measurement item : Acoustic Calibrator Class : 2  
Manufacturer : LARSON DAVIS Range : 94 , 114 dB / 1000 Hz  
Model : CAL150 Instrument Status : Used  
Serial Number : 6171  
ID : UAE-EFM.117/2562

### Calibration Environment and Details


Temperature : ( 23 ± 2 °C )  
Humidity : ( 50 ± 20 %RH )  
Barometric Pressure : ( 1013 ± 10.0 hPa )  
Received Date : 20 June 2024  
Calibration Date : 25 June 2024  
Location of Calibration : LAB 1 Acoustic  
Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators


Reference Standard	Model	Serial Number	Traceable	Due Calibration
Sound Calibrator	SV 35A	58079	EEI	12 June 2025
THD Multimeter	2015	1047765	NIMT	16 January 2025

**Traceability** : This certificate provides traceability of measurement to recognized national standard, and to the realization of the international System of Units (SI).

### Note

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

Calibrated By :   
Mr. Noppodon Luangart  
Service Calibration Engineer

Approved By :   
Mr. Pachi Mathavorn  
Calibration Engineer Supervisor  
Issue Date : 25 June 2024

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.  
FM-708-ACT-02 Rev.03 Issue date 5/6/24

เอกสารไม่ควบคุม

Certificate No : 24-ACT-086

Request No : Req-2024-1364

### Sound pressure level

### Calibration Results : Without Adjustment

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty ( ± dB )	Acceptance limit Class 2 ( ± dB )	Result
	Measured	Deviated value	Measured	Deviated value			
94 dB / 1000 Hz	93.99	-0.01	-	-	0.13	0.40	Pass
114 dB / 1000 Hz	114.02	0.02	-	-	0.14	0.40	Pass

### Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty ( ± % )	Acceptance limit Class 2 ( ± % )	Result
	Measured (Hz)	Deviated	Measured (Hz)	Deviated			
94 dB / 1000 Hz	1000.00	0.00	-	-	0.01	1.7	Pass
114 dB / 1000 Hz	1000.00	0.00	-	-	0.01	1.7	Pass

### Total Harmonic Distortion plus Noise of Sound pressure level (THD+N %)

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty ( ± % )	Acceptance limit Class 2 ( ± % )	Result
	Measured (%)	Deviated (%)	Measured (%)	Deviated (%)			
94 dB / 1000 Hz	0.05	-	-	-	0.40	3.0	Pass
114 dB / 1000 Hz	0.30	-	-	-	0.40	3.0	Pass

### Note :

Function	Maximum-permitted Uncertainty of measurement
Sound pressure level	0.35 dB
Frequency	0.20%
Total distortion+noise	1.00%

- Acceptance limit was IEC60642:2017 Class 1  
- The calibration results exclude the calibrator pressure correction  
- The calibration results exclude the microphone volume correction

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.  
FM-708-ACT-02 Rev.03 Issue date 5/6/24

เอกสารไม่ควบคุม

Certificate No : 24-ACT-086  
Request No : Req-2024-1364

### Decision Rule for Statements of Conformity

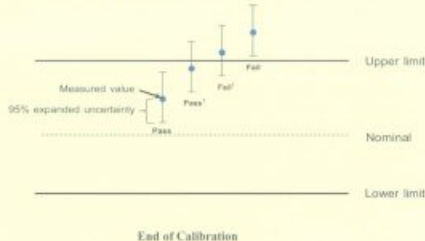
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09:2019: Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

Pass - The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass<sup>1</sup> - The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail<sup>1</sup> - The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail - The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Calibration

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.  
FM-708-ACT-02 Rev.03 Issue date 5/6/24

เอกสารไม่ควบคุม



## Certificate of Calibration

Certificate No. : 24H1487  
Page : 1 of 2

Equipment : Digital Thermo-Hygrometer  
Manufacturer : Digicon  
Model : TH-02A  
Serial No. : 435031148  
ID No. : UAE-EFM.006/2567

Condition As-Received: New Item

Received Date : 10 July 2024

Calibration Date : 15 July 2024

to 17 July 2024

Reference : 2407-0393WSG

Ambient Temperature : ( 25 ± 3 ) °C

Relative Humidity : ( 50 ± 20 ) %

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.

Submitted by: United Analyst and Engineering Consultant Co.,Ltd.

81 Soi Udomsuk 41, Sukhumvit Road, Bangchak,  
Phrakhanong, Bangkok 10260

**Procedure used:** Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with standard chilled mirror sensor for humidity measurement function and comparison with standard temperature probe for temperature measurement function into humidity / temperature chamber.

### Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Chilled Mirror Hygrometer Sensor	Dew Prime II	31863	21819	25 Sep 2024
2) Handheld Thermometer With Sensor	1523	5717086	231321	06 Nov 2024

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

3.This Certification is traceable to the International System of Unit maintained through-

-Thunder Scientific Corporation, NV/LAB Accreditation No. Calibration 200582-0

-Technology Promotion Association (Thailand-Japan), NSC-ONSAC Accredited No. Calibration 0008

Calibrated by : Sunsit Phansudhol  
Issue Date : 17 July 2024

Approved Signatory :   
[ ] Chakrit Waeuwajua  
[x] Viporn Tantiyasawat  
[ ] Unnophol Harschal

เอกสารไม่ควบคุม



Cert. No.: 24H1487  
Page: 2 of 2

Result of Calibration: Without Adjustment  
Function: Humidity Measurement.

Reference Temperature (°C)	Standard Humidity (%R.H.)	UUC* Reading (%R.H.)	Error (%R.H.)	Uncertainty of Measurement (%R.H.)
25.0	40.1	39	-1.1	1.4
25.0	50.1	48	-2.1	1.6
25.0	60.0	58	-2.0	1.6
25.0	70.2	68	-2.2	1.6

Result of Calibration: Without Adjustment  
Function: Temperature Measurement.

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (°C)
20.014	20.3	0.286	0.42
24.984	25.2	0.216	0.42
30.050	30.1	0.050	0.42
40.027	40.0	-0.027	0.42

UUC\* : Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor  $k = 2.00$ , providing confidence level approximately 95%.

-000-

เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
53/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250  
TEL: 0-2717-3800-24 FAX: 0-2719-9484



## Certificate of Calibration

Certificate No.: 24P1856  
Page: 1 of 2

Equipment: Aneroid Barometer

Manufacturer: Barigo

Model: -

Serial No.: -

ID No.: UAE.EMA2.110/2555

Condition As-Received: Used Item

Received Date: 24 May 2024

Calibration Date: 04 June 2024

Reference: 2405-0919WSC

Ambient Temperature: ( 23 ± 2 ) °C

Relative Humidity: ( 50 ± 15 ) %

Atmospheric Pressure: 1006 mbar

Submitted by: United Analyst and Engineering Consultant Co., Ltd.

81 Soi Udomsak 41, Sukhumvit Road,  
Bangchak, Phrakhanong, Bangkok 10260

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments Standard according to in-house calibration procedure CP-P10, using "DKD-R 6-1 : Calibration of Pressure Gauges, Edition 03/2014" as a guidelines.

### Condition of this result of calibration

1. Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Barometer	DPI142	1422505046	MP-0034-24	03 May 2025
2. This instrument was installed in vertical orientation and center of the dial was used as the reference level.				
3. This result of calibration was made on requested at the point specified by customer.				
4. This result of calibration instrument was in absolute pressure.				
5. This instrument was used clean air as pressure media.				
6. The certificate is valid only to the item calibrated on date and place of calibration.				
7. This Certification is traceable to the International System of Unit maintained through:-				
-National Institute of Metrology Thailand (NIMT)				

Calibrated by: Suksan Khankaew  
Issue Date: 06 June 2024

Approved Signatory: Attapol P.  
[ ] Phatnue Prabpalat  
[ ] Sura Suwannasri  
[x] Attapol Panurach

เอกสารไม่ควบคุม  
B 0316956



Cert.No.: 24P1856  
Page: 2 of 2

Result of calibration: Without adjustment

Function: Absolute Pressure Measurement

Range: 720 mmHg to 800 mmHg

Scale Interval: 1 mmHg (The Fifth Estimate)

Increasing Pressure

Applied Pressure (mmHg)	720.43	730.67	740.34	751.52	756.56	761.83	773.53	798.76
UUC* Indication (mmHg)	720.0	730.0	740.0	750.0	755.0	760.0	770.0	790.0
Error (mmHg)	-0.43	-0.67	-0.34	-1.52	-1.56	-1.83	-3.53	-8.76

Decreasing Pressure

Applied Pressure (mmHg)	798.76	773.60	761.89	756.65	751.59	740.72	730.68	720.59
UUC* Indication (mmHg)	790.0	770.0	760.0	755.0	750.0	740.0	730.0	720.0
Error (mmHg)	-8.76	-3.60	-1.89	-1.65	-1.59	-0.72	-0.68	-0.59

The uncertainty of measurement was ± 0.24 mmHg

\* UUC = Unit Under Calibration

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

-000-

Attapol P.

เอกสารไม่ควบคุม  
a 1165502

INNOVATIVE INSTRUMENT CALIBRATION LAB

INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE

719 MOO 13, SOI SUTINAKORN 11 TAMBON BANG KHAO,

AMPHOE BANG PHU, SAMUT PRAKAN PROVINCE 10640 THAILAND

TEL: 0909-2110-5800-1 FAX: 0909-2110-7140



INNOVATIVE  
INSTRUMENT CO., LTD.  
ISO 9001:2015 Registered Office



ANAB  
ANAB National Accreditation Body  
ACCREDITED  
CALIBRATION LABORATORY  
ACC 1803

Page: 1/7

## Certificate of Calibration

Customer

Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Certificate No.: 24-SLM-231

Address: 81 Soi Udomsak 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Request No.: Req-2024-1439

Unit Under Calibration Details

Measurement Item: Sound Level Meter

Microphone Class: 2

Manufacturer: Larsen Davis

Microphone Model: 375802

Model: LX2

Microphone S/N: 11792

Serial Number: 0065293

Preamplifier Model: PRMLA12B

ID: UAE.EFM.1082567

Preamplifier S/N: 036073

Resolution: 0.1 dB

Instrument Status: Used

Calibration Environment and Details

Temperature: 23 °C ± 2 °C

Humidity: 50 %RH ± 20 %RH

Barometric Pressure: 1013 hPa ± 10 hPa

Received Date: 1 July 2024

Calibrated Date: 10 July 2024

Calibration Procedure: In-house method CP-SLM-01 based on IEC 61672-3: 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests

Location of Calibration: Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	20 August 2024	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	26 July 2024	TSI
Audio Generator	Svante	Svan401	131	8 October 2024	WK Electric

Note

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

Calibrated By: Mr. Noppadon Luangnoi  
Service Calibration Engineer

Approved By: Mr. Pachi Mahavorn  
Calibration Engineer Supervisor  
Issue Date: 10 July 2024

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Technology Promotion Association (Thailand-Japan).  
เอกสารไม่ควบคุม  
250-708 SLM-01 Rev.04 Issue Date: 5/6/24





Certificate No : 24-SLM-231  
Request No : Req-2024-1450

Certificate No : 24-SLM-231  
Request No : Req-2024-1450

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
		Level	UUC (dB)	ERR (dB)	UUC (dB)			
FAST / A / 37-139								
Calibrator Setting (dB)								
1000 Hz 114 dB	113.76	114.3	0.54	113.8	+0.04	0.20	0.30	Pass

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN: 58079

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139		
UUC Weighting (dB)		(± dB)
A	29.8	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139		
UUC Weighting (dB)		(± dB)
A	29.4	0.10
C	28.8	0.10
Z	32.9	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
	A	C	Z			
FAST / 37-139						
STD Setting (dB)						
125 Hz	0.0	0.1	0.1	0.60	1.5	Pass
1000 Hz	0.0	0.0	0.0	0.60	1.0	Pass
4000 Hz	0.7	0.7	0.7	0.60	3.0	Pass
8000 Hz	1.4	1.4	1.5	0.70	5.0	Pass

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the calibration laboratory.  
ISO 17025:2018-01 Rev.04 Issue date 5/6/24

เอกสารไม่ควบคุม

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
	A (dB)	C (dB)	Z (dB)			
FAST / 37-139						
STD Setting						
63 Hz	-0.2	-0.1	-0.1	0.20	2.0	Pass
125 Hz	-0.1	0.0	-0.1		1.5	Pass
250 Hz	-0.1	0.0	-0.1		1.5	Pass
500 Hz	-0.1	0.0	-0.1		1.5	Pass
1000 Hz	0.0	0.0	-0.1		1.0	Pass
2000 Hz	0.0	0.0	0.0		2.0	Pass
4000 Hz	0.0	0.0	0.0		3.0	Pass
8000 Hz	-0.1	-0.1	0.0		5.0	Pass
16000 Hz	-0.1	-0.1	-0.1		+5, -INF	Pass

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
		REF	UUC (dB)	ERR (dB)		
FAST / 37-139						
UUC Weighting (dB)						
A	114.00	114.0	0.0	0.20	0.20	Pass
C	114.00	114.0	0.0		0.20	Pass
Z	114.00	114.0	0.0		0.20	Pass

UUC Setting	STD	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
		REF	UUC (dB)	ERR (dB)		
37-139 / A						
UUC Time Response (dB)						
Fast	114.00	114.0	0.0	0.20	0.10	Pass
Slow	114.00	114.0	0.0		0.10	Pass
Leq	114.00	114.0	0.0		0.10	Pass

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the calibration laboratory.  
ISO 17025:2018-01 Rev.04 Issue date 5/6/24

เอกสารไม่ควบคุม



Certificate No : 24-SLM-231  
Request No : Req-2024-1450

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance	Result
FAST / A / 37-139	UUC	(± dB)	Limit (± dB)	
STD Setting (dB)				
Initial	114.0			
Final	114.0			
Deviated	0.0			
		0.10	0.30	Pass

8. Level linearity on the reference level range

UUC Setting	Anticipated		Deviation (dB)	UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
	REF	UUC				
FAST / A / 37-139						
STD dB						
139.00	139	139.0	0.0	0.30	1.1	Pass
134.00	134	134.0	0.0		1.1	Pass
129.00	129	129.0	0.0		1.1	Pass
124.00	124	124.0	0.0		1.1	Pass
119.00	119	119.0	0.0		1.1	Pass
114.00	114	114.0	0.0		1.1	Pass
109.00	109	109.0	0.0		1.1	Pass
104.00	104	104.0	0.0		1.1	Pass
99.00	99	98.9	-0.1		1.1	Pass
94.00	94	93.9	-0.1		1.1	Pass
89.00	89	88.9	-0.1		1.1	Pass
84.00	84	83.9	-0.1		1.1	Pass
79.00	79	78.9	-0.1		1.1	Pass
74.00	74	73.9	-0.1		1.1	Pass
69.00	69	68.9	-0.1		1.1	Pass
64.00	64	63.9	-0.1		1.1	Pass
59.00	59	58.9	-0.1		1.1	Pass
54.00	54	53.9	-0.1		1.1	Pass
49.00	49	49.0	0.0		1.1	Pass
44.00	44	44.1	0.1		1.1	Pass
39.00	39	39.5	0.5		1.1	Pass

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the calibration laboratory.  
ISO 17025:2018-01 Rev.04 Issue date 5/6/24

เอกสารไม่ควบคุม



Certificate No : 24-SLM-231  
Request No : Req-2024-1450

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
		REF	UUC (dB)	ERR (dB)		
FAST / A						
UUC Range (dB)						
37-139	44.80	44.9	0.1	0.30	1.1	Pass
	134	134.0	0.0		1.1	Pass

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
			Ref	UUC (dB)	ERR (dB)		
A / 37-139							
UUC Time Response (ms)							
Fast	200	135.0	135.0	0.0	0.20	1.0	Pass
	2	118.0	117.9	-0.1		+1.0, -2.5	Pass
	0.25	109.0	108.6	-0.4		+1.5, -5.0	Pass
Slow	200	128.6	128.5	-0.1		1.0	Pass
	2	109.0	108.9	-0.1		+1.0, -5.0	Pass
	200	129.0	129.0	0.0		1.0	Pass
SEL	2	109.0	109.1	+0.1		+1.0, -2.5	Pass
	0.25	100.0	99.8	-0.2		+1.5, -5.0	Pass

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
FAST / C / 65-142	REF	UUC (dB)	ERR (dB)			
STD Setting (dB)						
Complete cycle	137.4	136.7	-0.70	0.20	3.0	Pass
Positive half cycle	136.4	136.2	-0.20		2.0	Pass
Negative half cycle	136.4	136.2	-0.20		2.0	Pass

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the calibration laboratory.  
ISO 17025:2018-01 Rev.04 Issue date 5/6/24

เอกสารไม่ควบคุม

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit	Result
FAST / A / 37-139	UUC	(± dB)	(± dB)	
STD Setting	(dB)			
Positive one-half cycle	143.7			
Negative one-half cycle	143.8			
Deviated	-0.1	0.20	1.5	Pass

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit	Result
FAST / A / 37-139	UUC	(± dB)	(± dB)	
STD Setting	(dB)			
Initial	138.0			
Final	138.0			
Deviated	0.0	0.10	0.30	Pass

Note :

Function	Maximum-permitted Uncertainty of measurement
1. Indication at the calibration check frequency	Not applicable
2. Self-generated noise, Microphone installed	Not applicable
3. Self-generated noise, Microphone replaced by the electrical input signal device	Not applicable
4. Acoustic signal test of frequency weightings at 10 Hz to 4 kHz	0.60 dB
4. Acoustic signal test of frequency weightings at >4 kHz to 10 kHz	0.70 dB
5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz	0.30 dB
6. Frequency and time weightings at 1kHz	0.20 dB
7. Long Term Stability	0.10 dB
8. Level linearity on the reference level range	0.30 dB
9. Level linearity including the level range control	0.30 dB
10. Tone burst response	0.30 dB
11. Peak C Sound level	0.35 dB
12. Overload indication	0.25 dB
13. High Level Stability	0.10 dB

- Acceptance limit and Maximum-permitted Uncertainty was IEC 61672-1:2013

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Calibration Laboratory.  
Page: 7/7

เอกสารไม่ควบคุม

FM-700-SLM-01 Rev.04 Issue date: 5/6/24

Decision Rule for Statements of Conformity

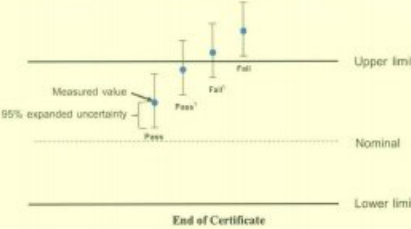
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:2019. Guidelines on the Reporting of Compliance with Specifications as following Fig. and statements

Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass<sup>1</sup> = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail<sup>1</sup> = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Calibration Laboratory.  
Page: 7/7

เอกสารไม่ควบคุม

FM-700-SLM-01 Rev.04 Issue date: 5/6/24

Customer

Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.      Certificate No : 24-SLM-236  
Address : 81 Soi Udomsak 41, Sakhumvit Road, Bangchak, Prakanong, Bangkok 10260      Request No : Req-2024-1455

Unit Under Calibration Details

Measurement item : Microphone Class : 2  
Manufacturer : Larson Davis      Microphone Model : 375A04  
Model : LxT2      Microphone S/N : 335080  
Serial Number : 0006691      Preamplifier Model : PRMLxT2C  
ID : UAEFEM131/2965      Preamplifier S/N : 071565  
Resolution : 0.1 dB      Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C  
Humidity : 50 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 1 July 2024  
Calibrated Date : 10 July 2024  
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests  
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	S/N	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	20 August 2024	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	26 July 2024	TSI
Audio Generator	Scantek	Scan-01	131	8 October 2024	WK Electric

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

Calibrated By :       Approved By :   
Mr. Neppakorn Luangrat      Mr. Puck Mathavorn  
Service Calibration Engineer      Calibration Engineer Supervisor  
Issue Date : 10 July 2024

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Calibration Laboratory.  
Page: 1/7

เอกสารไม่ควบคุม

FM-700-SLM-01 Rev.04 Issue date: 5/6/24

Certificate No : 24-SLM-236  
Request No : Req-2024-1455

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY	Acceptance	Result
FAST / A / 37-139	Level	UUC	ERR	UUC	ERR		Limit	
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)	(± dB)	(± dB)	
1000 Hz 114 dB	113.76	114.2	0.44	113.8	+0.04	0.20	0.30	
								Pass

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN. 58079

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139		
UUC Weighting	(dB)	(± dB)
A	30.9	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139		
UUC Weighting	(dB)	(± dB)
A	30.8	0.10
C	30.5	0.10
Z	35.0	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY	Acceptance Limit	Result
FAST / 37-139	A	C	Z	(± dB)	(± dB)	
STD Setting	(dB)	(dB)	(dB)			
125 Hz	0.1	0.1	0.1	0.60	1.5	Pass
1000 Hz	0.0	0.0	0.0	0.60	1.0	Pass
4000 Hz	2.0	1.9	1.9	0.60	3.0	Pass
8000 Hz	1.7	1.6	1.7	0.70	5.0	Pass

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Calibration Laboratory.  
Page: 1/7

เอกสารไม่ควบคุม

FM-700-SLM-01 Rev.04 Issue date: 5/6/24



Certificate No : 24-SLM-236  
Request No : Req-2024-1455

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

U.C Setting	Deviation from various Frequency			UNCERTAINTY	Acceptance Limit	Result
FAST / 37-139	Weighting Response curve					
STD Setting	A (dB)	C (dB)	Z (dB)	( $\pm$ dB)	( $\pm$ dB)	
63 Hz	-0.1	0.0	0.0	0.20	2.0	Pass
125 Hz	-0.1	0.0	0.0		1.5	Pass
250 Hz	-0.1	0.0	0.0		1.5	Pass
500 Hz	0.0	0.1	0.0		1.5	Pass
1000 Hz	0.0	0.0	0.0		1.0	Pass
2000 Hz	0.0	0.1	0.0		2.0	Pass
4000 Hz	0.0	0.0	0.0		3.0	Pass
8000 Hz	0.0	0.0	0.1		5.0	Pass
16000 Hz	0.0	-0.1	-0.1		+5, -INF	Pass

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)	Result
FAST / 37-139	REF	UUC	ERR			
UUC Weighting	(dB)	(dB)	(dB)	0.20	0.20	Pass
A	114.00	114.0	0.0			
C	114.00	114.0	0.0			
Z	114.00	114.0	0.0			

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)	Result
37-139 / A	REF	UUC	ERR			
UUC Time Response	(dB)	(dB)	(dB)	0.20	0.10	Pass
Fast	114.00	114.0	0.0			
Slow	114.00	114.0	0.0			
Log	114.00	114.0	0.0			

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of

เอกสารไม่ควบคุม

FS4-789-SLM-01 Rev.04 Issue date 5/6/24

Certificate No : 24-SLM-236  
Request No : Req-2024-1455

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)	Result
FAST / A / 37-139	UUC			
STD Setting	(dB)	0.10	0.30	Pass
Initial	114.0			
Final	114.0			
Deviated	0.0			

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)	Result
FAST / A / 37-139	REF	UUC	ERR			
STD dB	(dB)	(dB)	(dB)	0.30	1.1	Pass
119.00	119	119.0	0.0			
114.00	114	114.0	0.0			
129.00	129	129.0	0.0			
124.00	124	124.0	0.0			
119.00	119	119.0	0.0			
114.00	114	114.0	0.0			
109.00	109	109.0	0.0			
104.00	104	104.0	0.0			
99.00	99	99.0	0.0			
94.00	94	94.0	0.0			
89.00	89	89.0	0.0			
84.00	84	84.0	0.0			
79.00	79	79.0	0.0			
74.00	74	74.0	0.0			
69.00	69	69.0	0.0			
64.00	64	64.0	0.0			
59.00	59	59.0	0.0			
54.00	54	54.0	0.0			
49.00	49	49.1	0.1			
44.00	44	44.2	0.2			
43.00	43	43.3	0.3			
42.00	42	42.3	0.3			
41.00	41	41.4	0.4			
40.00	40	40.5	0.5			

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of

เอกสารไม่ควบคุม

FS4-789-SLM-01 Rev.04 Issue date 5/6/24

Certificate No : 24-SLM-236  
Request No : Req-2024-1455

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)	Result
FAST / A	REF	UUC	ERR			
UUC Range	(dB)	(dB)	(dB)	0.30	1.1	Pass
37-139	46.00	46.1	0.1			
	114	114.0	0.0			

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)	Result
A / 37-139	Touchburst	Ref	UUC	ERR			
UUC Time Response	(ms)	(dB)	(dB)	(dB)	0.20	+1.0, -2.5	Pass
Fast	200	135.0	135.0	0.0			
	2	118.0	117.8	-0.2			
	0.25	109.0	108.5	-0.5			
Slow	200	128.6	128.5	-0.1			
	2	109.0	108.5	-0.2			
	200	129.0	129.0	0.0			
SEL	2	109.0	109.0	0.0			
	0.25	100.0	99.7	-0.3			

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)	Result
FAST / C / 95-142	REF	UUC	ERR			
STD Setting	(dB)	(dB)	(dB)	0.20	2.0	Pass
Complete cycle	137.4	136.6	-0.80			
Positive half cycle	136.4	136.2	-0.20			
Negative half cycle	136.4	136.2	-0.20			

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of

เอกสารไม่ควบคุม

FS4-789-SLM-01 Rev.04 Issue date 5/6/24

Certificate No : 24-SLM-236  
Request No : Req-2024-1455

12. Overload indication

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)	Result
FAST / A / 37-139	UUC			
STD Setting	(dB)	0.20	1.5	Pass
Positive one-half cycle	144.9			
Negative one-half cycle	144.9			
Deviated	0.0			

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)	Result
FAST / A / 37-139	UUC			
STD Setting	(dB)	0.10	0.30	Pass
Initial	138.0			
Final	138.0			
Deviated	0.0			

Note :

Function	Maximum-permitted Uncertainty of measurement
1. Indication at the calibration check frequency	Not applicable
2. Self-generated noise, Microphone installed	Not applicable
3. Self-generated noise, Microphone replaced by the electrical input signal device	Not applicable
4. Acoustic signal test of frequency weightings at 10 Hz to 4 kHz	0.60 dB
4. Acoustic signal test of frequency weightings at >4 kHz to 10 kHz	0.70 dB
5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz	0.20 dB
6. Frequency and time weightings at 1kHz	0.20 dB
7. Long Term Stability	0.10 dB
8. Level linearity on the reference level range	0.30 dB
9. Level linearity including the level range control	0.30 dB
10. Tone burst response	0.30 dB
11. Peak C Sound level	0.35 dB
12. Overload indication	0.25 dB
13. High Level Stability	0.10 dB

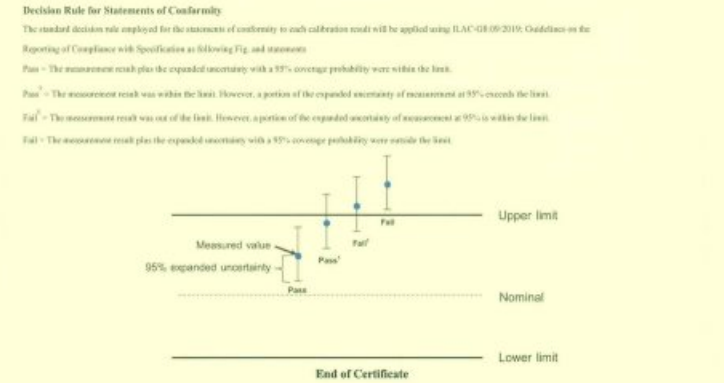
- Acceptance limit and Maximum permitted Uncertainty was IEC 61672-1:2013

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of

เอกสารไม่ควบคุม

FS4-789-SLM-01 Rev.04 Issue date 5/6/24





Customer

Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
Address : 81 Soi Udomsak 41, Sukhumvit Road, Bangkok, Prakanong, Bangkok 10260

Certificate No : 24-SLM-238  
Request No : Req-2024-1457

Unit Under Calibration Details

Measurement item : Sound Level Meter  
Manufacturer : Larson Davis  
Model : LxT2  
Serial Number : 0005290  
ID : UAE-FM.106.2562  
Resolution : 0.1 dB

Microphone Class : 2  
Microphone Model : 375A04  
Microphone S/N : 351837  
Preamplifier Model : PRMLxT2B  
Preamplifier S/N : 056077  
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C  
Humidity : 50 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 2 July 2024  
Calibrated Date : 11 July 2024  
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests  
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	20 August 2024	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	26 July 2024	TNI
Audio Generator	Scantek	Scas401	131	9 October 2024	WK Electric

Note

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

Calibrated By :   
Mr. Noppadon Luangrit  
Service Calibration Engineer

Approved By :   
Mr. Pichit Mahavom  
Calibration Engineer Supervisor  
Issue Date : 11 July 2024

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY	Acceptance Limit	Result
FAST / 37-139	Level (dB)	UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)	(± dB)	(± dB)	
Calibrator Setting								
1000 Hz 114 dB	113.76	114.1	0.34	113.8	+0.04	0.20	0.30	Pass

Note : Absolute sensitivity was established by the use of Sound Calibrator brand SVANTEK, Model SV 35A, SN: 54079

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139	(dB)	(± dB)
UUC Weighting		
A	25.4	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139	(dB)	(± dB)
UUC Weighting		
A	24.8	0.10
C	24.3	0.10
Z	28.6	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY	Acceptance Limit	Result
FAST / 37-139	A	C	Z	(± dB)	(± dB)	
STD Setting	(dB)	(dB)	(dB)			
125 Hz	0.1	0.2	0.2	0.60	1.5	Pass
1000 Hz	0.0	0.0	0.0	0.60	1.0	Pass
4000 Hz	0.6	0.6	0.6	0.60	3.0	Pass
8000 Hz	0.8	0.8	0.9	0.70	5.0	Pass

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY	Acceptance Limit	Result
FAST / 37-139	A	C	Z	(± dB)	(± dB)	
STD Setting	(dB)	(dB)	(dB)			
63 Hz	-0.2	-0.1	-0.1	0.20	2.0	Pass
125 Hz	-0.1	0.0	-0.1		1.5	Pass
250 Hz	-0.1	0.0	-0.1		1.5	Pass
500 Hz	-0.1	0.0	-0.1		1.5	Pass
1000 Hz	0.0	0.0	-0.1		1.0	Pass
2000 Hz	0.0	0.0	0.0		2.0	Pass
4000 Hz	0.0	0.0	0.0		3.0	Pass
8000 Hz	-0.1	-0.1	0.0		5.0	Pass
16000 Hz	-0.1	-0.1	-0.1		<5, -INF	Pass

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit	Result
FAST / 37-139	REF	UUC	ERR	(± dB)	(± dB)	
UUC Weighting	(dB)	(dB)	(dB)			
A	114.00	114.0	0.0	0.20	0.20	Pass
C	114.00	114.0	0.0		0.20	Pass
Z	114.00	114.0	0.0		0.20	Pass

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit	Result
37-139 / A	REF	UUC	ERR	(± dB)	(± dB)	
UUC Time Response	(dB)	(dB)	(dB)			
Fast	114.00	114.0	0.0	0.20	0.10	Pass
Slow	114.00	114.0	0.0		0.10	Pass
Eq	114.00	114.0	0.0		0.10	Pass

Certificate No : 24-SLM-238  
Request No : Req-2024-1457

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY (± dB)	Acceptance	Result
FAST / A / 37-139	UUC		Limit	
STD Setting	(dB)			
Initial	114.0			
Final	114.0			
Deviated	0.0	0.10	0.30	Pass

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY  ( ± dB)	Acceptance	Result
FAST / A / 37-139	REF	UUC	ERR		Limit ( ± dB)	
STD dB	(dB)	(dB)	(dB)			
137.00	137	137.0	0.0	0.30	1.1	Pass
134.00	134	134.0	0.0		1.1	Pass
129.00	129	129.0	0.0		1.1	Pass
124.00	124	124.0	0.0		1.1	Pass
119.00	119	119.0	0.0		1.1	Pass
114.00	114	114.0	0.0		1.1	Pass
109.00	109	109.0	0.0		1.1	Pass
104.00	104	104.0	0.0		1.1	Pass
99.00	99	99.0	0.0		1.1	Pass
94.00	94	93.9	-0.1		1.1	Pass
89.00	89	88.9	-0.1		1.1	Pass
84.00	84	83.9	-0.1		1.1	Pass
79.00	79	78.9	-0.1		1.1	Pass
74.00	74	73.9	-0.1		1.1	Pass
69.00	69	68.9	-0.1		1.1	Pass
64.00	64	63.9	-0.1		1.1	Pass
59.00	59	58.9	-0.1		1.1	Pass
54.00	54	53.9	-0.1		1.1	Pass
49.00	49	48.9	-0.1		1.1	Pass
44.00	44	44.0	0.0		1.1	Pass
39.00	39	39.1	0.1		1.1	Pass
34.00	34	34.2	0.2		1.1	Pass
29.00	29	29.2	0.2		1.1	Pass
24.00	24	24.3	0.3		1.1	Pass
19.00	19	19.4	0.4		1.1	Pass

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the owner.  
PM-708-SLM-01 Rev.04 Issue date:5/4/24

เอกสารไม่ควบคุม

Certificate No : 24-SLM-238  
Request No : Req-2024-1457

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance	Result
FAST / A		REF	UUC		ERR	
UUC Range	(dB)	(dB)	(dB)	( ± dB)	( ± dB)	
37-139	40.10	40.2	0.1	0.30	1.1	Pass
	114	114.0	0.0		1.1	Pass

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY ( ± dB)	Acceptance Limit ( ± dB)	Result
A / 37-139	Toneburst	Ref	UUC	ERR			
UUC Time Response	(ms)	(dB)	(dB)	(dB)			
Fast	200	135.0	135.0	0.0	0.20	1.0	Pass
	2	118.0	117.9	-0.1		+1.0, -2.5	Pass
	0.25	109.0	108.6	-0.4		+1.5, -5.0	Pass
Slow	200	128.6	128.5	-0.1		1.0	Pass
	2	109.0	108.9	-0.1		+1.0, -5.0	Pass
SEL	200	129.0	129.0	0.0		1.0	Pass
	2	109.0	109.0	0.0		+1.0, -2.5	Pass
	0.25	100.0	99.8	-0.2		+1.5, -5.0	Pass

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance	Result
FAST / C / 95-142	REF	UUC	ERR		Limit	
STD Setting	(dB)	(dB)	(dB)	( ± dB)	( ± dB)	
Complete cycle	137.4	136.6	-0.80	0.20	3.0	Pass
Positive half cycle	136.4	136.2	-0.20		2.0	Pass
Negative half cycle	136.4	136.2	-0.20		2.0	Pass

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the owner.  
PM-708-SLM-01 Rev.04 Issue date:5/4/24

เอกสารไม่ควบคุม

Certificate No : 24-SLM-238  
Request No : Req-2024-1457

12. Overload indication

UUC Setting	Measured	UNCERTAINTY ( ± dB)	Acceptance	Result
FAST / A / 37-139	UUC		Limit	
STD Setting	(dB)			
Positive one-half cycle	138.8			
Negative one-half cycle	138.7			
Deviated	0.1	0.20	1.5	Pass

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY  ( ± dB)	Acceptance	Result
FAST / A / 37-139	UUC		Limit	
STD Setting	(dB)		( ± dB)	
Initial	138.0			
Final	138.0			
Deviated	0.0	0.10	0.30	Pass

Note :

Function	Maximum-permitted Uncertainty of measurement
1. Indication at the calibration check frequency	Not applicable
2. Self-generated noise, Microphone installed	Not applicable
3. Self-generated noise, Microphone replaced by the electrical input signal device	Not applicable
4. Acoustic signal test of frequency weightings at 10 Hz to 4 kHz	0.60 dB
4. Acoustic signal test of frequency weightings at >4 kHz to 10 kHz	0.70 dB
5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz	0.20 dB
6. Frequency and time weightings at 10Hz	0.20 dB
7. Long Term Stability	0.10 dB
8. Level linearity on the reference level range	0.30 dB
9. Level linearity including the level range control	0.30 dB
10. Tone burst response	0.30 dB
11. Peak C Sound level	0.35 dB
12. Overload indication	0.25 dB
13. High Level Stability	0.10 dB

- Acceptance limit and Maximum-permitted Uncertainty was BS EN 61872-1:2013

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the owner.  
PM-708-SLM-01 Rev.04 Issue date:5/4/24

เอกสารไม่ควบคุม

Certificate No : 24-SLM-238  
Request No : Req-2024-1457

Decision Rule for Statements of Conformity

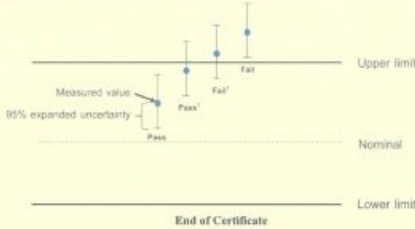
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:2019 Guidelines on the Reporting of Compliance with Specification as following Fig and statements:

Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass<sup>1</sup> = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail<sup>1</sup> = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability, were outside the limits.



The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the owner.  
PM-708-SLM-01 Rev.04 Issue date:5/4/24

เอกสารไม่ควบคุม



Certificate of Calibration

**Customer**  
Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
Address : 81 Soi Udomsak 41, Sukhumvit Road, Bangchak, Prakanong, Bangkok  
10260

Certificate No : 24-SLM-240  
Request No : Req-2024-1459

**Unit Under Calibration Details**  
Measurement Item : Microphone Class : 2  
Manufacturer : Larson Davis  
Model : LxT2  
Serial Number : 0805299  
ID : UAEJFM1142502  
Resolution : 0.1 dB  
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electromagnetics - Sound level meters - Part 3: Periodic tests  
Location of Calibration : Lab Acoustic

Microphone Model : 375A04  
Microphone S/N : 323471  
Preamplifier Model : PRMLxT2C  
Preamplifier S/N : 071493  
Instrument Status : Used

**Calibration Environment and Details**  
Temperature : 23 °C ± 2 °C  
Humidity : 50 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 2 July 2024  
Calibrated Date : 11 July 2024

Reference Standard					
Instrument	Brand	Model	S/N	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	20 August 2024	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	26 July 2024	TSI
Audio Generator	Svanick	Svan401	131	8 October 2024	WK Electronic

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

Calibrated By :   
Mr. Nopadon Luangn  
Service Calibration Engineer

Approved By :   
Mr. Patch Muihavorn  
Calibration Engineer Supervisor  
Issue Date : 11 July 2024

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the owner.  
เอกสารไม่ควบคุม

Certificate No : 24-SLM-240  
Request No : Req-2024-1459

1. Indication at the calibration check frequency

UUC Setting	Nominal Level	Before Adjust		After Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)			
FAST / A / 37-139 Calibrator Setting								
1000 Hz 114 dB	113.76	115.3	1.54	113.8	-0.04	0.20	0.30	Pass

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTER, Model SV 35A, SN: 58079

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139		(dB)
UUC Weighting	(dB)	(± dB)
A	27.1	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139		(dB)
UUC Weighting	(dB)	(± dB)
A	26.6	0.10
C	26.2	0.10
Z	30.6	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
	A (dB)	C (dB)	Z (dB)			
FAST / 37-139						
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)	
125 Hz	0.0	0.2	0.1	0.60	1.5	Pass
1000 Hz	0.0	0.0	0.0	0.60	1.0	Pass
4000 Hz	0.2	0.3	0.4	0.60	3.0	Pass
8000 Hz	-0.5	-0.4	-0.2	0.70	5.0	Pass

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the owner.  
เอกสารไม่ควบคุม

Certificate No : 24-SLM-240  
Request No : Req-2024-1459

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
	A (dB)	C (dB)	Z (dB)			
FAST / 37-139						
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)	
63 Hz	-0.2	0.0	0.0	0.20	2.0	Pass
125 Hz	-0.1	0.0	0.0	0.20	1.5	Pass
250 Hz	-0.1	0.0	0.0	0.20	1.5	Pass
500 Hz	-0.1	0.0	0.0	0.20	1.5	Pass
1000 Hz	0.0	0.0	0.0	0.20	1.0	Pass
2000 Hz	0.0	0.0	0.0	0.20	2.0	Pass
4000 Hz	0.0	0.0	0.0	0.20	3.0	Pass
8000 Hz	0.0	0.0	0.0	0.20	5.0	Pass
16000 Hz	-0.1	-0.1	-0.1	0.20	+5, -INF	Pass

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
		REF	ERR			
FAST / 37-139						
UUC Weighting	(dB)	(dB)	(dB)	(± dB)	(± dB)	
A	114.00	114.0	0.0	0.20	0.20	Pass
C	114.00	114.0	0.0	0.20	0.20	Pass
Z	114.00	114.0	0.0	0.20	0.20	Pass

UUC Setting	STD	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
		REF	ERR			
37-139 / A						
UUC Time Response	(dB)	(dB)	(dB)	(± dB)	(± dB)	
Fast	114.00	114.0	0.0	0.10	0.10	Pass
Slow	114.00	114.0	0.0	0.10	0.10	Pass
Log	114.00	114.0	0.0	0.10	0.10	Pass

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the owner.  
เอกสารไม่ควบคุม

Certificate No : 24-SLM-240  
Request No : Req-2024-1459

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance	Result
FAST / A / 37-139				
STD Setting	(dB)	(± dB)	Limit (± dB)	
Initial	114.0			
Final	114.0			
Deviation	0.0	0.10	0.30	Pass

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY (± dB)	Acceptance Limit (± dB)	Result
		REF (dB)	ERR (dB)			
FAST / A / 37-139						
STD dB	(dB)	(dB)	(dB)	(± dB)	(± dB)	
139.00	139	139.0	0.0	0.30	1.1	Pass
134.00	134	134.0	0.0	0.30	1.1	Pass
129.00	129	129.0	0.0	0.30	1.1	Pass
124.00	124	124.0	0.0	0.30	1.1	Pass
119.00	119	119.0	0.0	0.30	1.1	Pass
114.00	114	114.0	0.0	0.30	1.1	Pass
109.00	109	109.0	0.0	0.30	1.1	Pass
104.00	104	104.0	0.0	0.30	1.1	Pass
99.00	99	99.0	0.0	0.30	1.1	Pass
94.00	94	94.0	0.0	0.30	1.1	Pass
89.00	89	89.0	0.0	0.30	1.1	Pass
84.00	84	84.0	0.0	0.30	1.1	Pass
79.00	79	79.0	0.0	0.30	1.1	Pass
74.00	74	74.0	0.0	0.30	1.1	Pass
69.00	69	69.0	0.0	0.30	1.1	Pass
64.00	64	64.0	0.0	0.30	1.1	Pass
59.00	59	59.0	0.0	0.30	1.1	Pass
54.00	54	54.0	0.0	0.30	1.1	Pass
49.00	49	49.0	0.0	0.30	1.1	Pass
44.00	44	44.0	0.0	0.30	1.1	Pass
39.00	39	39.2	0.2	0.30	1.1	Pass
34.00	34	34.3	0.3	0.30	1.1	Pass
29.00	29	29.4	0.4	0.30	1.1	Pass
24.00	24	24.5	0.5	0.30	1.1	Pass

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the owner.  
เอกสารไม่ควบคุม

Certificate No : 24-SLM-240  
Request No : Req-2024-1459

#### 9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance	Result
FAST / A	REF	UUC	ERR	Limit	
UUC Range	(dB)	(dB)	(dB)	(± dB)	(± dB)
37-139	41.90	42.1	0.2	1.1	Pass
	114	114.0	0.0	1.1	Pass

#### 10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY	Acceptance	Result
A / 37-139	Toneburst	Ref	UUC	ERR	Limit	
UUC Time Response	(ms)	(dB)	(dB)	(dB)	(± dB)	(± dB)
Fast	200	135.0	134.9	-0.1	1.0	Pass
	2	118.0	117.9	-0.1	+1.0, -2.5	Pass
	0.25	109.0	108.8	-0.2	+1.5, -5.0	Pass
Slow	200	128.6	128.5	-0.1	1.0	Pass
	2	109.0	108.9	-0.1	+1.0, -5.0	Pass
SEL	200	129.0	129.0	0.0	1.0	Pass
	2	109.0	109.1	+0.1	+1.0, -2.5	Pass
	0.25	100.0	100.0	0.0	+1.5, -5.0	Pass

#### 11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY	Acceptance	Result
FAST / C / 95-142	REF	UUC	ERR	Limit	
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
Complete cycle	137.4	136.6	-0.80	3.0	Pass
Positive half cycle	136.4	136.2	-0.20	2.0	Pass
Negative half cycle	136.4	136.2	-0.20	2.0	Pass

The results related only to the items calibrated. The certificate shall not be reproduced except in full, without written approval of the

เอกสารไม่ควบคุม

PM-708-01.34-01 Rev.04 Issue date: 5/8/24

Certificate No : 24-SLM-240  
Request No : Req-2024-1459

#### 12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance	Result
FAST / A / 37-139	UUC		Limit	
STD Setting	(dB)	(± dB)	(± dB)	
Positive one-half cycle	140.6			
Negative one-half cycle	140.7			
Deviated	-0.1	0.20	1.5	Pass

#### 13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance	Result
FAST / A / 37-139	UUC		Limit	
STD Setting	(dB)	(± dB)	(± dB)	
Initial	138.0			
Final	138.0			
Deviated	0.0	0.10	0.30	Pass

#### Note :

Function	Maximum-permitted Uncertainty of measurement
1. Indication at the calibration check frequency	Not applicable
2. Self-generated noise, Microphone installed	Not applicable
3. Self-generated noise, Microphone replaced by the electrical input signal device	Not applicable
4. Acoustic signal test of frequency weightings at 10 Hz to 4 kHz	0.60 dB
4. Acoustic signal test of frequency weightings at >4 kHz to 10 kHz	0.70 dB
5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz	0.20 dB
6. Frequency and time weightings at 1 kHz	0.20 dB
7. Long Term Stability	0.10 dB
8. Level linearity on the reference level range	0.30 dB
9. Level linearity including the level range control	0.30 dB
10. Tone burst response	0.30 dB
11. Peak C Sound level	0.35 dB
12. Overload indication	0.25 dB
13. High Level Stability	0.10 dB

\* Acceptance limit and Maximum-permitted Uncertainty was IEC 61072-1:2013

The results related only to the items calibrated. The certificate shall not be reproduced except in full, without written approval of the

เอกสารไม่ควบคุม

PM-708-01.34-01 Rev.04 Issue date: 5/8/24

Certificate No : 24-SLM-240  
Request No : Req-2024-1459

#### Decision Rule for Statements of Conformity

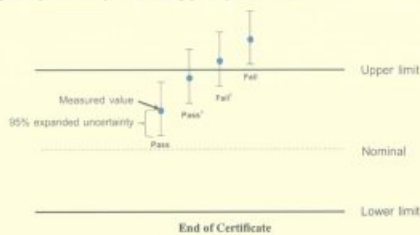
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:2019: Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

Pass - The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit

Pass\* - The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit

Fail\* - The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit

Fail - The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit



The results related only to the items calibrated. The certificate shall not be reproduced except in full, without written approval of the

เอกสารไม่ควบคุม

PM-708-01.34-01 Rev.04 Issue date: 5/8/24



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLIUANG, SUANLIUANG, BANGKOK 10250  
TEL: 0-2717-3900-24 FAX: 0-2719-9484

## Certificate of Calibration

Certificate No.: 25P112  
Page : 1 of 2

Equipment : U-Tube Manometer

Manufacturer: Dwyer

Model : 121-36-WIM

Serial No.: -

ID No.: UAE.EFM.181/2561

Condition As-Received: Used Item

Received Date: 10 February 2025

Calibration Date: 19 February 2025

Reference: 2502-0083WSC

Ambient Temperature: ( 23 ± 2 ) °C

Relative Humidity: ( 50 ± 15 ) %

Atmospheric Pressure: 1012 mbar

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.

Submitted by: United Analyst and Engineering Consultant Co., Ltd.  
81 Soi Udomek 41, Sukhumvit Road, Bangkok,  
Phraekhanong, Bangkok 10260

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments Standard according to in-house calibration procedure CP-P04, using " DKD-R 6-1 ; Calibration of Pressure Gauges, Edition 03/2014 " as a guidelines.

#### Condition of this result of calibration

1. Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Pressure Calibrator	PC106P	1189	MP-0113-24	10 Jul 2025

2. This result of calibration was made on requested at the point specified by customer.

3. Scale and conversion factor is 1 kPa = 4.0146293 inH<sub>2</sub>O

4. This instrument was used clean air as pressure media.

5. This instrument was installed in vertical orientation and center of connector was used as the reference level.

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

7. This Certification is traceable to the International System of Unit maintained at-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Nopparat Phongam  
Issue Date : 21 February 2025

Approved Signatory : Atitapol P.

[ ] Phathee Prapapal  
[ ] Sursu Suwananari  
[x] Atitapol Panurach

เอกสารไม่ควบคุม  
B 0250406



Result of calibration:- Without adjustment  
Function:- Pressure Measurement  
Increasing Pressure

Range: 0 inH<sub>2</sub>O to 36 inH<sub>2</sub>O  
Scale Interval: 0.1 inH<sub>2</sub>O (The Fifth Estimate)

UUC Indication				
Applied Pressure (inH <sub>2</sub> O)	High-port side (inH <sub>2</sub> O)	Low-port side (inH <sub>2</sub> O)	ΔP (inH <sub>2</sub> O)	Error (inH <sub>2</sub> O)
0.00	0.00	0.00	0.00	0.00
2.00	1.00	-0.98	1.98	-0.02
4.00	2.00	-1.96	3.98	-0.02
6.00	3.00	-3.02	5.98	0.02
8.00	4.00	-4.02	8.02	0.02
10.00	5.00	-5.04	10.04	0.04
12.00	6.00	-6.04	12.04	0.04
14.00	7.00	-7.06	14.06	0.06
16.00	8.00	-8.06	16.06	0.06
18.00	9.00	-9.06	18.06	0.06
20.00	10.00	-10.06	20.06	0.06
22.00	11.00	-11.08	22.08	0.08
24.00	12.00	-12.08	24.08	0.08
26.00	13.02	-13.10	26.12	0.12
28.00	14.02	-14.10	28.12	0.12
30.00	15.02	-15.10	30.12	0.12
32.00	16.02	-16.10	32.12	0.12
34.00	17.02	-17.08	34.10	0.10
35.50	17.86	-17.92	35.78	0.28

The uncertainty of measurement was ± 0.11 inH<sub>2</sub>O  
\* UUC = Unit Under Calibration  
\* ΔP = High-port side - Low-port side  
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 %.

-o0o-

Atitapol P.  
เอกสารไม่ควบคุม  
a 1037943

**J NAC**  
JIRANATEE ASSOCIATES CO., LTD.

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

Flow measurement laboratory  
Calibration services department

**IAC-MRA**  
NSC-TIS-TIS 17025  
CALIBRATION 0367

**CERTIFICATE OF CALIBRATION**

Certificate No.: J-COF-039-67

MEASUREMENT ITEM: Top Load Office  
MANUFACTURER: TSCH  
MODEL/TYPE: TE-5025A  
SERIAL NUMBER: 3383  
ID NUMBER: UAE.EFM.063/2560  
CONDITION AS-RECEIVED  
CUSTOMER: United Analyst and Engineering Consultant Co., Ltd.  
81 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phraekhanong, Bangkok 10260

RECEIVED DATE: 16 Sep 2024  
MEASUREMENT DATE: 27 Sep 2024  
ISSUE DATE: 27 Sep 2024

ENVIRONMENTAL CONDITIONS:  
Ambient condition in the laboratory are as follow:  
Temperature: 23.0 ± 3.0 °C  
Relative Humidity: 55.0 ± 15.0 %RH  
Atmospheric Pressure: 1030 ± 10 hPa

CALIBRATION CONDITION:  
Preconditioning: 24 hours at ambient conditions.  
Measurement Condition: The average values during measurement are 23.9 °C and 49.0 %RH.

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

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

Calibrated by: ☐ Mr. Sornchai Thachalad  
☒ Ms. Jiraporn Lertasomphol

Approved signature:   
Mr. Pannya Booncharoen  
Calibration Department Manager

**J NAC**  
JIRANATEE ASSOCIATES CO., LTD.

Continuation of Certificate of Calibration Number COF-039-67

MEASUREMENT RESULTS:  
The Orifice gas flow device was calibrated by direct comparison method with the Standard Rotary Displacement Meter (Roots Meter). The Humid air was used as a medium in the system. The standard conditions are 25 °C (298.15 K) and 760 mmHg for standard temperature and standard pressure respectively.

Table 1: The results of g calibration data

Plate	Flow rate m <sup>3</sup> /min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	ΔP_meter mmHg	ΔP_Orifice inH <sub>2</sub> O	y	Standard Flow [Q <sub>s</sub> ] m <sup>3</sup> /min
1	0.703	758.131	29.52	22.40	56.556	1.738	1.319	0.654
2	1.000	758.205	29.70	22.81	61.034	3.473	1.166	0.820
3	1.121	758.284	29.64	22.80	62.635	4.582	2.357	1.068
4	1.167	758.274	29.64	22.85	31.359	5.197	2.282	1.125
5	1.409	758.325	24.00	23.14	30.402	7.654	1.732	1.357

Slope (m): 2.05577  
Intercept (b): -0.02807  
Correlation coefficient (r): 0.99985  
Uncertainty (k=2): 0.015 m<sup>3</sup>/min

Table 2: The results of g actual calibration data

Plate	Flow rate m <sup>3</sup> /min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	ΔP_meter mmHg	ΔP_Orifice inH <sub>2</sub> O	y	Standard Flow [Q <sub>s</sub> ] m <sup>3</sup> /min
1	0.703	758.131	29.52	22.40	56.556	1.738	0.825	0.653
2	1.000	758.205	29.70	22.81	61.034	3.473	1.166	0.820
3	1.121	758.284	29.64	22.80	62.635	4.642	1.388	1.061
4	1.167	758.274	29.64	22.85	31.359	5.197	1.426	1.123
5	1.409	758.325	24.00	23.14	30.402	7.654	1.732	1.357

Slope (m): 1.78763  
Intercept (b): -0.01756  
Correlation coefficient (r): 0.99985  
Uncertainty (k=2): 0.015 m<sup>3</sup>/min

\*\*\*End of Certificate of Calibration\*\*\*



เอกสารไม่ควบคุม

**ELECTRICAL AND ELECTRONICS INSTITUTE  
FOUNDATION FOR INDUSTRIAL DEVELOPMENT**  
975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,  
Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280  
Tel: +66 2709 4860 Fax: +66 2324 0917

Certificate No.: CP20240290EA  
Operation No.: CP2024070253

**Certificate of Calibration**

Equipment: Sound Level Meter  
Manufacturer: Larson Davis (Meter), PCB (Microphone), PCB (Preamplifier)  
Model/Type: LxT1 (Meter), 377B02 (Microphone), PRMLxT1 (Preamplifier)  
Serial No.: 0007306 (Meter), 345235 (Microphone), 077641 (Preamplifier)  
ID No.: UAE.EFM.039/2566  
Customer: United Analyst and Engineering Consultant Co.,Ltd.  
Address: 81 Soi Udomsuk 41, Sukhumvit Road, Bangchak Phraekhanong, Bangkok 10260  
Received Date: 25 July 2024  
Calibrated Date: 5 - 6 August 2024  
Issued Date: 7 August 2024  
Calibrated by: Ms. Juntaporn Kunhakom

Approved by:   
( Mr. Sittichai Swaksuriyawong )  
Group Manager

This report was prepared electronically using applicable electronic signature, Printing or copy of file are considered as a copy of the document.  
The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor (k) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.

Page 1 of 6

เอกสารไม่ควบคุม

Certificate No.: CP20240290EA

## Calibration Report

Equipment: Sound Level Meter  
Manufacturer: Larson Davis (Meter), PCB (Microphone), PCB (Preamplifier)  
Model/Type: LxT1 (Meter), 377B02 (Microphone), PRMLxT1 (Preamplifier)  
Serial No.: 0007306 (Meter), 345235 (Microphone), 077641 (Preamplifier)  
ID No.: UAE EFM.039/2566  
Ambient Temperature: (23 ± 2 ) °C  
Relative Humidity: ( 50 ± 15 ) %  
Pressure: (101.3 ± 1.5) kPa

Method of Calibration :-  
IEC 61672-3:2013.

## Condition of this result of calibration

1. Reference standards instrument :-

	Instrument	Model	Serial No.	Cert. No.	Due Date
1)	Standard microphone	4180	2787490	AA-1012-23	12 November 2024
2)	Arbitrary Function Generator	AFG2021	C010063	CK20240048EA	23 June 2025
3)	Programmable Attenuator	PA5	2755	EF-0040-23	1 October 2024
4)	6.5 Digit precision multimeter	8846A	9610014	CB20230200EA	15 November 2024
5)	Pressure humidity and Temperature Transmitter	PTU301	L3950483	CL1-P240023 CD20240142EA	24 March 2025 12 June 2025
6)	Pressure humidity and Temperature Transmitter	PTU301	L3950484	CL1-P240030 CD20240143EA	11 April 2025 12 June 2025
7)	Performance Audio Analyzer	U8903B	MY56510003	CB20240035EB CK20230072EA	13 February 2025 13 September 2024

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

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

- Reference standards instrument for Acoustic function
  - National Institute of Metrology (Thailand)
- Reference standards instrument for Electrical function
  - National Institute of Metrology (Thailand)
  - Electrical and Electronics Institute; NSC Accredited Calibration No.01119

## Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
-	-	-	-

เอกสารไม่ควบคุม

Page 2 of 6

F-CAL-005 Ed.1

Certificate No.: CP20240290EA

## Calibration Report

Function : 2. Self-generated Noise  
2.1 Microphone Installed

Measured value (dB)
28.8

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	28.7
C-weighting	28.4
Z-weighting	34.5

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

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

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
125	0.1	0.0	0.0	±1.0
1000	-0.1	-0.1	-0.1	±0.7
8000	-0.4	-0.5	-0.4	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
63	0.0	0.0	0.0	±1.0
125	0.0	0.0	0.0	±1.0
250	0.0	0.0	0.0	±1.0
500	0.0	0.0	0.0	±1.0
1000	0.0	0.0	0.0	±0.7
2000	0.0	0.0	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	-0.1	-0.1	0.0	+1.5; -2.5
16000	0.0	0.0	0.0	+2.5; -16.0

เอกสารไม่ควบคุม

Page 3 of 6

F-CAL-005 Ed.1

Certificate No.: CP20240290EA

## Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	109.0	0.0	±0.8
114.0	114.0	0.0	±0.8
119.0	119.0	0.0	±0.8
124.0	124.0	0.0	±0.8
129.0	129.0	0.0	±0.8
134.0	134.0	0.0	±0.8
139.0	139.0	0.0	±0.8
140.0	140.0	0.0	±0.8

เอกสารไม่ควบคุม

Page 4 of 6

F-CAL-005 Ed.1

Certificate No.: CP20240290EA

## Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.1	0.1	±0.8
39.0	39.4	0.4	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	136.0	0.0	±0.5
	2	118.8	-0.2	+1.0 ; -1.5
	0.25	109.7	-0.3	+1.0 ; -3.0
Slow	200	129.5	-0.1	±0.5
	2	109.8	-0.2	+1.0 ; -3.0
	200	130.0	0.0	±0.5
LAE	2	110.0	0.0	+1.0 ; -1.5
	0.25	100.9	-0.1	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	135.4	134.8	-0.6	±2.0
Positive half cycle	134.4	134.0	-0.4	±1.0
Negative half cycle	134.4	134.0	-0.4	±1.0

เอกสารไม่ควบคุม

Page 5 of 6

F-CAL-005 Ed.1



ELECTRICAL AND ELECTRONICS INSTITUTE  
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20240290EA

Calibration Report

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle		
142.6	142.6	0.0	±1.5

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	139.0	139.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

- Remarks:
1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
  2. The acceptance limit is for the deviated value.
  3. Acceptance limits was IEC61672-3:2013 Class 1.
  4. The coverage factor  $k = 2.00$

-- End of Report --

เอกสารไม่ควบคุม

Page 6 of 6

F-CAL-005 Ed.1



ELECTRICAL AND ELECTRONICS INSTITUTE  
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20240322EA

Calibration Report

Equipment: Sound Level Meter  
Manufacturer: Larson Davis (Meter), PCB (Microphone), PCB (Preamplifier)  
Model/Type: LxT1 (Meter), 377B02 (Microphone), PRMLxT1 (Preamplifier)  
Serial No.: 0007308 (Meter), 345238 (Microphone), 077643 (Preamplifier)  
ID No.: UAE.EFM.040/2566  
Ambient Temperature: (23 ± 2) °C  
Relative Humidity: (50 ± 15) %  
Pressure: (101.3 ± 1.5) kPa

Method of Calibration :-

IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2787490	AA-1012-23	12 November 2024
2) Arbitrary Function Generator	AFG2021	C010063	CK20240048EA	23 June 2025
3) Programmable Attenuator	PA5	2755	EF-0040-23	1 October 2024
4) 6.5 Digit precision multimeter	8846A	9610014	CB20230200EA	15 November 2024
5) Pressure humidity and Temperature Transmitter	PTU301	L3950483	CL1-P240023 CD20240142EA	24 March 2025 12 June 2025
6) Pressure humidity and Temperature Transmitter	PTU301	L3950484	CL1-P240030 CD20240143EA	11 April 2025 12 June 2025
7) Performance Audio Analyzer	U8903B	MY56510003	CB20240035EB CK20230072EA	13 February 2025 13 September 2024

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

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

Reference standards instrument for Acoustic function

- National Institute of Metrology (Thailand)

Reference standards instrument for Electrical function

- National Institute of Metrology (Thailand)

- Electrical and Electronics Institute; NSC Accredited Calibration No.01119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
-	-	-	-

เอกสารไม่ควบคุม

Page 2 of 6

F-CAL-005 Ed.1



ELECTRICAL AND ELECTRONICS INSTITUTE  
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,

Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280

Tel: +66 2709 4860 Fax: +66 2324 0917



Certificate No.: CP20240322EA

Operation No.: CP2024080293

Certificate of Calibration

Equipment: Sound Level Meter  
Manufacturer: Larson Davis (Meter), PCB (Microphone), PCB (Preamplifier)  
Model/Type: LxT1 (Meter), 377B02 (Microphone), PRMLxT1 (Preamplifier)  
Serial No.: 0007308 (Meter), 345238 (Microphone), 077643 (Preamplifier)  
ID No.: UAE.EFM.040/2566  
Customer: United Analyst and Engineering Consultant Co.,Ltd.  
Address: 81 Soi Udomsuk 41, Sukhumvit Road, Bangchak  
Phrakhanong, Bangkok 10260  
Received Date: 9 August 2024  
Calibrated Date: 22 - 26 August 2024  
Issued Date: 28 August 2024  
Calibrated by: Ms. Juntaporn Kunhakom

Approved by:   
( Mr. Sittichai Swaksuriyawong )  
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor ( $k$ ) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.

Page 1 of 6

เอกสารไม่ควบคุม

F-CAL-004 Ed.1



ELECTRICAL AND ELECTRONICS INSTITUTE  
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20240322EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Measured value (dB)
29.4

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	29.0
C-weighting	28.9
Z-weighting	35.5

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

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

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
125	0.2	0.1	0.2	±1.0
1000	0.3	0.3	0.3	±0.7
8000	-0.6	-0.5	-0.5	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
63	-0.1	0.1	0.0	±1.0
125	0.0	0.0	-0.1	±1.0
250	-0.1	0.0	0.0	±1.0
500	0.0	0.0	-0.1	±1.0
1000	0.0	0.0	0.0	±0.7
2000	0.0	0.0	0.0	±1.0
4000	0.0	-0.1	0.0	±1.0
8000	-0.1	-0.1	0.0	+1.5; -2.5
16000	0.0	0.0	-0.1	+2.5; -16.0

เอกสารไม่ควบคุม

Page 3 of 6

F-CAL-005 Ed.1

Certificate No.: CP20240322EA

## Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	109.0	0.0	±0.8
114.0	114.0	0.0	±0.8
119.0	119.0	0.0	±0.8
124.0	124.0	0.0	±0.8
129.0	129.0	0.0	±0.8
134.0	134.0	0.0	±0.8
139.0	139.0	0.0	±0.8
140.0	140.0	0.0	±0.8

เอกสารไม่ควบคุม

Page 4 of 6

F-CAL-005 Ed.1

Certificate No.: CP20240322EA

## Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.1	0.1	±0.8
39.0	39.4	0.4	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	135.9	-0.1	±0.5
	2	118.8	-0.2	+1.0 ; -1.5
	0.25	109.6	-0.4	+1.0 ; -3.0
Slow	200	129.5	-0.1	±0.5
	2	109.8	-0.2	+1.0 ; -3.0
	200	130.0	0.0	±0.5
LAE	2	110.0	0.0	+1.0 ; -1.5
	0.25	100.8	-0.2	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	135.4	134.8	-0.6	±2.0
Positive half cycle	134.4	134.0	-0.4	±1.0
Negative half cycle	134.4	134.1	-0.3	±1.0

เอกสารไม่ควบคุม

Page 5 of 6

F-CAL-005 Ed.1

Certificate No.: CP20240322EA

## Calibration Report

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle		
143.0	142.8	-0.2	±1.5

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	139.0	139.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

- Remarks:
1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
  2. The acceptance limit is for the deviated value.
  3. Acceptance limits was IEC61672-3:2013 Class 1.
  4. The coverage factor  $k = 2.00$

-- End of Report --

เอกสารไม่ควบคุม

Page 6 of 6

F-CAL-005 Ed.1

## CERTIFICATE OF ANALYSIS

## Grade of Product: EPA PROTOCOL STANDARD

Customer:	AIR LIQUIDE (THAILAND)	Reference Number:	160-402772205-1
LTD.:		Cylinder Volume:	144.0 CF
Part Number:	E05N191E15A0014	Cylinder Pressure:	2016 PSIG
Cylinder Number:	EB0162121	Valve Outlet:	660
Laboratory:	124 - Plumsteadville - PA	Certification Date:	Jul 06, 2023
PGVP Number:	A12023		
Gas Code:	CO,CO2,NO,NOX,SO2,BALN		

Expiration Date: Jul 06, 2031

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 800/R-12/031, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a molar basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	100.0 PPM	100.4 PPM	G1	±0.9% NIST Traceable	06/27/2023, 07/06/2023
NITRIC OXIDE	100.0 PPM	100.2 PPM	G1	±0.9% NIST Traceable	06/27/2023, 07/06/2023
SULFUR DIOXIDE	100.0 PPM	100.0 PPM	G1	±1.4% NIST Traceable	06/27/2023, 07/06/2023
CARBON MONOXIDE	200.0 PPM	199.2 PPM	G1	±0.3% NIST Traceable	06/29/2023
CARBON DIOXIDE	8,000 %	7,982 %	G1	±1.2% NIST Traceable	06/27/2023
NITROGEN	Balance				
CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	104202308	CC754364	98.36 PPM NITRIC OXIDE/NITROGEN	±0.4%	Jan 04, 2031
PRM	C2219101	APF1514048	100.19 PPM NITRIC OXIDE/NITROGEN	±0.3%	Feb 28, 2025
GMIS	2023042525	CC754381	98.52 PPM NITRIC OXIDE/NITROGEN	±0.4%	Apr 25, 2031
PRM	12409	DR13660	15.01 PPM NITROGEN DIOXIDE/AIR	±1.5%	Feb 17, 2023
GMIS	153400202002	EB0130037	9.893 PPM NITROGEN DIOXIDE/NITROGEN	±1.6%	Sep 29, 2025
NTRM	160102-22	KAL003820	97.69 PPM SULFUR DIOXIDE/NITROGEN	±0.8%	Nov 01, 2027
CO	230601	CC145902	249.47 PPM CARBON MONOXIDE/NITROGEN	±0.3%	Dec 09, 2028
NTRM	130606-02	CC411730	13.358 % CARBON DIOXIDE/NITROGEN	±0.8%	May 14, 2025
The SRM, NTRM, PRM, or RGM noted above is only in reference to the GMS used in the assay and not part of the analysis.					
ANALYTICAL EQUIPMENT					
Instrument/Make/Model	Analytical Principle		Last Multipoint Calibration		
Nicolet iS50 FTIR AUP2010245 CQ2	FTIR		Jun 15, 2023		
SIEMENS ULTRAMAT6E N1-C8-180	NDIR		Jun 14, 2023		
Nicolet iS50 FTIR AUP2010245 ND	FTIR		Jun 29, 2023		
Nicolet iS50 FTIR AUP2010245 NO2	FTIR		Jun 15, 2023		
Nicolet iS50 FTIR AUP2010245 SCQ2	FTIR		Jun 08, 2023		

  
Approved for Release

Page 1 of 1

เอกสารไม่ควบคุม



### MULTI-POINT GAS TEST REPORT

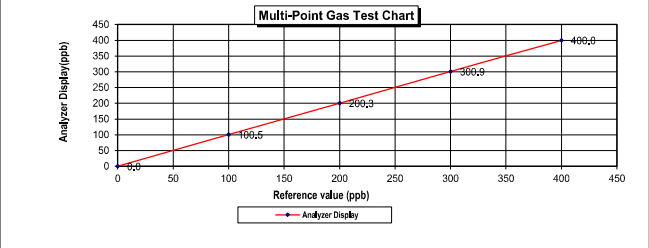
Test Date : May 7, 2025

Equipment : Gas Analyzer (NO<sub>2</sub>) Model : 42i  
Manufacturer : Thermo Scientific Serial Number : 1182920005

Standard Gas Concentration			Dilutor Detail	
Sulphur Dioxide (SO <sub>2</sub> )	42.89	PPM	Manufacturer :	Thermo Scientific
Nitric Oxide (NO)	46.77	PPM	Model :	146i
Methane (CH <sub>4</sub> )	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	965.9			
Cylinder No. :	EB0159156			
Expiration Date :	Nov 6, 2026			

#### Multi-point gas test data

Reference Value (ppb)		Analyzer Display (ppb)	Difference Error	Percent Error	[% Error ]
Level 1	Zero	0.0	0.00	0.00	0.00
Level 2	20.00%	100.5	0.50	0.50	0.50
Level 3	40.00%	200.3	0.30	0.15	0.15
Level 4	60.00%	300.9	0.90	0.30	0.30
Level 5	80.00%	400.0	0.00	0.00	0.00
Remark : Measuring Range		500.0 ppb	Average Difference (%)		0.19



Calculate by : 7 / 05 / 2025  
Approve by : 7 May 2025

### MULTI-POINT GAS TEST REPORT

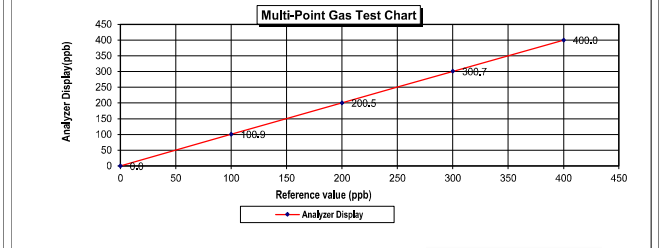
Test Date : Oct 11, 2024

Equipment : Gas Analyzer (NO<sub>2</sub>) Model : 42i  
Manufacturer : Thermo Scientific Serial Number : 1180540064

Standard Gas Concentration			Dilutor Detail	
Sulphur Dioxide (SO <sub>2</sub> )	42.89	PPM	Manufacturer :	Thermo Scientific
Nitric Oxide (NO)	46.77	PPM	Model :	146i
Methane (CH <sub>4</sub> )	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	965.9			
Cylinder No. :	EB0159156			
Expiration Date :	Nov 6, 2026			

#### Multi-point gas test data

Reference Value (ppb)			Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	100.9	0.90	0.89	0.89
Level 3	40.00%	200.0	200.5	0.50	0.25	0.25
Level 4	60.00%	300.0	300.7	0.70	0.23	0.23
Level 5	80.00%	400.0	400.0	0.00	0.00	0.00
Remark : Measuring Range			500.0 ppb	Average Difference (%)		0.27



Calculate by : 11 / 10 / 2567  
Approve by : 11 Oct 2024

### MULTI-POINT GAS TEST REPORT

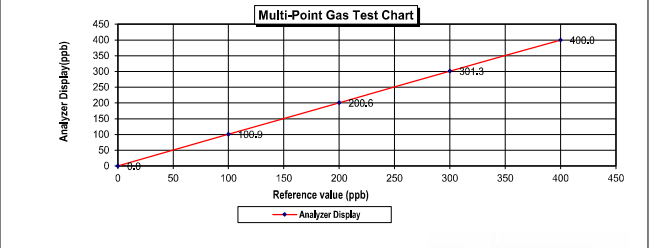
Test Date : Oct 17, 2024

Equipment : Gas Analyzer (NO<sub>2</sub>) Model : 42i  
Manufacturer : Thermo Scientific Serial Number : 1182920007

Standard Gas Concentration			Dilutor Detail	
Sulphur Dioxide (SO <sub>2</sub> )	42.89	PPM	Manufacturer :	Thermo Scientific
Nitric Oxide (NO)	46.77	PPM	Model :	146i
Methane (CH <sub>4</sub> )	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	965.9			
Cylinder No. :	EB0159156			
Expiration Date :	Nov 6, 2026			

#### Multi-point gas test data

Reference Value (ppb)			Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	100.9	0.90	0.89	0.89
Level 3	40.00%	200.0	200.6	0.60	0.30	0.30
Level 4	60.00%	300.0	301.3	1.30	0.43	0.43
Level 5	80.00%	400.0	400.0	0.00	0.00	0.00
Remark : Measuring Range			500.0 ppb	Average Difference (%)		0.32



Calculate by : 17 / 10 / 2567  
Approve by : 17 Oct 2024

### MULTI-POINT GAS TEST REPORT

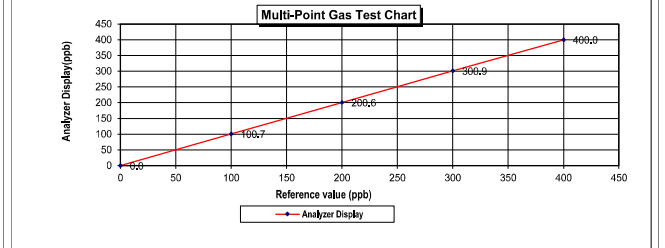
Test Date : Oct 4, 2024

Equipment : Gas Analyzer (NO<sub>2</sub>) Model : 42i  
Manufacturer : Thermo Scientific Serial Number : 1182920008

Standard Gas Concentration			Dilutor Detail	
Sulphur Dioxide (SO <sub>2</sub> )	42.89	PPM	Manufacturer :	Thermo Scientific
Nitric Oxide (NO)	46.77	PPM	Model :	146i
Methane (CH <sub>4</sub> )	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	965.9			
Cylinder No. :	EB0159156			
Expiration Date :	Nov 6, 2026			

#### Multi-point gas test data

Reference Value (ppb)			Analyzer Display (ppb)	Difference Error	Percent Error	[% Error ]
Level 1	Zero	0.0	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	100.7	0.70	0.70	0.70
Level 3	40.00%	200.0	200.6	0.60	0.30	0.30
Level 4	60.00%	300.0	300.9	0.90	0.30	0.30
Level 5	80.00%	400.0	400.0	0.00	0.00	0.00
Remark : Measuring Range			500.0 ppb	Average Difference (%)		0.26



Calculate by : 4 / 10 / 2567  
Approve by : 4 Oct 2024

### MULTI-POINT GAS TEST REPORT

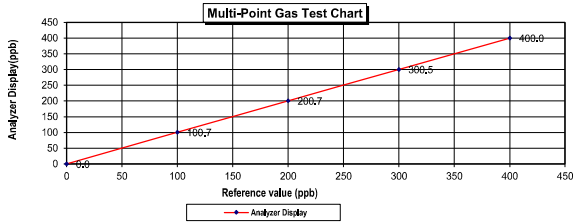
Test Date : May 12, 2025

Equipment : Gas Analyzer (SO<sub>2</sub>) Model : 43i  
Manufacturer : Thermo SCIENTIFIC Serial Number : 1180540065

Standard Gas Concentration			Dilutor Detail	
Sulphur Dioxide (SO <sub>2</sub> )	42.89	PPM	Manufacturer :	Thermo SCIENTIFIC
Nitric Oxide (NO)	46.77	PPM	Model :	146i
Methane (CH <sub>4</sub> )	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	965.9			
Cylinder No. :	EB01159156			
Expiration Date :	Nov 06, 2026			

#### Multi-point gas test data

Reference Value (ppb)			Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	100.7	0.70	0.70	0.70
Level 3	40.00%	200.0	200.7	0.70	0.35	0.35
Level 4	60.00%	300.0	300.5	0.50	0.17	0.17
Level 5	80.00%	400.0	400.0	0.00	0.00	0.00
Remark : Measuring Range			500.0 ppb	Average Difference (%)		0.24



Calculate by

12/.....05/.....2025.

Approve by

12/.....MAX/.....2025

### MULTI-POINT GAS TEST REPORT

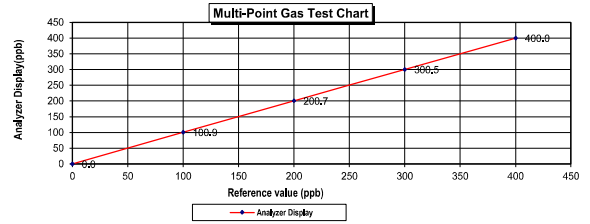
Test Date : May 12, 2025

Equipment : Gas Analyzer (SO<sub>2</sub>) Model : 43i  
Manufacturer : Thermo SCIENTIFIC Serial Number : 1182920012

Standard Gas Concentration			Dilutor Detail	
Sulphur Dioxide (SO <sub>2</sub> )	42.89	PPM	Manufacturer :	Thermo SCIENTIFIC
Nitric Oxide (NO)	46.77	PPM	Model :	146i
Methane (CH <sub>4</sub> )	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	965.9			
Cylinder No. :	EB01159156			
Expiration Date :	Nov 06, 2026			

#### Multi-point gas test data

Reference Value (ppb)			Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	100.9	0.90	0.89	
Level 3	40.00%	200.0	200.7	0.70	0.35	0.35
Level 4	60.00%	300.0	300.5	0.50	0.17	0.17
Level 5	80.00%	400.0	400.0	0.00	0.00	0.00
Remark : Measuring Range		500.0 ppb	Average Difference (%)			0.28



Calculate by

12/.....05/.....2025.

Approve by

12/.....MAX/.....2025

### MULTI-POINT GAS TEST REPORT

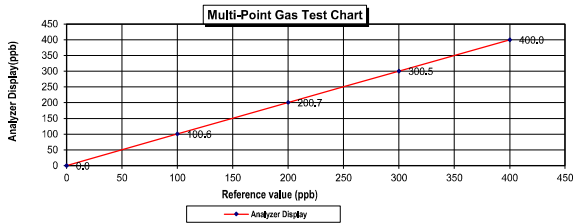
Test Date : May 12, 2025

Equipment : Gas Analyzer (SO<sub>2</sub>) Model : 43i  
Manufacturer : Thermo SCIENTIFIC Serial Number : 1182920014

Standard Gas Concentration			Dilutor Detail	
Sulphur Dioxide (SO <sub>2</sub> )	42.89	PPM	Manufacturer :	Thermo SCIENTIFIC
Nitric Oxide (NO)	46.77	PPM	Model :	146i
Methane (CH <sub>4</sub> )	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	965.9			
Cylinder No. :	EB01159156			
Expiration Date :	Nov 06, 2026			

#### Multi-point gas test data

Reference Value (ppb)		Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	0.60	0.60	0.60
Level 3	40.00%	200.0	0.70	0.35	0.35
Level 4	60.00%	300.0	0.50	0.17	0.17
Level 5	80.00%	400.0	0.00	0.00	0.00
Remark : Measuring Range		500.0 ppb	Average Difference (%)		0.22



Calculate by

12/.....05/.....2025.

Approve by

12/.....MAX/.....2025

### MULTI-POINT GAS TEST REPORT

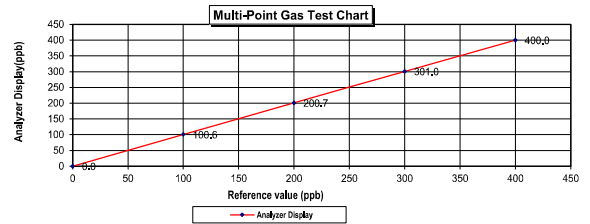
Test Date : May 6, 2025

Equipment : Gas Analyzer (SO<sub>2</sub>) Model : 43i  
Manufacturer : Thermo SCIENTIFIC Serial Number : 1182920017

Standard Gas Concentration			Dilutor Detail	
Sulphur Dioxide (SO <sub>2</sub> )	42.89	PPM	Manufacturer :	Thermo SCIENTIFIC
Nitric Oxide (NO)	46.77	PPM	Model :	146i
Methane (CH <sub>4</sub> )	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	965.9			
Cylinder No. :	EB01159156			
Expiration Date :	Nov 06, 2026			

#### Multi-point gas test data

Reference Value (ppb)			Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	100.6	0.60	0.60	0.60
Level 3	40.00%	200.0	200.7	0.70	0.35	0.35
Level 4	60.00%	300.0	301.0	1.00	0.33	0.33
Level 5	80.00%	400.0	400.0	0.00	0.00	0.00
Remark : Measuring Range			500.0 ppb	Average Difference (%)		0.26



Calculate by

6/.....05/.....2025

Approve by

6/.....May/.....2025

# Certificate of Calibration

## WL-21 Wireless Anemometer

Scarlet Tech Ltd. hereby certifies that the WL-21 wireless anemometer listed below was thoroughly calibrated, tested and inspected following the standard calibration procedure (st-wl-21) and is within manufacturer's specification at the time when the calibration is done.

Client: Envir Service Co., Ltd.

Serial No.: 22050T0113

Calibration Date: 2022/9/14

Calibration Expiry Date: 2023/9/13

### The Result of Calibration

Velocity				
Measured Value(m/s)	Actual Value (m/s)	Deviation	Tolerance	Result
1.0	1.0	0.0	0.9-1.1	Pass
2.1	2.0	0.1	1.8-2.2	Pass
5.1	5.0	0.1	4.7-5.3	Pass
7.0	7.0	0.0	6.0-8.0	Pass
10.2	10.0	0.2	9.5-10.5	Pass
19.8	20.0	0.2	19.0-21.0	Pass

Wind Direction				
Measured Value	Actual Value	Deviation	Tolerance	Result
45°	45°	0	42-48	Pass
136°	135°	1	132-138	Pass
227°	225°	2	222-228	Pass
316°	315°	1	312-318	Pass
358°	0°	2	357-3	Pass

Inspection Room Temp	Actual Value	Deviation	Tolerance	Result
22.5°C	22.5°C	0.0	21.5-23.5	Pass

Atmospheric Pressure Inspection	Actual Value	Deviation	Tolerance	Result
1005	1005	0	1001-1019	Pass

#### Environment conditions :

Air temperature: 22 °C  
Relative humidity: 55 %  
Static pressure: 102.2 kPa

Performed by:

Certified by Head of Engineering



This certificate may not be published or reproduced, except in full, unless obtaining permission in writing form from Scarlet Tech Ltd.  
4F-3, No. 347, 2nd Sec., Heping E. Rd., Dasi Dist. Taipei City 106, Taiwan

เอกสารไม่ควบคุม



## Certificate of Calibration

Cert.No.: 25CH52  
Page.: 1 of 3

Equipment : pH Meter  
Manufacturer : Horiba  
Model : LAQUA-PH210  
Serial No. : HA1M0036  
ID No. : UAE.EFM.012/2565(EFM.pH.02/65)  
Condition As-Received: Used Item  
Received Date : 14 January 2025  
Calibration Date : 15 January 2025  
Reference : 2501-0473WSC-2  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong, Bangkok 10260

Ambient Temperature : (25 ± 2.5) °C  
Relative Humidity : (50 ± 15) %  
Calibration Procedure : In-house method :  
- CP-CH5 by direct measurement with DC voltage  
standard and direct measurement with  
certified reference material (CRM)  
- CP-CH8 by comparison with temperature standard

Calibrated by : Warakorn Lemagtrakul

Approved by :   
Approved Signatory

( ) Pornthippa Tameyakul  
( ) Ponpan Paipim  
(✓) Saithip Meangmai

Issue Date : 17 January 2025

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written  
Approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.

### Condition of this calibration result

#### 1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	24E2759	25 Aug 2025
2) Ref. Standard Thermometer	4982054	110RC044	24I757	14 July 2025

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

#### 2. Certified Reference Materials

The measurement results are traceable to SI through Hach Lenge GmbH Ltd.,  
Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00  
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	1034203	27 Sep 2026
pH 6.999	Hach Lenge GmbH	C03220	29 Oct 2026
pH 10.010	CPA chem	1034205	27 Sep 2025

3. This certificate is valid only to the item calibrated on date and place of calibration.

### Calibration Results

#### Function : mV Measurement

#### Performing standard curve by Document Process Calibrator at pH (4,7)(7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
	pH	mV	mV	pH		
pH Meter S/N : HA1M0036	4.00	177.48	177.6	4.01	0.058	2.00
	7.00	0.00	0.1	7.00	0.058	2.00
	7.00	0.00	0.1	7.00	0.058	2.00
	10.00	-177.48	-177.4	10.01	0.058	2.00



Cert.No.: 25CH52  
Page.: 3 of 3

### Calibration Results

#### Function : pH Measurement

#### Performing three buffers standard curve by using buffer nominal pH (4,7)(7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor k
pH Electrode S/N : -	4.008	4.01	173.6	0.0071	2.00
	6.999	6.99	-0.9	0.0085	2.00
	6.999	7.01	-1.7	0.0092	2.00
	10.010	10.01	-173.4	0.0092	2.00

#### Function : Temperature Measurement

(\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : -

- Serial No. : -

Dimension of probe

- Length : 110 mm.

- Diameter : 16 mm.

- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
15.0	15.003	15.0	-0.003	0.13	2.00
30.0	30.002	30.0	-0.002	0.13	2.00
45.0	45.002	45.1	0.098	0.13	2.00

Remark : - UUC\* = Unit Under Calibration

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

-000-

# FOSS

## Customer Service Report

FOSS South East Asia  
3388 Srinrat Building, 25th - 26th Floor, Unit No. 3388/50,  
Rama IV Road, Klongton, Klongtoey, Bangkok, Thailand 10110

Report No.: 12875

Date:	July 5, 2024	Customer:	UAE
Job No.:	8315	Address:	Bangkok
Instrument:	K9 Distillator	Serial:	94105293
Start	Travel To Customer (Hrs) 08.30	Labour (Hrs) 09.30	Travel From Customer (Hrs) 14.30
Finish	09.30	14.30	16.00

Application		Special		Job Type		Standard	
Distributor	✓	Courtesy Visit	✓	Installation	✓	Training	✓
Digital Service	✓	PMA Onboarding	✓	Quote	✓	In House	✓
Internal	✓	Warranty	✓	Repair	✓	PM	✓
Investigate	✓	Sales Support	✓	Remote	✓	Health Check Visit	✓

PMA Type	Smartcare	✓	Smartcare Pro	✓	Fosscare	✓
	Smartcare Advance	✓	Fosscare Pro	✓	N/A	✓

Details of Work / Test	
- PMA -	
- Visual Check -	
+ No leak	
+ No draining	
- Change PMA Kit x1 Ref - OK	
- Function Check -	
+ Distillation 80 mL → 50 mL	
+ Alkali 50 mL → 50 mL	
+ Receiver N/A → N/A	
+ Steam / Drain	
Blank = Follow up, Recovery = 100% SD = Follow up	
Instrument Ready for Use	OK

Part No.	Batch	Description	Qty
60100146	02-01-2024	PM kit Kjeltec 9 Distillator	1

I confirm this report is accurate and complete	
Signed FOSS	Signed Customer
Name	Name
Email	Customer Contact:

\*Remark: เอกสารไม่ควบคุม



## Calibration Certificate

**Certificate No.:** 2502226-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakhnong, Bangkok 10260

Page 1 of 4

**Equipment:** Electronic Balance  
**Manufacturer:** METTLER TOLEDO  
**Model:** XSR205DU  
**Serial No.:** C009071872  
**ID No.:** UAE.WAO.012/2563  
**Order No.:** 2502226  
**Operation No.:** 2502226-001  
**Date of Receipt:** 19 March 2025  
**Date of Calibration:** 20 March 2025

**Calibrated by** Mr.Yothin Charoensuk  
**Scientist**  
**Approved by** *for N. Nigubatt*  
(Mr.Pheraphat Tuanjit)  
**Manager, Division of Calibration Laboratory**  
**Responsible for the Technical Management Team**  
**Date of Issue:** 25 March 2025

The uncertainties are for a confidence probability of approximately 95%

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-C5-009 Revision: 01 Date: 20-04-65

2008 ฐานการประเมินและรับรองผลการปฏิบัติงานของห้องปฏิบัติการ  
ฐานการประเมินและรับรองผลการปฏิบัติงานของห้องปฏิบัติการ  
2008 Soi 35, Anu Amarin Road, Bang Phak Subdistrict, Bang Phak District, Bangkok 10700, Thailand  
Tel: +66(0) 2438 8588 Fax: +66(0) 2438 8585

เอกสารไม่ควบคุม



## Calibration Report

**Certificate No.:** 2502226-001-01  
**Equipment:** Electronic Balance  
**Model:** XSR205DU  
**Serial No.:** C009071872  
**Capacity:** 82 g / 220 g  
**Manufacturer:** METTLER TOLEDO  
**Resolution:** 0.0001 g / 0.0001 g  
**ID No.:** UAE.WAO.012/2563

Page 2 of 4

**Date of Calibration:** 20 March 2025  
**Environment Condition:** Ambient Temperature: 21.2 ± 0.6 °C Relative Humidity: 48 ± 3.5 %  
**Place of Calibration:** 208 Balance Room, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Condition of Equipment:** Good Condition  
**Condition of This Results of Calibration:**  
1. Calibration Method: NFI Method W-NA-001 In-House Method based on UKAS Lab 14 : 2019  
2. Reference Standards:  
**Reference Standard** **Model** **Serial No.** **Calibrated By** **Certificate No.** **Due Date**  
Standard Weight Class E2 1mg to 200g 8905567572 TCS M24041005 19 April 2025  
**Instrument** **Model** **Serial No.** **Calibrated By** **Certificate No.** **Due Date**  
Thermo-Hygro Meter 608-H1 NFI.BTH 017/23 Quality Reborn QR25-0542 18 February 2025  
3. This certification is traceable to SI UNIT  
4. This certificate was certified only for the instrument we calibrated.  
5. This result of calibration was found accurate as shown on date and place of calibration only.

### Calibration Results:

#### 1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
40	0.0000052
80	0.0000042
100	0.0000030
200	0.0000020

#### 2. Off-Center Error:

A mass of 100 g was placed and moved to various position on pan.

The balance reading obtained is given in the table.



1	2	3	4	5	6	(Maximum Difference)
(g)	(g)	(g)	(g)	(g)	(g)	(g)
100.0001	100.0001	100.0001	100.0001	100.0001	100.0002	0.0001

F-C5-012 Revision: 01 Date: 20-04-65

2008 ฐานการประเมินและรับรองผลการปฏิบัติงานของห้องปฏิบัติการ  
ฐานการประเมินและรับรองผลการปฏิบัติงานของห้องปฏิบัติการ  
2008 Soi 35, Anu Amarin Road, Bang Phak Subdistrict, Bang Phak District, Bangkok 10700, Thailand  
Tel: +66(0) 2438 8588 Fax: +66(0) 2438 8585

เอกสารไม่ควบคุม



## Calibration Report

**Certificate No.:** 2502226-001-01  
**Equipment:** Electronic Balance  
**Model:** XSR205DU  
**Serial No.:** C009071872  
**Capacity:** 82 g / 220 g  
**Manufacturer:** METTLER TOLEDO  
**Resolution:** 0.0001 g / 0.0001 g  
**ID No.:** UAE.WAO.012/2563

**Date of Calibration:** 20 March 2025

### Calibration Results: (Continued)

**Calibration Range:** 0-80 g

**Calibration Adjustment:** Internal Calibration

**3. Departure from Nominal Value:** (Range: 0 - 82 g ; Resolution: 0.0001 g )

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (g)	Coverage Factor k
Unloaded	0.000000	0.000000	0.000000	0.0000089	2.00
0.001	0.001003	0.001000	0.000003	0.0000092	2.00
0.005	0.005002	0.005000	0.000002	0.0000094	2.00
0.01	0.010003	0.010000	0.000003	0.0000091	2.00
0.05	0.049996	0.050000	0.000004	0.0000098	2.00
0.1	0.100011	0.100000	-0.000011	0.000011	2.00
0.5	0.500016	0.500000	-0.000016	0.000014	2.00
1	1.000003	1.000001	-0.000002	0.000016	2.00
2	2.000023	2.000005	-0.000018	0.000017	2.00
5	5.000015	5.000005	-0.000010	0.000021	2.00
10	10.000009	10.000005	-0.000004	0.000026	2.00
20	20.000030	20.000012	-0.000018	0.000037	2.00
30	30.000039	30.000012	-0.000027	0.000050	2.00
50	50.000028	50.000014	-0.000014	0.000068	2.00
80	80.000067	80.000020	-0.000047	0.00011	2.00

F-C5-012 Revision: 01 Date: 20-04-65

2008 ฐานการประเมินและรับรองผลการปฏิบัติงานของห้องปฏิบัติการ  
ฐานการประเมินและรับรองผลการปฏิบัติงานของห้องปฏิบัติการ  
2008 Soi 35, Anu Amarin Road, Bang Phak Subdistrict, Bang Phak District, Bangkok 10700, Thailand  
Tel: +66(0) 2438 8588 Fax: +66(0) 2438 8585

เอกสารไม่ควบคุม



## Calibration Report

**Certificate No.:** 2502226-001-01  
**Equipment:** Electronic Balance  
**Model:** XSR205DU  
**Serial No.:** C009071872  
**Capacity:** 82 g / 220 g  
**Manufacturer:** METTLER TOLEDO  
**Resolution:** 0.0001 g / 0.0001 g  
**ID No.:** UAE.WAO.012/2563

Page 4 of 4

**Date of Calibration:** 20 March 2025  
**Calibration Results: (Continued)**  
**Calibration Range:** >80-200 g  
**Calibration Adjustment:** Internal Calibration  
**3. Departure from Nominal Value:** (Range: >80 - 200 g ; Resolution: 0.0001 g )

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (g)	Coverage Factor k
90	90.000010	90.000002	-0.000008	0.000015	2.00
100	100.000006	100.000001	-0.000005	0.000016	2.00
110	110.000007	110.000001	-0.000006	0.000017	2.00
120	120.000009	120.000002	-0.000007	0.000018	2.00
130	130.000010	130.000002	-0.000008	0.000019	2.00
140	140.000013	140.000002	-0.000011	0.000019	2.00
150	150.000009	150.000002	-0.000007	0.000021	2.00
160	160.000010	160.000002	-0.000008	0.000022	2.00
170	170.000012	170.000002	-0.000010	0.000023	2.00
200	200.000013	200.000002	-0.000011	0.000028	2.00

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

F-C5-012 Revision: 01 Date: 20-04-65

2008 ฐานการประเมินและรับรองผลการปฏิบัติงานของห้องปฏิบัติการ  
ฐานการประเมินและรับรองผลการปฏิบัติงานของห้องปฏิบัติการ  
2008 Soi 35, Anu Amarin Road, Bang Phak Subdistrict, Bang Phak District, Bangkok 10700, Thailand  
Tel: +66(0) 2438 8588 Fax: +66(0) 2438 8585

เอกสารไม่ควบคุม



## Agilent 55 240 280 Series Atomic Absorption Spectroscopy Systems

### Preventive Maintenance Checklist

Agilent Preventive Maintenance provides factory recommended service for your analytical systems 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 everything you need to reduce unplanned downtime and keep your systems operating at their peak. This checklist will be completed at the end of the service and provided to you as a record of the installation.

**Note:** While non-current production AA instrument and/or accessory models are not covered specifically in this document it can be used as a basic reference.

For more information about Agilent Technologies services please visit our web site using the following URL: <http://www.agilent.com/en-us/services>

### 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.
- 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.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



### Important Customer Web Links

- For more information about Agilent Technologies services, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- 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.
- A useful Agilent Resource Center web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>
- Need technical support, FAQs, supplies? – visit our Support Home page at <http://www.agilent.com/search/support>
- Get answers. Share insights. Build connections. Join the Agilent Community at <https://community.agilent.com/welcome>

### Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Confirm the ability of the instrument to deliver continued safe operation as established via the Agilent AA safe operation flow chart. (Refer directly to the AA 55/240/280 Preventive Maintenance Scope of Work to make this decision.)
- 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 "Section not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance 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.
- Complete the total number of pages field in the Service Completion section.
- Ask the customer to sign the Service Completion section including the customer's and your signature.

This information is subject to change without notice.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



### Instrument Maintenance

#### System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	240 FS AAS
Instrument System Site and Location	United Analyst and Engineering Consultant

List System Component Product Numbers	List the Serial Numbers of each Component
1. G 8432 A	M1 13160001
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

### Preparation, Safe operation and Initial performance checks

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



- ☐ Agilent AA safe operation flow chart inspections (to determine if the PM can be performed).

**NOTE: If by following the flow chart the instrument is deemed to be unsafe for continued use you MUST NOT continue PM work. Inform the customer immediately of the Agilent recommendation that use of the instrument be discontinued.**

- ☒ Discuss any specific issues with the customer before starting.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it. **NA**
- ☒ 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, settings as defined by current Service Notes
- ☒ Check for required firmware updates and verify with customers if they would like them installed.
- ☒ Use SVD to perform a Full Wavelength Scan for Cu HCL - "As found test\_1"
- ☒ Perform a Basic Cu ABS test - "As found test\_2"
- ☒ Print the Details page or screen captures of the test results and attach to the end of this checklist.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021





## Preventive Maintenance Procedures

### FLAME SYSTEM section

☐ Section not applicable

#### Electronic components

- ☒ Review and confirm instrument configuration data in SVD
- ☒ Confirm power supply voltages using the **SVD Power Supply diagnostic**.
- ☒ For Dual Beam instruments - Confirm RBC frequency using the **SVD RBC frequency diagnostic**.

#### Mechanical components

- ☒ Check the burner adjuster controls for complete and free movement. If the burner adjuster needs lubrication, use Molykote 321 or mineral-based molybdenum disulphide grease.
- ☒ Run SVD tests to exercise all motor drives over the full range of their travel:
  - ☒ Monochromator drive
  - ☒ Slit drive
  - ☒ Lamp selector
  - ☐ ABA

#### Optics components

- ☒ Check that external optical surfaces are clean – Clean or replace as required.
- ☒ Use SVD and perform **Mono Wavelength Correction**.
- ☒ Use SVD and perform **Slit Calibration**.
- ☒ Use SVD and perform **Grating Squareness Diagnostic**.
- ☒ Use SVD and perform **Zero Order Offset/Mono Correction**.
- ☒ Use SVD and perform **Wavelength Repeatability**.
- ☒ Physically inspect selected HC lamps (customer to supply per their choice) and measure the % Gain for each lamp. Advise customer if lamps are showing emission degradation due to age.
- ☒ Check that the signal energy of the D2 and HC lamps track properly. Advise customer if their D2 lamp is showing emission degradation due to age.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



เอกสารไม่ควบคุม

### Sample Introduction and Atomization

- ☒ Inspect the burner interlock plate to ensure that the interlock pin is secure and correct for the burner type.
- ☒ Clean the burner slot with a clean white card.
- ☒ Check the uniformity of the slot width.
- ☒ Clean the burner if required.
- ☒ Change the burner o-ring.
- ☒ Clean the nebulizer, spray chamber and liquid trap.
- ☒ Change all o-rings and seals in the nebulizer, nebulizer block and spray chamber.
- ☒ Check that the pressure relief bung releases readily.
- ☒ Change o-rings on the fuel and oxidant delivery bars.
- ☒ Leave the liquid trap EMPTY and verify the flame will not ignite in this state.
- ☒ Refill liquid trap and check that overflow drains freely into the drain/waste tube.
- ☒ Check the drain/waste tube for good drainage. It should not have tight bends, kinks or loops and the lower end must be above the liquid level in the waste vessel
- ☒ Check and clean the igniter electrode

### Gas handling components and safety interlocks

- ☒ Pressure test for leaks
- ☒ Leak test gasbox internal components and connections
- ☒ Check safety interlock status and operation using the **SVD Interlock monitoring diagnostic**.

### Analytical performance for Flame systems

- ☒ Ignite a flame.
- ☒ Check that you can adjust the nebulizer uptake rate from 4 to 6.5 mL per minute.
- ☒ Optimize the instrument ready to perform Cu sensitivity test.
- ☒ Create a manual method to perform a Basic Cu ABS test - "Final Performance Testing"
- ☒ Run a PM completed sensitivity test for a 5 ppm copper sample and record the results in the AA PM Performance test results and measurements table.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



เอกสารไม่ควบคุม

### FURNACE SYSTEM section

☒ Section not applicable

#### Electronic components

- ☐ Review and confirm instrument configuration data in SVD
- ☐ Confirm power supply voltages using the **SVD Power Supply diagnostic**.

#### Mechanical components

- ☐ Run SVD tests to exercise all motor drives over the full range of their travel:
  - ☐ Monochromator drive
  - ☐ Slit drive
  - ☐ Lamp selector

#### Optics components

- ☐ Check that external optical surfaces are clean – Clean or replace as required.
- ☐ Use SVD and perform **Mono Wavelength Correction**.
- ☐ Use SVD and perform **Slit Calibration**.
- ☐ Use SVD and perform **Grating Squareness Diagnostic**.
- ☐ Use SVD and perform **Zero Order Offset/Mono Correction**.
- ☐ Use SVD and perform **Wavelength Repeatability**.
- ☐ Physically inspect selected HC lamps (customer to supply per their choice) and measure the % Gain for each lamp. Advise customer if lamps are showing emission degradation due to age.

#### Gas handling, water system and workhead component checks

- ☐ Inspect the GTA workhead gas hoses and connections for leaks.
- ☐ Pressure test for gas leaks
- ☐ If the cooler system is accessible (stand-alone) check for correct operation and coolant/water level – this includes any temperature and pressure settings plus filter cleaning (air flow and water).
- ☐ Inspect the GTA workhead water hoses and connections for leaks.
- ☐ Check all graphite components and replace if necessary.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



เอกสารไม่ควบคุม

- ☐ Tube
- ☐ Electrodes
- ☐ Shroud

☐ Check and clean the end windows on the workhead.

☐ Check safety interlock operation.

### Analytical performance for Furnace systems

- ☐ Optimize the instrument ready to perform Cu sensitivity test.
- ☐ Run the sensitivity test for a 25 ppb copper sample and record the results in the results table.

### PSD autosampler accessory for Furnace systems

- ☒ Section NOT Applicable
- ☐ Check condition of the PSD capillary – replace if necessary
- ☐ Check condition and operation of PSD syringe – ensure it does not have air locks and bubbles.
- ☐ Change PSD rinse bottle o-ring.
- ☐ Check and clean the rinse vessel.
- ☐ Check the drain tube for good drainage. It should not have tight bends, kinks or loops and the lower end must be above the liquid level in the waste vessel.
- ☐ Ensure that the waste vessel is suitable for use with the furnace system.

### Sample introduction pump system (SIPS) accessory

- ☒ Section NOT Applicable
- ☐ Re-torque screws securing the hubs, presser arms and pump rotors.
- ☐ Adjust each roller so that it rotates freely.
- ☐ Wipe clean the pump rotor rollers and pump bands with a dry clean cloth.
- ☐ Ensure that the presser arms and the surfaces near the pump are free from dirt and spills.
- ☐ Remove the pump module rear cover and check for the incursion of liquids and any signs of corrosion.
- ☐ Re-torque the nuts that fasten the motor mounting plates to the chassis.
- ☐ Check clips securing the diluents holder and replace if necessary.
- ☐ Disconnect, clean T-piece, and reassemble the tubing using the following steps.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



เอกสารไม่ควบคุม

- ☐ Remove the T-piece by disconnecting the pump tubes, the pump bands and all other tubing.
- ☐ Place the T-piece in an ultrasonic bath containing strong detergent 1-5% Decon 30 or similar, for approximately 5-10 minutes.
- ☐ Wash the T-piece under a tap with a strong flow of water.
- ☐ Rinse with distilled water through all of the inlets in the reverse direction to normal sample flow.
- ☐ Reassemble.

#### Sample preparation system (SPS 4) accessory

##### ☒ Section NOT Applicable

The Agilent SPS 4 autosampler is designed to need minimal maintenance.

The following maintenance requirements are suggested to maintain the performance of the autosampler.

- ☐ Cleaning the spill tray, rack location mat, end frames and chassis accessories with a damp soft cloth and diluted mild detergent.
- ☐ Cleaning the autosampler cover panels with domestic window cleaner.
- ☐ Checking 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 edge or damaged connectors.

**NOTE: The autosampler requires no extra lubrication throughout its lifetime.**

For further details refer to the SPS 4 service manual G8410-90050.

#### Sample preparation system (SPS 3) accessory

##### ☒ Section NOT Applicable

- ☐ Check the x-axis and z-axis timing belts – Replace if there is any cracks, splits or color deterioration and belt tension.
- ☐ Check belt tensions - adjust if required
- ☐ Check the lubrication pad for single x-axis shaft. If pad is dry or customer has observed any vibration or erratic movements of the x-axis carriage, add 1 mL of Dow Corning 200 @ Fluid, 200 CS into the well.
- ☐ Check the auto-sampler ability to find tube positions - Calibrate if required.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



#### Vapor generation accessory VGA (hydride generator)

##### ☒ Section NOT Applicable

- ☐ Inspect VGA gas supply hose.
- ☐ Inspect/replace VGA pump tubing.
- ☐ Check low gas pressure interlock setting – adjust if required.
- ☐ Check precision orifice gas flow setting – adjust if required.
- ☐ Check gas regulator pressure to 46 psi (325 kPa) – adjust if required.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

#### UltrAA lamp accessory (external)

##### ☒ Section NOT Applicable

- ☐ Check the condition of the power cable.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

#### Restore System

- ☐ If you have altered the customer's instrumentation during the course of PM, restore to the original status to allow the customer to conduct their normal activities (e.g., reload the customer's method.)

#### 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.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



### Signature Page

#### Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ 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 or if necessary, in the customer's IQ records.

#### Test Results

Test Description	Expected Test Result	Actual Test Result
<b>Flame optics PMT Gain test</b>		
For copper at 324.8 nm, 4 mA, 0.5 nm slit width	< 55 %	49.7
<b>Flame performance test with 5 ppm copper sample</b>		
Air /acetylene, mixing paddle removed	Abs value > 0.5	0.559%
Air /acetylene, mixing paddle installed, 10 replicates	%RSD < 1.0	0.2
<b>Deuterium furnace optics PMT Gain test</b>		
For copper at 324.8 nm, 4 mA, 0.5 nm slit width	< 55 %	—
<b>Deuterium furnace performance test with 25 ppb copper sample (324.8 nm)</b>		
Precision %RSD	≤ 4.0%	—
Abs value	≥ 0.15	—
<b>Zeeman furnace analytical performance: 25 ppb copper sample (327.4 nm)</b>		
Precision %RSD	≤ 4.0%	—
Abs value	≥ 0.10	—
MSR%	≥ 70 %	—

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



#### AA consumable and parts list table

Part Description	Part Number	Product/Model # where used	PM supplied or Consumable	Instrument-Type
Test Solution – Cu 5ppm solution	6610030100	50 55 140 240 280	PM supplied	Common
Test Solution - Blank solution	5190-7001	50 55 140 240 280	PM supplied	Common
Copper, 1000 ug/ml, 100ml	5190-8279	50 55 140 240 280	*	Common
Kit, Mk 7 O-rings, aqueous, complete set	9910093400	50 55 140 240 280	PM supplied	Flame
Organic Kit	9910093500	50 55 140 240 280	PM supplied	Flame
Wire Nebulizer Cleaning	9910024700	50 55 140 240 280	consumable	Flame
Tubing-Capillary Std Nebs	9910024800	50 55 140 240 280	consumable	Flame
Capillary Tube Hivac Neb (3) (organics only)	9910044000	50 55 140 240 280	consumable	Flame
Glass impact beads (5/pk)	9910025700	50 55 140 240 280	consumable	Flame
Teflon impact beads (5/pk) (organics only)	9910053300	50 55 140 240 280	consumable	Flame
Burner cleaning strip (100/pk)	9910053900	50 55 140 240 280	consumable	Flame
Window UV silica – round (right side)	2010082600	50 55 140 240 280	PM supplied	Common
Window UV silica – rectangular (left side)	2010082500	50 55 140 240 280	PM supplied	Common
Pad adhesive window (round)	4910012700	50 55 140 240 280	PM supplied	Common
Pad adhesive window (rectangular)	4910012800	50 55 140 240 280	PM supplied	Common
Electrode kit (1 pr) (D2)	6310003400	GTA120	PM supplied	Furnace
Shroud (D2)	6310003100	GTA120	PM supplied	Furnace
Zeeman electrode kit (1 pr)	6310003500	GTA120	PM supplied	Furnace
Zeeman shroud	6310003600	GTA120	PM supplied	Furnace
O-ring PSD rinse bottle	6910025900	PSD120	PM supplied	Furnace

\* For engineers who only service AA instruments 5190-8279 can be used as a cheaper alternative for 6610030100.

Items classified as PM supplied in the above table are included in the standard PM

Those classified as consumable should be provided by the customer or charged to the customer if supplied by the Agilent service engineer.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021





### Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

### Service Completion

Service request number 6007549143 Date service completed 30 Jan 2025  
 Agilent signature Kanyakorn S. Customer signature David Y.  
 Total number of pages in this document 13



### Frequency:

Averaging Period: 30.0  
 Datapoint Count: 20  
 Upper Limit: 51.00  
 Lower Limit: 49.00  
 Average Frequency: 50.00  
 Highest Measured Frequency: 50.00  
 Lowest Measured Frequency: 50.00  
 Result: **Passed**

### Power Supply:

	Lower Limit (V)	Actual (V)	Upper Limit (V)	Result:
12.00 V Rail	10.80	12.12	13.20	<b>Passed</b>
-12.00 V Rail	-13.20	-11.90	-10.80	<b>Passed</b>
5.00 V Rail	4.50	5.04	5.50	<b>Passed</b>
310.00 V Rail	270.00	330.00	341.00	<b>Passed</b>

เอกสารไม่ควบคุม

## SVD Results Report



Report ID: 2 Diagnostic Start Time: 1/30/2025 9:13:26 AM Diagnostic End Time: 1/30/2025 9:47:25 AM  
 Customer: UAE Service Engineer: Kanyakorn S.  
 Address: Soi Udomsuk 41, Sukhumvit Rd. Contact Details: 02637636381  
 Bangkok

### Instrument Configuration

Configuration:  
 Serial Number: MY13100001 Turret Type: Automatic  
 Instrument Model: Varian AA140/240/280 Number Of Lamps: 4  
 Flame Instrument: True Mono Type: Automatic  
 Furnace Instrument: True Gasbox Type: Y Gas Box  
 Zeeman Present: False Auto Burner Adjuster: False  
 Internal Zeeman: False Mains Frequency: 50  
 Internal UltraAA: False Firmware Version: 2.11  
 Optics Type: Double Beam Photomultiplier Type: Normal(900nm)  
 D2 BG Correction Fitted: True PWB Version: 45  
 Boot Block Version: 1.09

### EEPROM Data:

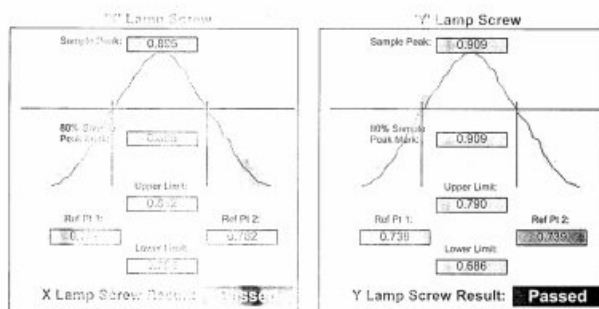
Instrument Run Hours: 69918.180 D2 Run Hours: 53396.500  
 Zero Wavelength Offset: 30.133 D2 Serial Number: not set 1  
 Mono Correction: 0.770 D2 Install Date: 1/1/1970  
 Flame Hours: 32411.834 D2 Original Intensity: 1.000  
 D2 Last Intensity: 475.000

เอกสารไม่ควบคุม

### Optics

#### Beam Balance:

Lamp Type: Copper  
 Lamp Socket Used: 3  
 Peak Selected: 324.80  
 Lamp Alignment: **Performed**



### Grating Scan

Lamp Element(s):	Copper			
Lamp Turret Position:	3			
Lamp Current(nA):	4.00			
SLW Wavelength(nm):	0.5			
1st Order Wavelength(nm):	324.80			
Lamp Alignment:	<b>Performed</b>			
	Lower Limit (nm)	Passed (nm)	Upper Limit (nm)	Result:
Zero Order	-8.10	0.00	0.10	<b>Passed</b>
First Order	324.45	324.75	325.15	<b>Passed</b>
Second Order	648.90	649.50	649.97	<b>Passed</b>

เอกสารไม่ควบคุม

**Wavelength Repeatable:**

Lamp Used: Copper  
Peak Used(nm): 324.759  
Connected to Socket: 3

Lamp Current(mA): 4  
Slit Width(nm): 0.2  
Slit Height: Normal

Lamp Alignment:

Lower Limit(nm): 324.775  
Upper Limit(nm): 324.888

(Typical from Zero Offset) (Typical from end)

Sample 1: 324.823  
Sample 2: 324.823  
Sample 3: 324.873  
Sample 4: 324.823  
Sample 5: 324.823  
Sample 6: 324.819  
Sample 7: 324.819  
Sample 8: 324.819  
Sample 9: 324.823  
Sample 10: 324.819

Mean: 324.823  
Standard Deviation: 0.003

Result:

เอกสารไม่ควบคุม

**Auto Lamp Recognition:**

Lamp 1: Unpaired Lamp/Not Connected  
Lamp 2: 67 - Silver Cadmium Lamp/Dec Ultra AA (Ag/C Lamp) Not Supported  
Lamp 3: 14 - Copper (Cu)  
Lamp 4: Unpaired Lamp/Not Connected  
Lamp 5: Not Supported  
Lamp 6: Not Supported  
Lamp 7: Not Supported  
Lamp 8: Not Supported

Result:

**GTA Temperature Monitoring:**

Notes:

Signatures:

30 Jan 2025  
Kanyakorn S. Date

เอกสารไม่ควบคุม

**Wavelength Drive:**

**Slit Drive:**

**Turret Drive:**

**Auto Burner Adjuster:**

**Signal Processing Linearity:**

On-Scale - Scale: New Date Mode

	Lower Limit	Actual	Upper Limit	Result:
S2	114	3	297	
S3	118	14	191	
S4	271	10	332	
S5	474	7	578	
S6	835	11	1008	
S7	1435	8	1754	
S8	2438	10	3053	
S9	4747	10	5313	

**Interlocks:**

Burner Flame:

NO Burner Flame:

Flame Offset Closed:

Gas Control Flame:

Pressure Release Gas Flame:

Liquid Trap Flame:

Flame Detect:

SCU Active:

Oxidant Pressure:

Oxidant Changeover:

Ignition:

เอกสารไม่ควบคุม

**Sequential by time report** 1/30/2025 10:53 AM Page 1 of 1 SpectraAA

Analyst: 1/30/2025 10:33 AM GMT: 1/30/2025 3:33 AM  
Date Started: Sensitivity Test 01  
Worksheet: Comment:  
Methods: Cu  
Computer name: DESKTOP-RSUIFRS  
Serial Number: MY13160001

Method: Cu (Flame)

Sample ID	Conc mg/L	%RSD	Mean Abs		
CAL Z1110	0.000	38.8	0.0002		
	Readings				
	0.0002	0.0003	0.0001	1/30/2025	10:51:48 AM
STANDARD 1	5.000	0.1	0.5571		
	Readings				
	0.5571	0.5563	0.5575	1/30/2025	10:52:22 AM

Abs Linear Origin - Cal Set 1

Curve Fit: = Linear Origin  
Characteristic Conc: = 0.038 mg/L  
r: = 1.0000  
Calculated Conc: = 0.002 5.000  
Residuals: = -0.007 0.000

Abs = 0.11141 x C

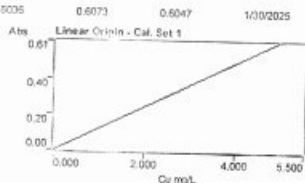
5 ppm Cu					
	5.000	0.3	0.5598		
	Readings				
	0.5592	0.5596	0.5615	1/30/2025	10:52:54 AM

เอกสารไม่ควบคุม

Analyst  
Date Started 1/30/2025 10:33 AM GMT; 1/30/2025 3:33 AM  
Worksheet Precision Test  
Comment  
Methods Cu  
Computer name DESKTOP-BSUFRS  
Serial Number MY13160001

Method: Cu (Flame)

Sample ID	Conc. mg/L	%RSD	Mean Abs
CAL ZERO	0.000	64.1	-0.0002
Readings			
	-0.0003	-0.0003	-0.0001
STANDARD 1	5.000	0.3	0.6052
Readings			
	0.5035	0.6073	0.6047



Curve Fit = Linear Origin  
Characteristic Conc = 0.039 mg/L  
r = 1.0000  
Calculated Conc = -0.002 5.000  
Residuals = 0.002 0.000

Abs = 0.12105 x C

5 ppm Cu	5.007	0.2	0.0051
Readings			
	0.6065	0.6052	0.6047
	0.6055	0.6076	0.6064
		0.6079	0.6042
			0.6079
			1/30/2025 10:48:32 AM

SPS 4

Gold Tube

Back 1 1

Type 1 1

Gold Tube

Down height 0 1.23 (mm)

Pump speed Medium

Key to tube colors

- Sample
- Calibration
- Calibration/QC
- Sample/QC
- Not Assigned

Align Probe

Focus

Stop/Save

Park

Optimization: Lamp

HC Lamp 1.30

1.00

0.50

0.00

0.917

Optimize Lamp

Optimize Sign

Rescale

Inst Zero

Gain 49 %

Ok

Sensitivity Check 1.5 mg/L gives about 0.2 Abs at 324.8 nm, A/A burner

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



## PinAAcle 900F Preventive Maintenance Report

Company Name: UAE Consultant Co., LTD.

Instrument Location: 41 Sukumvit Rd.,

Phra Khanong, Bangkok 10260

Instrument Serial No.: PFB520031902

Date: 29-Apr-2025

เอกสารไม่ควบคุม

### PinAAcle 900F Preventive Maintenance (PM)

Company Name:	United Analyst and Engineering Consultant Co., LTD.		
Address (Instrument Location):	41 Sukumvit Rd., Phra Khanong, Bangkok 10260		
Serial Number:	PFB520031902	PM Number:	1 of 2
Customer Name (if applicable):	K. Yinda	Telephone Number:	095-5580049
Customer Support Engineer Name:	K. Chayanon	Service Order Number:	WO-03126047
Date PM Performed: (DD-MM-YYYY)	29-Apr-2025	Next PM Due Date: (DD-MM-YYYY)	29-Oct-2025
Standard Labor Hours to Complete PM:		5 hours	

Part Number	Release	Publication Date	
09370145 Rev.9	A	January 2018	

#### Scope

The purpose of this PM is to ensure the continued functionality of the PinAAcle 900F by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer.

The customer should save their method before the PM begins.

#### General Instructions:

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM.

Always check with the customer before making any changes that may affect the customer's analysis or calibration, including a current back-up of system software and/or data files.

The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer.

Update the PM sticker and instrument logbook as required.

#### Copyright Information

This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this publication may be reproduced in any form whatsoever or translated into any language without the prior, written permission of PerkinElmer, Inc. Copyright © 2013 PerkinElmer, Inc.

#### Trademarks

Registered names, trademarks, etc. used in this document, even when not specifically marked as such, are protected by law. PerkinElmer is a registered trademark of PerkinElmer, Inc. All other trademarks and registered trademarks not owned by PerkinElmer, Inc. or its subsidiaries that are depicted herein are the property of their respective owners. Except as specifically set forth in its terms and conditions of sale, PerkinElmer makes no Warranty of any kind with regard to this document, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. PerkinElmer shall not be liable for incidental or consequential damages in connection with the furnishing or use of this document.

เอกสารไม่ควบคุม

## Component List

Component / Specific Model	Serial #	Configuration Notes
PinAAcle900F	PFBS20031902	Syngistix V4.0.1.1935
FIAS100	100524040501	

## Parts Lists

Parts Included with the PM		
Part Number (if applicable)	Description	Quantity
B0501696	Fan Filters	2
N3160156	O-Ring Kits for Sampling Introduction (Stainless Steels Nebulizer)	N/A
N3160157	O-Ring Kits for Sampling Introduction (Plastic Nebulizer)	1
N9301714	Replacement Acetylene Filter Cartridge	1
TH001022	Replacement Air Filter Cartridge	1

Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quality	Batch/Lot #	Expired Date (MM/YY)
N9300183	1000 mg/L Copper Standard	AR	27-39CUY1	Nov 2025

Additional Reagents and Standards Required for PM (Customer Support Solution)				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A	DI Water	250 mL	AR	AR
N/A	0.5% HNO <sub>3</sub>	250 mL	AR	AR

เอกสารไม่ควบคุม

## Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

### 1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.
- ☒ Inspect the customer log book and make any appropriate PM entries.
- ☒ Perform general inspection of system for cleanliness.

### 2. PC Instrument Software:

- ☒ Instrument Software user files/databases archived, packed, and/or deleted as needed.

### 3. Mechanical:

- ☒ Inspect and clean all fans and filters. Replace filters if necessary.
- ☒ Inspect all gas lines for leaks and/or wear. Replace if needed.
- ☒ Clean exterior of the instrument.
- ☒ Inspect the burner head, burner chamber, and nebulizer. Clean if needed as stated in the Hardware Guide.
- ☒ Check burner head dimensions with the feeler gauge as stated in the Hardware Guide in the Maintenance chapter section on cleaning the burner head and checking sloth width. Replace if out of specification.
- ☒ Check the condition of the end cap, burner head, and nebulizer O-rings. Replace if necessary.
- ☒ Check the drain system for signs of wear. Replace worn or damaged parts.
- ☒ Visually check for proper flame conditions when igniting the Air-C2H2 and N2O-C2H2 flames (if applicable).

### 4. Electrical:

- ☒ Inspect PC boards. Clean if necessary.
- ☒ Carefully check all internal and external cable connections.
- ☒ Check instrument firmware revisions upgrade to current levels (if necessary)
- ☒ Run Diagnostics Test within the Advanced function of the Spectrometer page. Check the results in the service log folder in the Spectrometer BM Log Viewer.

### 5. Optics:

- ☒ Inspect and clean the sample compartment windows, if needed.
- ☒ Inspect optics. Clean or replace if necessary.

### 6. Gasses:

- ☒ Verify that the Gasses supplied to the instrument are within the pressure and purity specifications found in the PinAAcle 900 Series Pre-Installation Checklist SDB.
- ☒ Verify that the acetylene filter and air filter element is dry. Replace if necessary.

เอกสารไม่ควบคุม

## Additional Tools Required for PM

Part Number (if applicable)	Description	Quantity	Serial #
N1013000	0.2A Neutral density filter	1	101N0089015
N1013002	1.0A Neutral density filter	1	101N0089015
03030997	System 2 EDL Driver	1	03030997
N3050605	As System 2 EDL	1	16148
N3050121	Cu Lumina HCL	1	060419-030180
N3050109	Ba Lumina HCL	1	061219-020041
N3050139	K Lumina HCL	1	030819-010130
N3050152	Ni Lumina HCL	1	052719-020020

เอกสารไม่ควบคุม

### 7. Flame Interlock Check:

Description: Check to ensure that all safety interlocks are closed.

Parameter	Specification	Test Results	Pass/Fail
Flame Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
Drain Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
Nebulizer Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
C <sub>2</sub> H <sub>2</sub> Pressure Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
Air Pressure Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
Burner Head Sensor	Choosing Nitrous Oxide as the oxidant should trigger an interlock shuts down	Active	Passed

### 8. After PM Performance tests:

#### 8.1 Detector Linearity with Barium

Description: Ensures that the detector is linear in the Visible Range.

Parameter	Specification	Certificate Value at 553.6 nm (Abs.)	Test Results	Pass/Fail
1.0 A ND Filter	± 5% from Cert.	0.9668	0.9678	Passed
0.2 A ND Filter	± 5% from Cert.	0.1953	0.1876	Passed

#### 8.2 Baseline Noise at 1.0 Absorbance with Barium

Description: Ensures that a high absorbance will not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0005	Passed

#### 8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.001	0.0001	Passed

เอกสารไม่ควบคุม



8.4 D<sub>3</sub> Background Compensation with Copper

Description: Verifies the instruments ability to compensate for Background absorption.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.009	Passed

## 8.5 AA-BG Baseline Noise with Copper

Description: Ensures that background correction does not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0001	Passed

## 8.6 AA-BG Baseline Noise with Arsenic

Description: Ensures that background correction does not produce excessive noise at a low wavelength.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0004	Passed

## 8.7 Flame Sensitivity

Description: Instrument Sensitivity checked against Copper standard.

Standard Copper Sensitivity	Specification	Results (Abs.)	Pass/Fail
5 mg/L Sensitivity SS Neb (if applicable)	> 0.250 Abs.	N/A	Not Applicable
2 mg/L Sensitivity HS Neb (if applicable)	> 0.250 Abs.	N/A	Passed

## 10. Review:

- ☒ Review with the customer PM work performed.  
☒ Review with the customer routine maintenance procedures.  
☒ Discuss recommended customer supplied materials to have on hand.  
☒ Attach PM sticker.

## Additional Comments

Additional Comments Regarding the PM

## Review

The preventive maintenance checks and if applicable performance tests for PinAAcle 900F have been completed.

This PinAAcle 900F ☒ Passes ☐ Fails the preventive maintenance.

## Review of Preventive Maintenance:

Authorized PerkinElmer Representative:	Date: 29 Apr 2025 (DD-MMM-YYYY)
Authorized Customer Representative:	Date: 29 Apr 2025 (DD-MMM-YYYY)

PinAAcle 900F Preventive Maintenance Report (PM)

Page 6 of 7

PinAAcle 900F Preventive Maintenance Report (PM)

Page 7 of 7

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



PerkinElmer Scientific (Thailand) Co., Ltd.  
250 Soi Soorajai 4  
Khwaeng Bangkapi, Khut Huay Kwang  
Bangkok 10310  
Thailand  
Tel: 66 2719 6420 ; Fax: +66 2 319 7900  
http://www.perkinelmer.com

Customer Acknowledgment of receipt of the above repair / replacement.  
Special Terms and Conditions: This is not an invoice.  
Terms will be applied to your invoice if applicable.

## Service Report

Work Order Number	Activity Code	Billing Type	Requested Start Date	Model	Serial Number
WO-03126047	Planned Maintenance	Contract	10/01/2025 11:38 h.	AAN3300051	PHB55031902
Service Representative Name	Contract Number	Expiry Date	Equipment ID	System ID	
Karnan, Chayanon	SC-0039964100	31/10/2025	N/A	N/A	
UCI Number					
N/A					
Equipment Location			SB To Name		
บริษัท ทรานส์เทคโนโลยี จำกัด อาคาร 1000 ถนนแจ้งวัฒนะ แขวงทุ่งพญาไท เขตราชเทวี กรุงเทพมหานคร 10600 TH			บริษัท ทรานส์เทคโนโลยี จำกัด อาคาร 1000 ถนนแจ้งวัฒนะ แขวงทุ่งพญาไท เขตราชเทวี กรุงเทพมหานคร 10600 TH		
Customer Contact	Phone Number	Fax Number	Email	Purchase Order	
K. ทรานส์เทคโนโลยี (โทรสาร)	055-5593049	N/A	richakorn.prasert199@gmail.com	HPO-050106002	

## Work Description

- PM 20 (Annual) - Cleaning Cell, Chopper, Filter - Wavelength Calibrate : Pass - Wavelength Scan As.Cu.Ba.K.Ni : Pass - Align cell with Hg : OK	
Start Date	End Date
29/04/2025	05/05/2025

## Tools Used

Quantity	Calibrated Tool	Description	Serial Number	Last Calibration Date	Next Calibration Date
*** No Calibrated Tools Used ***					

## Material Used

Part Number	Part Description	Note	Lot/Serial Number	Quantity
*** No Parts Used ***				

## Labour Details

Part Number	Part Description	Start Date	Quantity
25430013	Preventative maintenance	28/04/2025	4

Work Complete		Customer Signature	Technician Signature
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	สัญญาพร	Chayanon K.
PM/QSPV Left with Customer			
Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>		
862568 K. ทรานส์เทคโนโลยี (โทรสาร)		862568 Karnan, Chayanon	

Terms &amp; Conditions

เอกสารไม่ควบคุม


Page 2 of 2

8/5/2025 WO-03126047

เอกสารไม่ควบคุม

Page 2 of 2

Atomic Absorption/FLAS 100/400 Preventive Maintenance (PM)			
Company Name:	United Analyst and Engineering Consultant Co., LTD.		
Address (Instrument Location):	41 Sukumvit Rd., Phra Khanong, Bangkok 10260		
Room Number:	Lab		
Asset Number (if applicable):	2 of 2W	Customer System ID:	K. Yanida
Service Engineer Name:	K. Chayanan	Service Order Number:	WO-03051971
Date PM Performed: (DD-MM-YYYY)	29-Apr-2025	Next PM Due Date: (DD-MM-YYYY)	29-Oct-2025

Part Number	Release	Publication Date	
09370005	C	January 2013	

#### Scope

The purpose of this PM is to ensure the continued functionality of the Atomic Absorption/FLAS 100/400 by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. The customer should save their method before the PM begins.

#### General Instructions:

Always check with the customer before making any changes that may affect the customer's analysis or calibration. The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer. Update the PM sticker and instrument logbook as required.

#### Copyright Information

This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this publication may be reproduced in any form whatsoever or translated into any language without the prior, written permission of PerkinElmer, Inc. Copyright © 2013 PerkinElmer, Inc.

#### Trademarks

Registered names, trademarks, etc. used in this document, even when not specifically marked as such, are protected by law. PerkinElmer is a registered trademark of PerkinElmer, Inc. All other trademarks and registered trademarks not owned by PerkinElmer, Inc. or its subsidiaries that are depicted herein are the property of their respective owners. Except as specifically set forth in its terms and conditions of sale, PerkinElmer makes no warranty of any kind with regard to this document, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. PerkinElmer shall not be liable for incidental or consequential damages in connection with the furnishing or use of this document.

## Component List

Component / Specific Model	Serial #	Firmware Version	Configuration Notes
FLAS100	100S24040501	2.20	Syngistix V4.0.1.1935

## Parts Lists

Parts Included with the PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
B050 2706	Fan Filter	1	N/A	N/A

Additional Tools Required for PM				
Part Number (if applicable)	Description	Quantity	Serial #	Calibration Due Date (MM/YY)
N/A	Digital Volt Meter	1	N/A	N/A

Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A	N/A	N/A	N/A	N/A

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

## Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

### 1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.

- ☒ Is the Working Environment Acceptable? If not, document.

- ☐ Visual Damage (if yes, describe)

- ☒ Check incoming AC line voltage for proper levels and grounding.  
☒ Verify Voltage switch on back of instrument is correct.  
☒ Perform general inspection of system for cleanliness. Clean if needed.  
☒ Gas supply cylinders secured, lines leak checked and argon or nitrogen supply pressure verified (45 – 58 psi).  
☒ Inspect the customer log book and make any appropriate PM entries.  
☒ Fan checked and filter cleaned  
☒ Heating mantle or Universal Cell Holder checked

### 2. Instrument components

- ☒ Non-return valve checked/repairs/replaced if needed (B019 8111). Clean the valve if there is any liquid in it. Replace the rubber sleeve (B013 5123) if it is worn. Check the flow meter for any signs of fluid in it. Clean the flow meter if needed.  
☒ Verify condition of pump pressure adjustment levers (B050 7794 - look for cracks or problems with the springs), pump rollers (B300 0251 check for wear), and thumb screws (B050 7796).  
☒ Check the Multiport valve for proper switching, flow, and insure there are no leaks. Clean valve parts and replace o-rings if needed (large o-ring: B050 1250, small o-ring: B004 5095). Use a squirt bottle & fishing line to try to dislodge clogs.  
☒ Firmware Version checked. Latest is 2.20.

### 3. Mixing/Separation Assembly & Pump Tubing:

- ☒ Mixing separator assembly checked  
☒ Filter/membrane checked (B050 8306)  
☒ Condition of the pump tubing (replace if necessary), correct pump tubing for the solutions being run. Make sure the correct magazines are being used. B050 7791 for 0.13 – 1.80 mm tubing; B050 7792 for 1.60 – 3.18 mm tubing.

เอกสารไม่ควบคุม

### 4. Cell, Cell Windows, Transfer Line:

- ☒ Cell checked  
☒ Cell windows checked  
☒ Transfer line checked for moisture (if moisture is a problem, the Nafion dryer might be needed)

### 5. Operational Tests:

- ☒ Run DI water through the carrier/reductant/sample system. Verify smooth flow of liquid throughout without leaks. Replace tubing & fittings if needed.

### 6. Review:

- ☒ Review with the customer PM work performed.  
☒ Review with the customer routine maintenance procedures.  
☒ Discuss recommended customer-supplied materials to have on hand.  
☒ Attach PM sticker.  
☒ Update Logbook.

เอกสารไม่ควบคุม

## Additional Comments

Additional Comments Regarding the PM

## Document History

Revision	Description of Change	Page(s)	Date
A	First release		May 2008
B	Addition of Batch/Lot Number, Expiration Date, and Report Fields.	2,7	February 2009
C	Update to new format	All	January 2013

## Review

The preventive maintenance checks and if applicable performance tests for FIAS 100/400 have been completed.	
This FIAS 100/400 Passes <input checked="" type="checkbox"/> Fails <input type="checkbox"/> the preventive maintenance.	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative: <i>Chayman k</i>	Date: 29 Apr 2025 (DD-MM-YYYY)
Authorized Customer Representative: <i>สุวิทย์ หอคำ</i>	Date: 29 Apr 2025 (DD-MM-YYYY)

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



PerkinElmer Scientific (Thailand) Co., Ltd.  
290 Soi Soonthorn 4  
Khwang Bangkapi, Khet Huay Kwang  
Bangkok 10310  
Thailand  
Tel: 66 2719 8420 : Fax: +66 2 319 7900  
http://www.perkinelmer.com

Customer Acknowledgment of receipt of the above repair / replacement.  
Special Terms and Conditions: This is not an invoice.  
Terms will be applied to your invoice if applicable.

## Service Report

Work Order Number	Activity Code	Billing Type	Requested Start Date	Model	Serial Number
WO-03051971	Planned Maintenance	Contract	10/03/2568 23.08 u.	B0558570	10024043501
Service Representative Name	Contract Number	Expiry Date	Equipment ID	System ID	
Kanan, Chayman	BC-003889090	24/05/2025	N/A	N/A	
UDI Number					
N/A					
Equipment Location			SB To Name		
บริษัท อีโคโนมิค เซอร์วิส จำกัด อาคารพาณิชย์ 100/100 ถนนวิภาวดีรังสิต แขวงจตุจักร กรุงเทพฯ 10200 TH			บริษัท อีโคโนมิค เซอร์วิส จำกัด อาคารพาณิชย์ 100/100 ถนนวิภาวดีรังสิต แขวงจตุจักร กรุงเทพฯ 10200 TH		
Customer Contact	Phone Number	Fax Number	Email	Purchase Order	
K. Nithakorn amritsu	095-6589069	N/A	perkitosha.n42@gmail.com	HPO-240430211	

Work Description	
- PM 2/2 Warranty - Clearing Port Valve, Memfold, Tuning - Run Up test : Pass Start Date: 29/04/2025 End Date: 29/04/2025 29/04/2025 29/04/2025	

Tools Used				
Quantity	Calibrated Tool	Description	Serial Number	Last Calibration Date / Next Calibration Date
*** No Calibrated Tools Used ***				

Material Used				
Part Number	Part Description	Note	Lot/Serial Number	Quantity
*** No Parts Used ***				

Labour Details			
Part Number	Part Description	Start Date	Quantity
SV030013	Preventative maintenance	29/04/2025	3
SV030002	Service Travel	29/04/2025	1

Work Complete	Customer Signature	Technician Signature
Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> PM/QOPV Left with Customer Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	<i>สุวิทย์ หอคำ</i>	<i>Chayman k</i>
	95/2568 K. Nithakorn amritsu	95/2568 Kanan, Chayman

Terms & Conditions
--------------------

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



Terms & Conditions

Customer Acknowledgment of receipt of the above repair / replacement.

Special Terms and Conditions: This is not an invoice.

Taxes will be applied to your invoice if applicable.

# FOSS

FOSS South East Asia  
3388 Srinrat Building, 25th - 26th Floor, Unit No. 3388/50,  
Rama IV Road, Klongton, Klongtoey, Bangkok, Thailand 10110

## Customer Service Report

Date:	July 5, 2024	Report No.:	12875
Job No.:	8315	Customer:	UAE
Instrument:	KT9 Distiller	Address:	Bangkok
		Serial:	94105393
Start	Travel To Customer (Hrs) 09.30 1	Labour (Hrs) 09.30 5	Travel From Customer (Hrs) 14.30 1.5

Job Type		Standard	
Distributor	Courtesy Visit	Installation	Training
Digital Service	PMA Onboarding	Quote	In House
Internal	Warranty	Repair	PM
Investigate	Sales Support	Remote	Health Check Visit

PMA Type	Smartcare	Smartcare Pro	Fosscore
	Smartcare Advance	Fosscore Pro	N/A

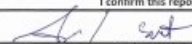
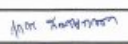
Details of Work / Test

- PM -  
- Visual Check -  
+ No leak  
+ No downing  
- Change PM Kit x1 Pct -ok  
- Function Check -  
+ Dilution 80 ml -> 52 ml  
+ Alkali 52 ml -> 52 ml  
+ Receiver N/A -> N/A  
+ Meter / Drain  
Blank = Follow up, Recovery Am > 100% SD = Follow up

Instrument Ready for Use OK X Not OK\*

Part No.	Batch	Description	Qty
60100196	03.09.2020	PM kit Kjetter 9 Distiller	1

I confirm this report is accurate and complete

Signed FOSS		Signed Customer	
Name	Arun	Name	N. Nijarat

Email: Customer Contact:

\*Remark:

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



## Calibration Certificate

Certificate No.: 2502226-001-01  
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
Address: 3 Sol Udomsuk 41, Sukhumvit Road, Bangchack, Prakhnong, Bangkok 10260

Page 1 of 4

Equipment: Electronic Balance

Manufacturer: METTLER TOLEDO

Model: XSR205DU

Serial No.: C009071872

ID No.: UAE.WAO.012/2563


Order No.: 2502226

Operation No.: 2502226-001

Date of Receipt: 19 March 2025

Date of Calibration: 20 March 2025

Calibrated by Mr.Yothin Charoensuk  
Scientist

Approved by   
(Mr.Pheraphat Tuanjit)  
Manager, Division of Calibration Laboratory  
Responsible for the Technical Management Team

Date of Issue: 25 March 2025

The uncertainties are for a confidence probability of approximately 95%

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65

เอกสารไม่ควบคุม



## Calibration Report

Certificate No.: 2502226-001-01  
Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: XSR205DU  
Serial No.: C009071872  
Capacity: 82 g / 220 g  
Resolution: 0.00001 g / 0.0001 g  
ID No.: UAE.WAO.012/2563

Page 2 of 4

Date of Calibration: 20 March 2025  
Environment Condition: Ambient Temperature: 21.2 ± 0.6 °C Relative Humidity: 48 ± 3.5 %

Place of Calibration: 208 Balance Room, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NPL Method W-PA-001 In-House Method based on UKAS Lab 14 : 2019

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	8505567572	TCS	M24041005	19 April 2025

Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	608-H1	NPL BTH 017723	Quality Reborn	QR25-0542	10 February 2026

3. This certification is traceable to SI UNIT

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

Calibration Results:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
40	0.0000052
80	0.0000042
100	0.0000030
200	0.0000020

2. Off-Center Error:

A mass of 100 g was placed and moved to various position on pan.

The balance reading obtained is given in the table.



1	2	3	4	5	6	(Maximum Difference)
(g)	(g)	(g)	(g)	(g)	(g)	(g)
100.0001	100.0001	100.0001	100.0001	100.0001	100.0002	0.0001

F-CS-012 Revision: 01 Date: 20-04-65

เอกสารไม่ควบคุม



## Calibration Report

**Certificate No.:** 2502226-001-01  
**Equipment:** Electronic Balance  
**Manufacturer:** METTLER TOLEDO  
**Model:** XSR205DU  
**Resolution:** 0.0001 g / 0.0001 g  
**Serial No.:** C09071872  
**ID No.:** UAE.WAO.012/2563  
**Capacity:** 82 g / 220 g

**Date of Calibration:** 20 March 2025 **Page 3 of 4**

**Calibration Results:** (Continued)

**Calibration Range:** 0-90 g

**Calibration Adjustment:** Internal Calibration

**3. Departure from Nominal Value:** (Range: 0 - 82 g ; Resolution: 0.0001 g )

Nominal Value ( g )	Standard Value ( g )	Average Reading ( g )	Correction ( g )	Uncertainty ( ± g )	Coverage Factor k
Unloaded	0.000000	0.000000	0.000000	0.0000089	2.00
0.001	0.001003	0.001000	0.000000	0.0000092	2.00
0.005	0.005002	0.005000	0.000000	0.0000094	2.00
0.01	0.010003	0.010000	0.000000	0.0000091	2.00
0.05	0.049996	0.050000	0.000000	0.0000098	2.00
0.1	0.100011	0.100000	0.000001	0.000011	2.00
0.5	0.500016	0.500000	0.000002	0.000014	2.00
1	1.000003	1.000001	-0.000001	0.000016	2.00
3	3.000023	3.000005	-0.000007	0.000017	2.00
5	5.000015	5.000005	-0.000003	0.000021	2.00
10	10.000009	10.000005	-0.000004	0.000026	2.00
20	20.000030	20.000012	-0.000009	0.000037	2.00
30	30.000039	30.000012	-0.000008	0.000050	2.00
50	50.000028	50.000014	-0.000011	0.000068	2.00
80	80.000067	80.000020	-0.000013	0.00011	2.00

FCS-012 Revision: 01 Date: 20-04-65

2008 ซอยสุขุมวิท 35 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110  
2008 Soi 35, Asoi Anuram Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10710, Thailand  
Tel : +66(0) 2422 8568 Fax : +66(0) 2422 8545

## Calibration Certificate

**Certificate No.:** 2502226-002-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakhong, Bangkok 10260

**Page 1 of 4**

**Equipment:** Electronic Balance

**Manufacturer:** METTLER TOLEDO

**Model:** XSR205DU

**Serial No.:** C210685394

**ID No.:** UAE.WAO.010/2565

**Order No.:** 2502226

**Operation No.:** 2502226-002

**Date of Receipt:** 19 March 2025

**Date of Calibration:** 20 March 2025

**Calibrated by** Mr.Yothin Charoensuk  
Scientist

**Approved by** *Dr. N. Nigudat*  
( Mr.Pheraphat Tuanjit )  
Manager, Division of Calibration Laboratory  
Responsible for the Technical Management Team

**Date of Issue:** 25 March 2025

The uncertainties are for a confidence probability of approximately 95%

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

FCS-009 Revision: 01 Date: 20-04-65

2008 ซอยสุขุมวิท 35 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110  
2008 Soi 35, Asoi Anuram Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10710, Thailand  
Tel : +66(0) 2422 8568 Fax : +66(0) 2422 8545

## Calibration Report

**Certificate No.:** 2502226-001-01  
**Equipment:** Electronic Balance  
**Manufacturer:** METTLER TOLEDO  
**Model:** XSR205DU  
**Resolution:** 0.00001 g / 0.0001 g  
**Serial No.:** C09071872  
**ID No.:** UAE.WAO.012/2563  
**Capacity:** 82 g / 220 g

**Date of Calibration:** 20 March 2025 **Page 4 of 4**

**Calibration Results:** (Continued)

**Calibration Range:** >80-200 g

**Calibration Adjustment:** Internal Calibration

**3. Departure from Nominal Value:** (Range: >80 - 200 g ; Resolution: 0.0001 g )

Nominal Value ( g )	Standard Value ( g )	Average Reading ( g )	Correction ( g )	Uncertainty ( ± g )	Coverage Factor k
90	90.00010	90.0002	-0.0001	0.00015	2.00
100	100.00006	100.0001	0.0000	0.00016	2.00
110	110.00007	110.0001	0.0000	0.00017	2.00
120	120.00009	120.0002	-0.0001	0.00018	2.00
130	130.00010	130.0002	-0.0001	0.00019	2.00
140	140.00013	140.0002	-0.0001	0.00019	2.00
150	150.00009	150.0002	-0.0001	0.00021	2.00
160	160.00010	160.0002	-0.0001	0.00022	2.00
170	170.00012	170.0002	-0.0001	0.00023	2.00
200	200.00013	200.0002	-0.0001	0.00028	2.00

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

FCS-012 Revision: 01 Date: 20-04-65

2008 ซอยสุขุมวิท 35 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110  
2008 Soi 35, Asoi Anuram Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10710, Thailand  
Tel : +66(0) 2422 8568 Fax : +66(0) 2422 8545

## Calibration Report

**Certificate No.:** 2502226-002-01  
**Equipment:** Electronic Balance  
**Manufacturer:** METTLER TOLEDO  
**Model:** XSR205DU  
**Resolution:** 0.00001 g / 0.0001 g  
**Serial No.:** C210685394  
**ID No.:** UAE.WAO.010/2565  
**Capacity:** 82 g / 220 g

**Date of Calibration:** 20 March 2025 **Page 2 of 4**

**Environment Condition:** Ambient Temperature: 21.2 ± 0.6 °C Relative Humidity: 48 ± 3.5 %

**Place of Calibration:** 208 Balance Room, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

**Condition of Equipment:** Good Condition

**Condition of This Results of Calibration:**

1. Calibration Method: NFI Method W-PA-001 In-House Method based on UKAS Lab 14 : 2019

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	BS05567572	TCS	M24041005	19 April 2025
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	608-H1	NF18TH 017/23	Quality Reborn	QR25-0542	10 February 2026

3. This certification is traceable to SI UNIT

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

**Calibration Results:**

**1. Repeatability of Reading:**

Nominal Value ( g )	Standard Deviation of Reading ( g )
40	0.0000042
80	0.0000042
100	0.0000000
200	0.0000000

**2. Off-Center Error:**

A mass of 100 g was placed and moved to various position on pan.

The balance reading obtained is given in the table.

## Calibration Report

**Certificate No.:** 2502226-002-01  
**Equipment:** Electronic Balance  
**Model:** XSR2050U  
**Serial No.:** C210685394  
**Capacity:** 82 g / 220 g  
**Manufacturer:** METTLER TOLEDO  
**Resolution:** 0.0001 g / 0.0001 g  
**ID No.:** UAE.WAO.010/2565

**Date of Calibration:** 20 March 2025 **Page 3 of 4**

**Calibration Results:** (Continued)

**Calibration Range:** 0-80 g

**Calibration Adjustment:** Internal Calibration

**3. Departure from Nominal Value:** (Range: 0 - 82 g ; Resolution: 0.00001 g )

Nominal Value ( g )	Standard Value ( g )	Average Reading ( g )	Correction ( g )	Uncertainty ( ± g )	Coverage Factor k
Unloaded	0.000000	0.000000	0.000000	0.0000007	2.00
0.001	0.001003	0.001000	0.000000	0.0000090	2.00
0.005	0.005002	0.005001	-0.000001	0.0000092	2.00
0.01	0.010003	0.010002	-0.000001	0.0000089	2.00
0.05	0.049996	0.050001	-0.000001	0.0000096	2.00
0.1	0.100011	0.100002	-0.000001	0.000011	2.00
0.5	0.500016	0.500004	-0.000002	0.000014	2.00
1	1.000003	1.000005	-0.000005	0.000016	2.00
2	2.000027	2.000006	-0.000004	0.000017	2.00
5	5.000015	5.000006	-0.000005	0.000020	2.00
10	10.000009	10.000005	-0.000004	0.000026	2.00
20	20.000030	20.000007	-0.000004	0.000037	2.00
30	30.000039	30.000009	-0.000005	0.000050	2.00
50	50.000028	50.000008	-0.000005	0.000068	2.00
80	80.000067	80.000013	-0.000006	0.00011	2.00

F-CS-012 Revision: 01 Date: 20-04-65

เอกสารไม่ควบคุม



## Calibration Report

**Certificate No.:** 2502226-002-01  
**Equipment:** Electronic Balance  
**Model:** XSR2050U  
**Serial No.:** C210685394  
**Capacity:** 82 g / 220 g  
**Manufacturer:** METTLER TOLEDO  
**Resolution:** 0.0001 g / 0.0001 g  
**ID No.:** UAE.WAO.010/2565

**Date of Calibration:** 20 March 2025 **Page 4 of 4**

**Calibration Results:** (Continued)

**Calibration Range:** >80-200 g

**Calibration Adjustment:** Internal Calibration

**3. Departure from Nominal Value:** (Range: >80 - 200 g ; Resolution: 0.0001 g )

Nominal Value ( g )	Standard Value ( g )	Average Reading ( g )	Correction ( g )	Uncertainty ( ± g )	Coverage Factor k
90	90.00010	90.00002	-0.00001	0.00015	2.00
100	100.00006	100.00001	0.00000	0.00016	2.00
110	110.00007	110.00002	-0.00001	0.00017	2.00
120	120.00009	120.00002	-0.00001	0.00018	2.00
130	130.00010	130.00002	-0.00001	0.00019	2.00
140	140.00013	140.00002	-0.00001	0.00019	2.00
150	150.00009	150.00002	-0.00001	0.00021	2.00
160	160.00010	160.00002	-0.00001	0.00022	2.00
170	170.00012	170.00002	-0.00001	0.00023	2.00
200	200.00013	200.00002	-0.00001	0.00028	2.00

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

----- End -----

F-CS-012 Revision: 01 Date: 20-04-65

เอกสารไม่ควบคุม



### Certificate of Calibration

**Certificate No.:** 250422-1-BL002-25

**Code No.:** BL002-25

**Page:** 1 of 3

**Customer Name:** United Analyst and Engineering Consultant Co., Ltd.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Rd., Bang Chak, Phrakhanong, Bangkok 10260

**Equipment:** Electronic Balance

**Manufacturer:** Mettler Toledo

**Model:** AB204-S/FACT

**Serial No.:** 1129361010

**Asset No.:** UAE.WAS.002/2552

**Building:** N/A **Floor:** 1 **Room:** 107

**Received Date:** April 22, 2025

**Date of Calibration:** April 23, 2025

**Calibration Conditions:** Temperature 22.8 °C to 23.4 °C  
Humidity 54.8 % to 68.9 %  
Pressure 756.6 mmHg to 758.2 mmHg

**Calibrated by:** Sakkarin Sriahang

**Approved by:** Suwit Chotnok

**Signature:**

**Issued Date:** April 25, 2025

**Note:** 1) The Uncertainties are for a confidence probability of approximately 95%

2) This Certificate is valid only to the item calibrated on date and place of calibration.

3) 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 standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the United Analyst and Engineering Consultant Co., Ltd. (UAE)

เอกสารไม่ควบคุม

**Certificate No.:** 250422-1-BL002-25

**Code No.:** BL002-25

**Page:** 2 of 3

**Equipment:** Electronic Balance

**Model:** AB204-S/FACT

**Serial No.:** 1129361010

**Max. Capacity:** 220 g

**Calibration Date:** April 23, 2025

**Condition As-Received:** In Condition

**Manufacturer:** Mettler Toledo

**Readability:** 0.0001 g

**ID No.:** UAE.WAS.002/2552

**Condition of Equipment:**

**Condition of This Result of Calibration:**

1. Calibration Method: This instrument was calibrated by method UAE-CP-CAL-006 In-House Method based on UKAS Lab 14 : 2022

2. Reference Standards:

Reference Standard:	Model	Serial No.	Calibrated By	Certificate No.	Traceability	Due Date
Standard Weight Class E2 (IDML)	1 mg to 1 kg	8749109122	AMARC	25-009359	Mettler-Toledo	21-Jan-27
Standard Weight Class F1 (IDML)	1 mg to 200 g	11119512	AMARC	24-013840	Mettler-Toledo	04-Feb-26
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Traceability	Due Date
Thermo-Hygro-Baro Meter	NH9-38250	AK.66457	SUCCESS	SG-H-00997/67	Success Gateway	21-Nov-25
Thermo-Hygro-Baro Meter	NH9-38250	AK.66457	TPA	23PT95	TPA	25-Feb-26

3. This certification is traceable to SI Unit

4. This certification was certified only for the instrument we calibrated

5. This result of calibration was found accurate as shown on date and place of calibration only.

6. Through the reference standard laboratory of AMARC 25-009359 Calibration 0152

**Calibration Result:**

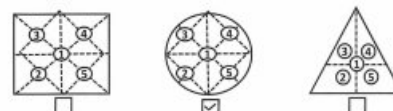
1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
200*	0.000045

2. Eccentric or off-center loading

A mass of 100 g was placed and moved to various position on pan

The Balance reading obtained is given in the table.



1 (g)	2 (g)	3 (g)	4 (g)	5 (g)	Maximum Difference (g)
100.0000	99.9996	99.9997	100.0003	100.0005	0.0005

เอกสารไม่ควบคุม



Certificate No.: 250422-1-BL002-25

Code No.: BL002-25

Page: 3 of 3

Equipment: Electronic Balance  
Model: AB204-S/FACT  
Serial No.: 1129361010  
Max. Capacity: 220 g  
Calibration Date: April 23, 2025

Manufacturer: Mettler Toledo  
Readability: 0.0001 g  
ID No.: UAE.WAS.002/2552

Calibration Result: (Continued)

Calibration Range: 0 - 200 g

Calibration Adjustment: Internal Calibration

3. Error of indication from nominal or conventional mass value:

Nominal Value (g)	Reference Value (g)	Indication (g)	Correction (g)	Uncertainty ( $\pm$ mg)	Coverage Factor k
Unload	0.0000000	0.0000	0.0000	0.10	2.05
0.01	0.0100025	0.0099	0.0001	0.10	2.05
0.05	0.0500056	0.0500	0.0000	0.10	2.05
0.1	0.1000012	0.0999	0.0001	0.10	2.05
0.5	0.5000133	0.5000	0.0000	0.10	2.05
1	1.0000105	1.0000	0.0000	0.10	2.05
10	10.000010	10.0000	0.0000	0.11	2.04
40	40.000076	40.0000	0.0000	0.14	2.00
50	50.000056	50.0000	0.0001	0.13	2.00
80	80.000107	80.0000	0.0001	0.18	2.00
100	100.000109	99.9999	0.0002	0.17	2.00
120	120.00015	119.9999	0.0003	0.21	2.00
150	150.000145	149.9998	0.0003	0.24	2.00
160	160.000175	159.9997	0.0005	0.26	2.00
200	200.000129	199.9998	0.0004	0.30	2.00

4. Effect of Tare test:

Tare Load (g)	Test Load (g)	Indication (g)	Correction (g)
100	20.000041	19.9999	0.0001
	40.000076	39.9998	0.0002
	60.000066	59.9997	0.0003
	80.000107	79.9999	0.0002
	100.000168	100.0004	-0.0003

Remark:

The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k, providing

o--o-End-o--o

เอกสารไม่ควบคุม



Cert.No.: 25CH163  
Page.: 2 of 3

#### Condition of this calibration result

##### 1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	24E2759	25 Aug 2025
2) Ref. Standard Thermometer	4982054	110RC044	24I757	14 July 2025

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

##### 2. Certified Reference Materials

:The measurement results are traceable to SI through Hach Lenge GmbH Ltd.,  
Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00  
: 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 4.007	CPA chem	1066665	18 Jan 2027
pH 6.999	Hach Lenge GmbH	C03220	29 Oct 2026
pH 10.010	CPA chem	1066669	18 Jan 2026

3. This certificate is valid only to the item calibrated on date and place of calibration.

#### Calibration Results

##### Function : mV Measurement

Performing standard curve by Document Process Calibrator at pH (4,7)(7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement ( $\pm$ mV)	Coverage factor k
	pH	mV	mV	pH		
pH Meter S/N.: JC03335	4.00	177.48	177	4.01	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	10.00	-177.48	-177	10.01	0.58	2.00



## Certificate of Calibration

Cert.No.: 25CH163  
Page.: 1 of 3

Equipment : pH Meter  
Manufacturer : EcoSense  
Model : pH100A  
Serial No. : JC03335  
ID No. : UAE.EFM.062/2562(ENV.pH.02/62)  
Condition As-Received: Used Item  
Received Date : 04 February 2025  
Calibration Date : 05 February 2025  
Reference : 2502-0105WSC-1  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong, Bangkok 10260

Ambient Temperature : (25  $\pm$  2.5) °C  
Relative Humidity : (50  $\pm$  15) %  
Calibration Procedure : In - house method :  
- CP-CH5 by direct measurement with DC voltage  
standard and direct measurement with  
certified reference material (CRM)  
- CP-CH8 by comparison with temperature standard

Calibrated by : Warakorn Lemgagtrakul

Approved by : \_\_\_\_\_  
Approved Signatory

( ) Chakrit Waewwanjua  
( ) Ponpan Paipim  
(✓) Saithip Meangmai

Issue Date : 06 February 2025

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.



Cert.No.: 25CH163  
Page.: 3 of 3

#### Calibration Results

##### Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7)(7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement ( $\pm$ )	Coverage factor k
pH Electrode S/N.: 231018SIA605377	4.007	4.01	173	0.0079	2.00
	6.999	7.00	-2	0.0092	2.00
	6.999	7.00	-2	0.0085	2.00
	10.010	10.01	-177	0.0092	2.00

##### Function : Temperature Measurement

(\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : -  
- Serial No. : 231018SIA605377  
Dimension of probe  
- Length : 110 mm.  
- Diameter : 12 mm.  
- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement ( $\pm$ °C)	Coverage factor k
15.0	15.003	15.1	0.097	0.13	2.00
30.0	30.002	30.1	0.098	0.13	2.00
45.0	45.002	45.1	0.098	0.13	2.00

Remark : - UUC\* = Unit Under Calibration


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

-o-o-



## Certificate of Testing

Cert.No.: 25TW29  
Page.: 1 of 2

Equipment : DO Meter  
Manufacturer : YSI  
Model : 5100  
Serial No. : 11B 101863  
ID No. : UAE.WAO.004/2554  
Received Date : 14 February 2025  
Test Date : 17 February 2025  
Reference : 2502-0473DSC-1  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak,  
Phrakhanong, Bangkok 10260  
Laboratory Condition : Temperature (  $25 \pm 5$  ) °C  
Humidity (  $50 \pm 20$  ) %  
Test Procedure : In - house method : CP-CH9  
by Comparison Technique with Azide Modification Method  
Tested by : Walalak Sirithean  
Approved by :   
Approved Signatory  
( ) Chakrit Waewwanjua  
( ) Ponpan Paipim  
(✓) Saithip Meangmai  
Issue Date : 18 February 2025

เอกสารไม่ควบคุม



### Condition of this result of calibration

1. Reference Standard Instruments :  
This certification is traceable to the International System of Unit through the reference standards  
laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1. Burette	-	130BU10	23CG1172	22 Mar 2025
2. Balance	14233821	110RC001	24MM131	04 July 2025

### 2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate 5-Hydrate AR	KEMAUS	2203162447	99.6%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %  
Dissolved Oxygen Probe No.: 24F100202

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.22	8.22	0.0055

This report was certified only for the instrument we tested. It is allowable to use for study  
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

-00-

เอกสารไม่ควบคุม

บันทึกผลการสอบเทียบ (Verification of Certificate)									
Certificate No.: 25TW29				Equipment : DO Meter		Model : 5100			
Brand : YSI				ID No.: UAE.WAO.004/2554					
Serial No.: 11B 101863									
Calibration results									
Titration Method	Standard Deviation (mg/L)	Do meter Reading (mg/L)	Error%	Correction% (mg/L)	Error		Judgment	(Total Error < Judgement) (mg/L)	
					Total Error (mg/L)	± mg/L			
	8.22	0.0055	8.22	0.0000	0.0000	0.02		pass	
โดย: เกรียงเกียรติ.....				จำนวน: 8/25/24					
วันที่: 20/2/2024				วันที่: 25.0.24					
เซ็นเซอร์:									



## Important Customer Web Links

- For more information about Agilent Technologies services, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- 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.
- A useful Agilent Resource Center web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>
- Need technical support, FAQs, supplies? – visit our Support Home page at <http://www.agilent.com/search/support>
- Get answers. Share insights. Build connections: Join the Agilent Community at <https://community.agilent.com/welcome>

## Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Confirm the ability of the instrument to deliver continued safe operation as established via the Agilent AA safe operation flow chart. (Refer directly to the AA 55/240/280 Preventive Maintenance Scope of Work to make this decision.)
- 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 "Section not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance 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.
- Complete the total number of pages field in the Service Completion section.
- Ask the customer to sign the Service Completion section including the customer's and your signature.

This information is subject to change without notice.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



## Instrument Maintenance

### System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	240 FS AAS
Instrument System Site and Location	United Analyst and Engineering Consultant

List System Component Product Numbers	List the Serial Numbers of each Component
1. G 8432 A	M1 13160001
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

### Preparation, Safe operation and Initial performance checks

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



- ☐ Agilent AA safe operation flow chart inspections (to determine if the PM can be performed).

**NOTE: If by following the flow chart the instrument is deemed to be unsafe for continued use you MUST NOT continue PM work. Inform the customer immediately of the Agilent recommendation that use of the instrument be discontinued.**

- ☒ Discuss any specific issues with the customer before starting.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it. **NA**
- ☒ 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, settings as defined by current Service Notes
- ☒ Check for required firmware updates and verify with customers if they would like them installed.
- ☒ Use SVD to perform a Full Wavelength Scan for Cu HCL - "As found test\_1"
- ☒ Perform a Basic Cu ABS test - "As found test\_2"
- ☒ Print the Details page or screen captures of the test results and attach to the end of this checklist.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



## Preventive Maintenance Procedures

### FLAME SYSTEM section

- ☐ Section not applicable

#### Electronic components

- ☒ Review and confirm instrument configuration data in SVD
- ☒ Confirm power supply voltages using the SVD Power Supply diagnostic.
- ☒ For Dual Beam Instruments - Confirm RBC frequency using the SVD RBC frequency diagnostic.

#### Mechanical components

- ☒ Check the burner adjuster controls for complete and free movement. If the burner adjuster needs lubrication, use Molykote 321 or mineral-based molybdenum disulphide grease.
- ☒ Run SVD tests to exercise all motor drives over the full range of their travel:
  - ☒ Monochromator drive
  - ☒ Slit drive
  - ☒ Lamp selector
  - ☐ ABA

#### Optics components

- ☒ Check that external optical surfaces are clean – Clean or replace as required.
- ☒ Use SVD and perform Mono Wavelength Correction.
- ☒ Use SVD and perform Slit Calibration.
- ☒ Use SVD and perform Grating Squareness Diagnostic.
- ☒ Use SVD and perform Zero Order Offset/Mono Correction.
- ☒ Use SVD and perform Wavelength Repeatability.
- ☒ Physically inspect selected HC lamps (customer to supply per their choice) and measure the % Gain for each lamp. Advise customer if lamps are showing emission degradation due to age.
- ☒ Check that the signal energy of the D2 and HC lamps track properly. Advise customer if their D2 lamp is showing emission degradation due to age.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



### Sample Introduction and Atomization

- ☒ Inspect the burner interlock plate to ensure that the interlock pin is secure and correct for the burner type.
- ☒ Clean the burner slot with a clean white card.
- ☒ Check the uniformity of the slot width.
- ☒ Clean the burner if required.
- ☒ Change the burner o-ring.
- ☒ Clean the nebulizer, spray chamber and liquid trap.
- ☒ Change all o-rings and seals in the nebulizer, nebulizer block and spray chamber.
- ☒ Check that the pressure relief bung releases readily.
- ☒ Change o-rings on the fuel and oxidant delivery bars.
- ☒ Leave the liquid trap EMPTY and verify the flame will not ignite in this state.
- ☒ Refill liquid trap and check that overflow drains freely into the drain/waste tube.
- ☒ Check the drain/waste tube for good drainage. It should not have tight bends, kinks or loops and the lower end must be above the liquid level in the waste vessel.
- ☒ Check and clean the igniter electrode.

### Gas handling components and safety interlocks

- ☒ Pressure test for leaks.
- ☒ Leak test gasbox internal components and connections.
- ☒ Check safety interlock status and operation using the *SVD interlock monitoring diagnostic*.

### Analytical performance for Flame systems

- ☒ Ignite a flame.
- ☒ Check that you can adjust the nebulizer uptake rate from 4 to 6.5 mL per minute.
- ☒ Optimize the instrument ready to perform Cu sensitivity test.
- ☒ Create a manual method to perform a Basic Cu ABS test - "Final Performance Testing"
- ☒ Run a PM completed sensitivity test for a 5 ppm copper sample and record the results in the AA PM Performance test results and measurements table.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



เอกสารไม่ควบคุม

### FURNACE SYSTEM section

☒ Section not applicable

#### Electronic components

- ☐ Review and confirm instrument configuration data in SVD
- ☐ Confirm power supply voltages using the *SVD Power Supply diagnostic*.

#### Mechanical components

- ☐ Run SVD tests to exercise all motor drives over the full range of their travel:
  - ☐ Monochromator drive
  - ☐ Silt drive
  - ☐ Lamp selector

#### Optics components

- ☐ Check that external optical surfaces are clean – Clean or replace as required.
- ☐ Use SVD and perform *Mono Wavelength Correction*.
- ☐ Use SVD and perform *Silt Calibration*.
- ☐ Use SVD and perform *Grating Squareness Diagnostic*.
- ☐ Use SVD and perform *Zero Order Offset/Mono Correction*.
- ☐ Use SVD and perform *Wavelength Repeatability*.
- ☐ Physically inspect selected HC lamps (customer to supply per their choice) and measure the % Gain for each lamp. Advise customer if lamps are showing emission degradation due to age.

### Gas handling, water system and workhead component checks

- ☐ Inspect the GTA workhead gas hoses and connections for leaks.
- ☐ Pressure test for gas leaks.
- ☐ If the cooler system is accessible (stand-alone) check for correct operation and coolant/water level – this includes any temperature and pressure settings plus filter cleaning (air flow and water).
- ☐ Inspect the GTA workhead water hoses and connections for leaks.
- ☐ Check all graphite components and replace if necessary.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



เอกสารไม่ควบคุม

- ☐ Tube
- ☐ Electrodes
- ☐ Shroud

- ☐ Check and clean the end windows on the workhead.
- ☐ Check safety interlock operation.

### Analytical performance for Furnace systems

- ☐ Optimize the instrument ready to perform Cu sensitivity test.
- ☐ Run the sensitivity test for a 25 ppb copper sample and record the results in the results table.

### PSD autosampler accessory for Furnace systems

☒ Section NOT Applicable

- ☐ Check condition of the PSD capillary – replace if necessary
- ☐ Check condition and operation of PSD syringe – ensure it does not have air locks and bubbles.
- ☐ Change PSD rinse bottle o-ring.
- ☐ Check and clean the rinse vessel.
- ☐ Check the drain tube for good drainage. It should not have tight bends, kinks or loops and the lower end must be above the liquid level in the waste vessel.
- ☐ Ensure that the waste vessel is suitable for use with the furnace system.

### Sample introduction pump system (SIPS) accessory

☒ Section NOT Applicable

- ☐ Re-torque screws securing the hubs, presser arms and pump rotors.
- ☐ Adjust each roller so that it rotates freely.
- ☐ Wipe clean the pump rotor rollers and pump bands with a dry clean cloth.
- ☐ Ensure that the presser arms and the surfaces near the pump are free from dirt and spills.
- ☐ Remove the pump module rear cover and check for the incursion of liquids and any signs of corrosion.
- ☐ Re-torque the nuts that fasten the motor mounting plates to the chassis.
- ☐ Check clips securing the diluents holder and replace if necessary.
- ☐ Disconnect, clean T-piece, and reassemble the tubing using the following steps.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



เอกสารไม่ควบคุม

- ☐ Remove the T-piece by disconnecting the pump tubes, the pump bands and all other tubing.
- ☐ Place the T-piece in an ultrasonic bath containing strong detergent 1-5% Decon 30 or similar, for approximately 5-10 minutes.
- ☐ Wash the T-piece under a tap with a strong flow of water.
- ☐ Rinse with distilled water through all of the inlets in the reverse direction to normal sample flow.
- ☐ Reassemble.

### Sample preparation system (SPS 4) accessory

☒ Section NOT Applicable

The Agilent SPS 4 autosampler is designed to need minimal maintenance.

The following maintenance requirements are suggested to maintain the performance of the autosampler.

- ☐ Cleaning the spill tray, rack location mat, end frames and chassis accessories with a damp soft cloth and diluted mild detergent.
- ☐ Cleaning the autosampler cover panels with domestic window cleaner.
- ☐ Checking 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 edge or damaged connectors.

**NOTE: The autosampler requires no extra lubrication throughout its lifetime.**

For further details refer to the SPS 4 service manual G8410-90050.

### Sample preparation system (SPS 3) accessory

☒ Section NOT Applicable

- ☐ Check the x-axis and z-axis timing belts – Replace if there is any cracks, splits or color deterioration and belt tension.
- ☐ Check belt tensions - adjust if required
- ☐ Check the lubrication pad for single x-axis shaft. If pad is dry or customer has observed any vibration or erratic movements of the x-axis carriage, add 1 mL of Dow Corning 200 ® Fluid, 200 CS into the well.
- ☐ Check the auto-sampler ability to find tube positions - Calibrate if required.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



เอกสารไม่ควบคุม

### Vapor generation accessory VGA (hydride generator)

☐ Section NOT Applicable

- ☐ Inspect VGA gas supply hose.
- ☐ Inspect/replace VGA pump tubing.
- ☐ Check low gas pressure interlock setting – adjust if required.
- ☐ Check precision orifice gas flow setting – adjust if required.
- ☐ Check gas regulator pressure to 46 psi (325 kPa) – adjust if required.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

### UltraAA lamp accessory (external)

☒ Section NOT Applicable

- ☐ Check the condition of the power cable.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

### Restore System

- ☐ If you have altered the customer's instrumentation during the course of PM, restore to the original status to allow the customer to conduct their normal activities (e.g., reload the customer's method.)

### 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.

Revision: 10.00, Issued November 2021

© Agilent Technologies, Inc. 2021



### Signature Page

#### Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ 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 or if necessary, in the customer's IQ records.

#### Test Results

Test Description	Expected Test Result	Actual Test Result
<b>Flame optics PMT Gain test</b>		
For copper at 324.8 nm, 4 mA, 0.5 nm slit width	< 55 %	49 %
<b>Flame performance test with 5 ppm copper sample</b>		
Air /acetylene, mixing paddle removed	Abs value > 0.5	0.5599
Air /acetylene, mixing paddle installed, 10 replicates	%RSD < 1.0	0.2 %
<b>Deuterium furnace optics PMT Gain test</b>		
For copper at 324.8 nm, 4 mA, 0.5 nm slit width	< 55 %	—
<b>Deuterium furnace performance test with 25 ppb copper sample (324.8 nm)</b>		
Precision %RSD	≤ 4.0%	—
Abs value	≥ 0.15	—
<b>Zeeman furnace analytical performance: 25 ppb copper sample (327.4 nm)</b>		
Precision %RSD	≤ 4.0%	—
Abs value	≥ 0.10	—
MSRP%	≥ 70 %	—

Revision: 10.00, Issued November 2021

© Agilent Technologies, Inc. 2021



### AA consumable and parts list table

Part Description	Part Number	Product/Model # where used	PM supplied or Consumable	Instrument Type
Test Solution – Cu 5ppm solution	6610030100	50 55 140 240 280	PM supplied	Common
Test Solution – Blank solution	5190-7001	50 55 140 240 280	PM supplied	Common
Copper, 1000 ug/ml, 100ml	5190-8279	50 55 140 240 280	*	Common
Kit, Mk 7 O-rings, aqueous, complete set	9910093400	50 55 140 240 280	PM supplied	Flame
Organic Kit	9910093500	50 55 140 240 280	PM supplied	Flame
Wire Nebulizer Cleaning	9910024700	50 55 140 240 280	consumable	Flame
Tubing-Capillary Std Nebs	9910024800	50 55 140 240 280	consumable	Flame
Capillary Tube Hvac Neb (3) (organics only)	9910044000	50 55 140 240 280	consumable	Flame
Glass impact beads (5/pkg)	9910025700	50 55 140 240 280	consumable	Flame
Teflon impact beads (5/pkg) (organics only)	9910053300	50 55 140 240 280	consumable	Flame
Burner cleaning strip (100/pkg)	9910053900	50 55 140 240 280	consumable	Flame
Window UV silica – round (right side)	2010082600	50 55 140 240 280	PM supplied	Common
Window UV silica – rectangular (left side)	2010082500	50 55 140 240 280	PM supplied	Common
Pad adhesive window (round)	4910012700	50 55 140 240 280	PM supplied	Common
Pad adhesive window (rectangular)	4910012800	50 55 140 240 280	PM supplied	Common
Electrode kit (1 pr) (D2)	6310003400	GTA120	PM supplied	Furnace
Shroud (D2)	6310003100	GTA120	PM supplied	Furnace
Zeeman electrode kit (1 pr)	6310003500	GTA120	PM supplied	Furnace
Zeeman shroud	6310003600	GTA120	PM supplied	Furnace
O-ring PSD rinse bottle	6910025900	PSD120	PM supplied	Furnace

\* For engineers who only service AA instruments 5190-8279 can be used as a cheaper alternative for 6610030100.

Items classified as PM supplied in the above table are included in the standard PM

Those classified as consumable should be provided by the customer or charged to the customer if supplied by the Agilent service engineer.

Revision: 10.00, Issued November 2021

© Agilent Technologies, Inc. 2021



### Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

#### Service Completion

Service request number 6007349143 Date service completed 30 Jan 2025  
 Agilent signature Kanyakorn S. Customer signature Samran Y.  
 Total number of pages in this document 13

Revision: 10.00, Issued November 2021

© Agilent Technologies, Inc. 2021





# SVD Results Report



Report ID: 1	Diagnostic Start Time: 1/30/2025 9:47:25 AM	Diagnostic End Time: 1/30/2025 9:47:25 AM
Customer: UAE	Service Engineer: Kanyakorn S.	
Address: Soi Udomsuk 41, Sukhumvit Rd. Bangkok	Contact Details: 02637636381	

## Configuration:

Serial Number: MY13160001	Turret Type: Automatic
Instrument Model: Varian AA140/240/280	Number Of Lamps: 4
Flame Instrument: True	Mono Type: Automatic
Furnace Instrument: True	Gasbox Type: Y Gas Box
Zeeman Present: False	Auto Burner Adjuster: False
Internal Zeeman: False	Mains Frequency: 50
Internal UltraAA: False	Firmware Version: 2.11
Optics Type: Double Beam	Photomultiplier Type: Normal(900nm)
D2 BG Correction Filtered: True	PWB Version: 45
Boot Block Version: 1.09	

## EEPROM Data:

Instrument Run Hours: 89819.180	D2 Run Hours: 53396.500
Zero Wavelength Offset: 36.133	D2 Serial Number: not set 1
Mono Correction: 0.770	D2 Install Date: 1/1/1970
Flame Hours: 32411.834	D2 Original Intensity: 1.000
	D2 Last Intensity: 475.000

## Frequency:

Averaging Period: 30.0	
Datapoint Count: 20	
Upper Limit: 51.00	Highest Measured Frequency: 50.00
Average Frequency: 50.00	
Lower Limit: 49.00	Lowest Measured Frequency: 50.00
Result: <b>Passed</b>	

## Power Supply:

Averaging Period: 30.0				
Datapoint Count: 20				
	Lower Limit (V)	Actual (V)	Upper Limit (V)	Result:
12.00 V Rail	10.80	12.12	13.20	<div>Passed</div>
-12.00 V Rail	-13.20	-11.90	-10.80	<div>Passed</div>
5.00 V Rail	4.50	5.04	5.50	<div>Passed</div>
310.00 V Rail	279.00	320.00	341.00	<div>Passed</div>

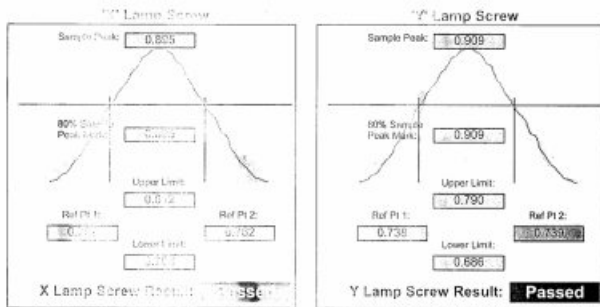
เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



## Beam Balance:

Lamp Type: Copper	Peak Selected: 324.80
Lamp Socket Used: 3	Lamp Alignment: <b>Performed</b>



## Wavelength Repeatability:

Lamp Used: Copper	Lamp Current(mA): 4
Peak Used(nm): 324.759	Slit Width(nm): 0.2
Connected to Socket: 3	Slit Height: Normal
Lamp Alignment: <b>Performed</b>	
Lower Limit(nm): 324.778	324.888 Upper Limit(nm)
(Measured from Zero Offset) (Measured from end)	
Sample 1: 324.821	Sample 2: 324.823
Sample 3: 324.873	Sample 4: 324.823
Sample 5: 324.823	Sample 6: 324.819
Sample 7: 324.819	Sample 8: 324.819
Sample 9: 324.821	Sample 10: 324.819
Mean: 324.823	Standard Deviation: 0.003
Result: <b>Passed</b>	


## Grating Setup:

Lamp Element(s): Copper
Lamp Turret Position: 3
Lamp Current(mA): 4.00
Slit Width(nm): 0.5
1st Order Wavelength(nm): 324.80
Lamp Alignment: <b>Performed</b>

	Lower Limit (nm)	Actual (nm)	Upper Limit (nm)	Result:
Zero Order	-0.10	0.00	0.10	<b>Passed</b>
First Order	324.68	324.75	325.15	<b>Passed</b>
Second Order	649.29	649.51	649.97	<b>Passed</b>

เอกสารไม่ควบคุม



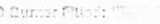








เอกสารไม่ควบคุม

Method:   
Wavelength Drive:  
Slit Drive:  
Turret Drive:  
Auto Burner / Injector Delay:  
Method:   
Signal Processing: Linear

Method: Auto Test Flow Only Mode


	Lower Limit	Actual	Upper Limit	Result
S2	114	0	297	Passed
S5	116	0	191	Passed
S1	271	0	332	Passed
C2	474	7	579	Passed
S4	939	11	1008	Passed
S1	1435	18	1754	Passed
C2	2108	110	3053	Passed
S1	4947	101	5313	Passed

Interface:

Burner Flame: 	Flame Detect: 
H2O Burner Flame: 	ECU Active: 
Flame Shield Closed: 	Oxidant Pressure: 
Gas Control Flame: 	Oxidant Changeover: 
Pressure Release During Flame: 	Ignition: 
Liquid Trap Closure: 	

Auto Lamp Recognition:

Lamp 1: Un-coded Lamp Not Connected	Lamp 5: Not Supported
Lamp 2: 87 - Silver Cadmium Lamp (Cd) (Ag/Lamp 5: Not Supported	
Lamp 3: 14 - Copper (Cu)	Lamp 7: Not Supported
Lamp 4: Un-coded Lamp Not Connected	Lamp 9: Not Supported

Result: 

GTA Temperature Readings:

Notes:

Signatures:

	30 Jan 2025
Kanyakorn S.	Date

เอกสารไม่ควบคุม

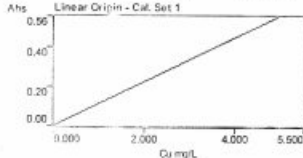
เอกสารไม่ควบคุม

Sequential by time report 1/30/2025 10:53 AM Page 1 of 1 SpectrAA

Analyst: 1/30/2025 10:33 AM GMT: 1/30/2025 3:33 AM  
Date Started: 1/30/2025 10:33 AM GMT: 1/30/2025 3:33 AM  
Worksheet: Sensitivity Test 01  
Comment: Precision Test  
Methods: Cu  
Computer name: DESKTOP-19UFRS  
Serial Number: MY13160001  
Method: Cu (Flame)

Sample ID	Conc. mg/L	%RSD	Mean Abs
CAL ZERO	0.000	38.8	0.0002
Readings			
0.0002	0.0003	0.0001	1/30/2025 10:51:46 AM
STANDARD 1	5.000	0.1	0.5571
Readings			
0.5574	0.5563	0.5575	1/30/2025 10:52:22 AM

Abs Linear Origin - Cal. Set 1



Curve Fit = Linear Origin  
Characteristic Conc = 0.020 mg/L  
r = 1.0000  
Calculated Conc = 0.002 5.000  
Residuals = -0.002 0.000

Abs = 0.11141 x C

5 ppm Cu	5.000	0.3	0.5558
Readings			
0.5552	0.5596	0.5615	1/30/2025 10:52:54 AM

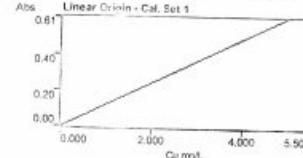
เอกสารไม่ควบคุม

Sequential by time report 1/30/2025 10:48 AM Page 1 of 1 SpectrAA

Analyst: 1/30/2025 10:33 AM GMT: 1/30/2025 3:33 AM  
Date Started: 1/30/2025 10:33 AM GMT: 1/30/2025 3:33 AM  
Worksheet: Precision Test  
Comment: Precision Test  
Methods: Cu  
Computer name: DESKTOP-19UFRS  
Serial Number: MY13160001  
Method: Cu (Flame)

Sample ID	Conc. mg/L	%RSD	Mean Abs
CAL ZERO	0.000	64.1	-0.0002
Readings			
-0.0003	-0.0003	-0.0001	1/30/2025 10:48:52 AM
STANDARD 1	5.000	0.3	0.6052
Readings			
0.6030	0.6073	0.6047	1/30/2025 10:47:24 AM

Abs Linear Origin - Cal. Set 1

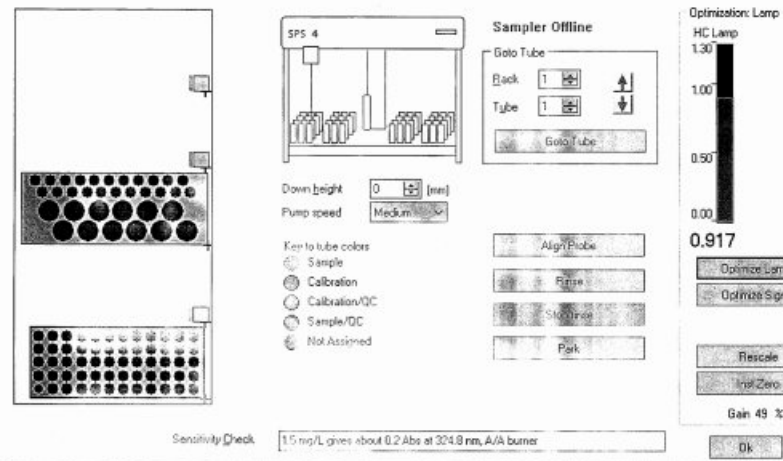


Curve Fit = Linear Origin  
Characteristic Conc = 0.020 mg/L  
r = 1.0000  
Calculated Conc = -0.002 5.000  
Residuals = 0.002 0.000

Abs = 0.12105 x C

5 ppm Cu	5.007	0.2	0.6051	
Readings				
0.6005	0.6052	0.6047	0.6042	
0.6025	0.6076	0.6054	0.6079	1/30/2025 10:48:32 AM

เอกสารไม่ควบคุม



## PinAAcle 900F Preventive Maintenance Report

Company Name: UAE Consultant Co., LTD.

Instrument Location: 41 Sukumvit Rd.,

Phra Khanong, Bangkok 10260

Instrument Serial No.: PFB520031902

Date: 29-Apr-2025

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

### PinAAcle 900F Preventive Maintenance (PM)

Company Name:	United Analyst and Engineering Consultant Co., LTD.		
Address (Instrument Location):	41 Sukumvit Rd., Phra Khanong, Bangkok 10260		
Serial Number:	PFB520031902	PM Number:	1 of 2
Customer Name (if applicable):	K. Yinda	Telephone Number:	095-5580049
Customer Support Engineer Name:	K. Chayanon	Service Order Number:	WO-03126047
Date PM Performed: (DD-MM-YYYY)	29-Apr-2025	Next PM Due Date: (DD-MM-YYYY)	29-Oct-2025
Standard Labor Hours to Complete PM :		5 hours	

Part Number	Release	Publication Date	
09370145 Rev.9	A	January 2018	

#### Scope

The purpose of this PM is to ensure the continued functionality of the PinAAcle 900F by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer.

The customer should save their method before the PM begins.

#### General Instructions:

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM.

Always check with the customer before making any changes that may affect the customer's analysis or calibration, including a current back-up of system software and/or data files.

The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer.

Update the PM sticker and instrument logbook as required.

#### Copyright Information

This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this publication may be reproduced in any form whatsoever or translated into any language without the prior, written permission of PerkinElmer, Inc. Copyright © 2013 PerkinElmer, Inc.

#### Trademarks

Registered names, trademarks, etc. used in this document, even when not specifically marked as such, are protected by law. PerkinElmer is a registered trademark of PerkinElmer, Inc. All other trademarks and registered trademarks not owned by PerkinElmer, Inc. or its subsidiaries that are depicted herein are the property of their respective owners. Except as specifically set forth in its terms and conditions of sale, PerkinElmer makes no Warranty of any kind with regard to this document, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. PerkinElmer shall not be liable for incidental or consequential damages in connection with the furnishing or use of this document.

### Component List

Component / Specific Model	Serial #	Configuration Notes
PinAAcle900F	PFB520031902	Syngistix V4.0.1.1935
FIAS100	100524040501	

### Parts Lists

Parts Included with the PM		
Part Number (if applicable)	Description	Quantity
B0501696	Fan Filters	2
N3160156	O-Ring Kits for Sampling Introduction (Stainless Steels Nebulizer)	N/A
N3160157	O-Ring Kits for Sampling Introduction (Plastic Nebulizer)	1
N9301714	Replacement Acetylene Filter Cartridge	1
TH001022	Replacement Air Filter Cartridge	1

#### Additional Reagents and Standards Required for PM

Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expired Date (MM/YY)
N9300183	1000 mg/L Copper Standard	AR	27-39CUY1	Nov 2025

#### Additional Reagents and Standards Required for PM (Customer Support Solution)

Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A	DI Water	250 mL	AR	AR
N/A	0.5% HNO <sub>3</sub>	250 mL	AR	AR

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



Additional Tools Required for PM			
Part Number (if applicable)	Description	Quantity	Serial #
N1013000	0.2A Neutral density filter	1	101N0089015
N1013002	1.0A Neutral density filter	1	101N0089015
03030997	System 2 EDL Driver	1	03030997
N3050605	As System 2 EDL	1	16148
N3050121	Cu Lumina HCL	1	060419-030180
N3050109	Ba Lumina HCL	1	061219-020041
N3050139	K Lumina HCL	1	030819-010130
N3050152	Ni Lumina HCL	1	052719-020020

## Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

### 1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.
- ☒ Inspect the customer log book and make any appropriate PM entries.
- ☒ Perform general inspection of system for cleanliness.

### 2. PC Instrument Software:

- ☒ Instrument Software user files/databases archived, packed, and/or deleted as needed.

### 3. Mechanical:

- ☒ Inspect and clean all fans and filters. Replace filters if necessary
- ☒ Inspect all gas lines for leaks and/or wear. Replace if needed.
- ☒ Clean exterior of the instrument.
- ☒ Inspect the burner head, burner chamber, and nebulizer. Clean if needed as stated in the Hardware Guide.
- ☒ Check burner head dimensions with the feeler gauge as stated in the Hardware Guide in the Maintenance chapter section on cleaning the burner head and checking sloth width. Replace if out of specification
- ☒ Check the condition of the end cap, burner head, and nebulizer O-rings. Replace if necessary.
- ☒ Check the drain system for signs of wear. Replace worn or damaged parts.
- ☒ Visually check for proper flame conditions when igniting the Air-C2H2 and N2O-C2H2 flames (if applicable).

### 4. Electrical:

- ☒ Inspect PC boards. Clean if necessary.
- ☒ Carefully check all internal and external cable connections.
- ☒ Check instrument firmware revisions upgrade to current levels (if necessary)
- ☒ Run Diagnostics Test within the Advanced function of the Spectrometer page. Check the results in the service log folder in the Spectrometer BM Log Viewer.

### 5. Optics:

- ☒ Inspect and clean the sample compartment windows, if needed.
- ☒ Inspect optics. Clean or replace if necessary.

### 6. Gasses:

- ☒ Verify that the Gasses supplied to the instrument are within the pressure and purity specifications found in the PinAAcle 900 Series Pre-installation Checklist SDB.
- ☒ Verify that the acetylene filter and air filter element is dry. Replace if necessary.

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

### 7. Flame Interlock Check:

Description: Check to ensure that all safety interlocks are closed.

Parameter	Specification	Test Results	Pass/Fail
Flame Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
Drain Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
Nebulizer Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
C <sub>2</sub> H <sub>2</sub> Pressure Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
Air Pressure Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
Burner Head Sensor	Choosing Nitrous Oxide as the oxidant should trigger an interlock shuts down	Active	Passed

### 8. After PM Performance tests:

#### 8.1 Detector Linearity with Barium

Description: Ensures that the detector is linear in the Visible Range.

Parameter	Specification	Certificate Value at 553.6 nm (Abs.)	Test Results	Pass/Fail
1.0 A ND Filter	± 5% from Cert.	0.9668	0.9878	Passed
0.2 A ND Filter	± 5% from Cert.	0.1953	0.1876	Passed

#### 8.2 Baseline Noise at 1.0 Absorbance with Barium

Description: Ensures that a high absorbance will not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0005	Passed

#### 8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.001	0.0001	Passed

#### 8.4 D<sub>2</sub> Background Compensation with Copper

Description: Verifies the instruments ability to compensate for Background absorption.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.009	Passed

#### 8.5 AA-BG Baseline Noise with Copper

Description: Ensures that background correction does not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0001	Passed

#### 8.6 AA-BG Baseline Noise with Arsenic

Description: Ensures that background correction does not produce excessive noise at a low wavelength.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0004	Passed

#### 8.7 Flame Sensitivity

Description: Instrument Sensitivity checked against Copper standard.

Standard Copper Sensitivity	Specification	Results (Abs.)	Pass/Fail
5 mg/L Sensitivity SS Neb (if applicable)	> 0.250 Abs.	N/A	Not Applicable
2 mg/L Sensitivity HS Neb (if applicable)	> 0.250 Abs.	N/A	Passed

### 10. Review:

- ☒ Review with the customer PM work performed.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer supplied materials to have on hand.
- ☒ Attach PM sticker.

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

## Additional Comments

Additional Comments Regarding the PM



PerkinElmer Scientific (Thailand) Co., Ltd.  
250 Soi Sornvijai 4  
Khwaeng Bangkapi, Khet Huay Kwang  
Bangkok 10310  
Thailand  
Tel: 66 2719 6420 ; Fax: +66 2 319 7900  
http://www.perkinelmer.com

## Service Report

Work Order Number	Activity Code	Billing Type	Requested Start Date	Model	Serial Number
WO-0319047	Planned Maintenance	Contract	1001/2568 11/08 N.	AAH2500551	PF0530031602
Service Representative Name		Contract Number	Expiry Date	Equipment ID	System ID
Kanan, Chayanon		SG-003644109	3/1/2025	N/A	N/A
UDA Number					
N/A					
Equipment Location			Bill To Name		
บริษัท ภูเก็ต เทคโนโลยี จำกัด อาคารพาณิชย์ 10260 TH			บริษัท ภูเก็ต เทคโนโลยี จำกัด อาคารพาณิชย์ 10260 TH		
Customer Contact	Phone Number	Fax Number	Email	Purchase Order	
K. Chayanon (Kanan Chayanon)	095-5580049	N/A	richkorn.prasert1984@gmail.com	IPO-25010002	

## Work Description

- PM 20 (AAH2500)  
- Cleaning Cell, Chamber, Filter  
- Wavelength Calibrate : Pass  
- Wavelength Scan As.Cu.Ba.K.Ni : Pass  
- Align cell with Hg : OK

Start Date	End Date	Work Description
28/04/2025	09/05/2025	

## Tools Used

Quantity	Calibrated Tool	Description	Serial Number	Last Calibration Date	Next Calibration Date
*** No Calibrated Tools Used ***					

## Material Used

Part Number	Part Description	Note	Lot/Serial Number	Quantity
*** No Parts Used ***				

## Labour Details

Part Number	Part Description	Start Date	Quantity
SV00013	Preventive maintenance	28/04/2025	4

Work Complete	Customer Signature	Technician Signature
Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
PM/IG/PIV Left with Customer		
Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	สัญญาใจ	Chayanon K.
	0952988 K. สัญญาใจ (Kanan Chayanon)	0952988 Kanan Chayanon

## Terms & Conditions

## Review

The preventive maintenance checks and if applicable performance tests for PinAAcle 900F have been completed.

This PinAAcle 900F Passes ☒ Fails ☐ the preventive maintenance.

## Review of Preventive Maintenance:

Authorized PerkinElmer Representative:	Date:
Chayanon K.	29 Apr 2025 (DD-MMM-YYYY)
Authorized Customer Representative:	Date:
สัญญาใจ	29 Apr 2025 (DD-MMM-YYYY)

PinAAcle 900F Preventive Maintenance Report (PM)

Page 7 of 7

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

Customer Acknowledgment of receipt of the above repair / replacement.

Special Terms and Conditions: This is not an invoice.

Terms will be applied to your invoice if applicable.

## Atomic Absorption/FIAS 100/400 Preventive Maintenance (PM)

Company Name:	United Analyst and Engineering Consultant Co., LTD.		
Address (Instrument Location):	41 Sukumvit Rd., Phra Khanong, Bangkok 10260		
Room Number:	Lab		
Asset Number (if applicable):	2 of 2W	Customer System ID:	K. Yanida
Service Engineer Name:	K. Chayanon	Service Order Number:	WO-03051971
Date PM Performed: (DD-MMM-YYYY)	29-Apr-2025	Next PM Due Date: (DD-MMM-YYYY)	29-Oct-2025

Part Number	Release	Publication Date	PerkinElmer
09370005	C	January 2013	

## Scope

The purpose of this PM is to ensure the continued functionality of the Atomic Absorption/FIAS 100/400 by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. The customer should save their method before the PM begins.

## General Instructions:

Always check with the customer before making any changes that may affect the customer's analysis or calibration. The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer. Update the PM sticker and instrument logbook as required.

## Copyright Information

This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this publication may be reproduced in any form whatsoever or translated into any language without the prior, written permission of PerkinElmer, Inc. Copyright © 2013 PerkinElmer, Inc.

## Trademarks

Registered names, trademarks, etc. used in this document, even when not specifically marked as such, are protected by law. PerkinElmer is a registered trademark of PerkinElmer, Inc. All other trademarks and registered trademarks not owned by PerkinElmer, Inc. or its subsidiaries that are depicted herein are the property of their respective owners. Except as specifically set forth in its terms and conditions of sale, PerkinElmer makes no warranty of any kind with regard to this document, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. PerkinElmer shall not be liable for incidental or consequential damages in connection with the furnishing or use of this document.

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

## Component List

Component / Specific Model	Serial #	Firmware Version	Configuration Notes
FIAS100	100S24040501	2.20	Syngistix V4.0.1.1935

## Parts Lists

Parts included with the PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
B050 2706	Fan Filter	1	N/A	N/A

Additional Tools Required for PM				
Part Number (if applicable)	Description	Quantity	Serial #	Calibration Due Date (MM/YY)
N/A	Digital Volt Meter	1	N/A	N/A

Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A	N/A	N/A	N/A	N/A

เอกสารไม่ควบคุม

## Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

### 1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.

- ☒ Is the Working Environment Acceptable? If not, document.

- ☐ Visual Damage (if yes, describe)

- ☒ Check incoming AC line voltage for proper levels and grounding.
- ☒ Verify Voltage switch on back of instrument is correct.
- ☒ Perform general inspection of system for cleanliness. Clean if needed.
- ☒ Gas supply cylinders secured, lines leak checked and argon or nitrogen supply pressure verified (45 – 58 psi).
- ☒ Inspect the customer log book and make any appropriate PM entries.
- ☒ Fan checked and filter cleaned
- ☒ Heating mantle or Universal Cell Holder checked

### 2. Instrument components

- ☒ Non-return valve checked/repaired/replaced if needed (B019 8111). Clean the valve if there is any liquid in it. Replace the rubber sleeve (B013 5123) if it is worn. Check the flow meter for any signs of fluid in it. Clean the flow meter if needed.
- ☒ Verify condition of pump pressure adjustment levers (B050 7794 - look for cracks or problems with the springs), pump rollers (B300 0251 check for wear), and thumb screws (B050 7796).
- ☒ Check the Multiport valve for proper switching, flow, and insure there are no leaks. Clean valve parts and replace o-rings if needed (large o-ring: B050 1250, small o-ring: B004 5095). Use a squirt bottle & fishing line to try to dislodge clogs.
- ☒ Firmware Version checked. Latest is 2.20.

### 3. Mixing/Separation Assembly & Pump Tubing:

- ☒ Mixing separator assembly checked
- ☒ Filter/membrane checked (B050 8306)
- ☒ Condition of the pump tubing (replace if necessary), correct pump tubing for the solutions being run. Make sure the correct magazines are being used. B050 7791 for 0.13 – 1.80 mm tubing; B050 7792 for 1.60 – 3.18 mm tubing.

เอกสารไม่ควบคุม

### 4. Cell, Cell Windows, Transfer Line:

- ☒ Cell checked
- ☒ Cell windows checked
- ☒ Transfer line checked for moisture (if moisture is a problem, the Nafion dryer might be needed)

### 5. Operational Tests:

- ☒ Run DI water through the carrier/reductant/sample system. Verify smooth flow of liquid throughout without leaks. Replace tubing & fittings if needed.

### 6. Review:

- ☒ Review with the customer PM work performed.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer-supplied materials to have on hand.
- ☒ Attach PM sticker.
- ☒ Update Logbook.

## Additional Comments

Additional Comments Regarding the PM

## Review

The preventive maintenance checks and if applicable performance tests for FIAS 100/400 have been completed.	
This FIAS 100/400 Passes <input checked="" type="checkbox"/> Fails <input type="checkbox"/> the preventive maintenance.	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative: <i>Chayman K</i>	Date: 29 Apr 2025 (DD-MM-YYYY)
Authorized Customer Representative: <i>สุวิทย์ หงษ์</i>	Date: 29 Apr 2025 (DD-MM-YYYY)

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



## Document History

Revision	Description of Change	Page(s)	Date
A	First release		May 2008
B	Addition of Batch/Lot Number, Expiration Date, and Report Fields.	2,7	February 2009
C	Update to new format	All	January 2013



PerkinElmer Scientific (Thailand) Co., Ltd.  
295 Soi Soorajit 4  
Khwang Bangkapi, Khet Huay Kwang  
Bangkok 10310  
Thailand  
Tel: 66 2719 8420 / Fax: +66 2 319 7900  
http://www.perkinelmer.com

## Service Report

Work Order Number	Activity Code	Billing Type	Requested Start Date	Model	Serial Number
WO-03051971	Planned Maintenance	Contract	10/03/2558 23:08 s.	80608579	100524540501
Service Representative Name	Contract Number	Expiry Date	Equipment ID	System ID	
Kanan, Chayman	SC-033555050	24/05/2025	N/A	N/A	
UDI Number					
N/A					
Equipment Location			Bill To Name		
บริษัท อู่เหล็ก สานอก จำกัด 49/54/54/54 ถนนสุขุมวิท ซอยสุขุมวิท 51 10250 TH			บริษัท อู่เหล็ก สานอก จำกัด เลขที่ 49/54/54/54 ถนนสุขุมวิท ซอยสุขุมวิท 51 10250 TH		
Customer Contact	Phone Number	Fax Number	Email	Purchase Order	
K. Nishakorn อู่เหล็ก	095-0580049	N/A	perphcha.m@gmail.com	HPO-340400211	

Work Description	
- PM 202 Warranty - Clearing Port Valve, Manifold, Tuning - Run Hg test, Pass Start Date: 29/04/2025 End Date: 29/04/2025 29/04/2025 29/04/2025	

Tools Used				
Quantity	Calibrated Tool	Description	Serial Number	Last Calibration Date
*** No Calibrated Tools Used ***				

Material Used				
Part Number	Part Description	Note	Lot/Serial Number	Quantity
*** No Parts Used ***				

Labour Details			
Part Number	Part Description	Start Date	Quantity
SV600015	Preventative maintenance	29/04/2025	3
SV600052	Service Travel	29/04/2025	1

Work Complete	Customer Signature	Technician Signature
Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	อู่เหล็ก	Chayman k
PM/CC/PTV Left with Customer		
Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	95/2558 K. Nishakorn อู่เหล็ก	95/2558 Kanan, Chayman

Terms & Conditions
--------------------

Page 1 of 2

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

Customer Acknowledgment of receipt of the above report / replacement.  
Special Terms and Conditions: This is not an invoice.  
Taxes will be applied to your invoice if applicable.

Terms & Conditions
Customer Acknowledgment of receipt of the above report / replacement. Special Terms and Conditions: This is not an invoice. Taxes will be applied to your invoice if applicable.

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

DQE Services Co.,Ltd.

DQE Services

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

ISO 17025:2017

LABORATORY DATA

CERTIFICATE OF CALIBRATION

Certificate No. : SP24-028

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Laboratory 315

Equipment : UV-Vis Spectrophotometer

Manufacturer : HITACHI

Model : U-5100

Serial No. : 23A4-008

ID No. : UAE.WAS.010/2567

Received Date : 10 September 2024

Calibration Date : 10 September 2024

Issue Date : 13 September 2024

Condition Instrument : Good

Calibrated by : 

Mr.Tanawat Ritidach

Technical Manager

Approved by : 

Ms.Chonthicha Sangern

Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the DQE Services Co., Ltd.

เอกสารไม่ควบคุม

DQE Services Co.,Ltd.

DQE Services

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

ISO 17025:2017

LABORATORY DATA

REPORT OF CALIBRATION

Certificate No. : SP24-028

Environment Condition : Ambient Temperature 25 ± 5 °C

Relative humidity 55 ± 20 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	115663	25 October 2025
Absorbance Standard set	25757	115638	25 October 2025
Wavelength Standard set	25806	115657	25 October 2025
Wavelength Standard set	25758	115665	25 October 2025

Traceability : This certification is traceable to the International System of Unit maintained at National - Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 5.0 nm.

Scan Speed of UUC : 40

Scan Interval of UUC : 0.1 nm.

Resolution of UUC : Photometric 0.001 Abs.

Wavelength 0.1 nm.

DQE Services Co.,Ltd.

DQE Services

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

ISO 17025:2017

LABORATORY DATA

REPORT OF CALIBRATION

Certificate No. : SP24-028

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5780	0.575	0.0030	0.0031	2.00
	1.0484	1.044	0.0044	0.0029	2.00
	2.1876	2.190	-0.0024	0.0075	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5595	0.557	0.0025	0.0034	2.00
	1.0239	1.021	0.0029	0.0035	2.00
	2.1230	2.121	0.0020	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5230	0.519	0.0040	0.0029	2.00
	0.9633	0.961	0.0023	0.0028	2.00
	1.9753	1.975	0.0003	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5181	0.515	0.0031	0.0031	2.00
	1.0002	0.997	0.0032	0.0033	2.00
	1.9973	1.996	0.0013	0.0085	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5517	0.549	0.0027	0.0030	2.00
	1.0803	1.078	0.0023	0.0029	2.00
	2.0373	2.031	0.0063	0.0081	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5591	0.557	0.0021	0.0031	2.00
	1.0518	1.049	0.0028	0.0029	2.00
	1.9274	1.923	0.0044	0.0080	2.00

เอกสารไม่ควบคุม

DQE Services Co.,Ltd.

DQE Services

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

ISO 17025:2017

LABORATORY DATA

REPORT OF CALIBRATION


Certificate No. : SP24-028

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7469	0.743	0.0039	0.0056	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8674	0.862	0.0054	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2919	0.291	0.0009	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6430	0.639	0.0040	0.0055	2.00

เอกสารไม่ควบคุม

DQE Services Co.,Ltd.  
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230  
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

  
DQE Services

REPORT OF CALIBRATION

Certificate No. : SP24-028Page 5 of 5

Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.00	240.4	0.60	0.18	2.00
279.30	278.7	0.60	0.18	2.00
288.90	288.5	0.40	0.18	2.00
334.50	334.2	0.30	0.18	2.00
361.40	361.1	0.30	0.18	2.00
418.40	418.0	0.40	0.18	2.00
447.20	446.7	0.50	0.18	2.00
459.30	459.6	-0.30	0.18	2.00
537.00	536.6	0.40	0.18	2.00
638.00	637.4	0.60	0.18	2.00
441.29	440.8	0.49	0.18	2.00
479.88	479.6	0.28	0.18	2.00
513.75	513.5	0.25	0.18	2.00
528.59	528.6	-0.01	0.18	2.00
575.10	574.9	0.20	0.18	2.00
585.56	585.3	0.26	0.20	2.00
684.70	684.1	0.60	0.18	2.00
740.51	740.0	0.51	0.20	2.00
747.61	747.2	0.41	0.18	2.00
807.04	806.3	0.74	0.18	2.00
879.68	878.9	0.78	0.18	2.00

Remark : - UUC = Unit Under Calibration  
- N/A = Not Available  
- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%  
- End of Certificate -

เอกสารไม่ควบคุม

DQE Services Co.,Ltd.  
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230  
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

  
DQE Services

CERTIFICATE OF CALIBRATION

Certificate No. : SP25-001Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Laboratory 213

Equipment : UV-Vis Spectrophotometer

Manufacturer : Hitachi

Model : U-2900

Serial No. : 21E22-009

ID No. : UAE.WAT.051/2564

Received Date : 3 January 2025

Calibration Date : 3 January 2025

Issue Date : 8 January 2025

Condition Instrument : Good


Calibrated by : (Mr.Tanawat Rittidach )Approved by : ( Ms.Chonthicha Sangngern )

Technical ManagerQuality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.  
The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written permission of the laboratory.

เอกสารไม่ควบคุม

DQE Services Co.,Ltd.  
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230  
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

  
DQE Services

REPORT OF CALIBRATION

Certificate No. : SP25-001Page 2 of 5

Environment Condition : Ambient Temperature 25 ± 5 °C  
Relative humidity 55 ± 20 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	115663	25 October 2025
Absorbance Standard set	25757	115638	25 October 2025
Wavelength Standard set	25806	115657	25 October 2025
Wavelength Standard set	25758	115665	25 October 2025

Traceability : This certification is traceable to the International System of Unit maintained at National -  
Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 1.5 nm.


Scan Speed of UUC : 200 nm/min

Scan Interval of UUC : 0.1 nm.

Resolution of UUC : Photometric 0.001 Abs.  
Wavelength 0.1 nm.

เอกสารไม่ควบคุม

DQE Services Co.,Ltd.  
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230  
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

  
DQE Services

REPORT OF CALIBRATION

Certificate No. : SP25-001Page 3 of 5

Calibration Results : Without adjustment


Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5780	0.578	0.0000	0.0031	2.00
	1.0484	1.045	0.0034	0.0029	2.00
	2.1876	2.192	-0.0044	0.0075	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5595	0.560	-0.0005	0.0034	2.00
	1.0239	1.023	0.0009	0.0035	2.00
	2.1230	2.125	-0.0020	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5230	0.521	0.0020	0.0030	2.00
	0.9633	0.961	0.0023	0.0029	2.00
	1.9753	1.977	-0.0017	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5181	0.518	0.0001	0.0031	2.00
	1.0002	0.998	0.0022	0.0033	2.00
	1.9973	1.993	0.0043	0.0084	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5517	0.552	-0.0003	0.0030	2.00
	1.0803	1.079	0.0013	0.0030	2.00
	2.0373	2.032	0.0053	0.0079	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5591	0.559	0.0001	0.0031	2.00
	1.0518	1.050	0.0018	0.0030	2.00
	1.9274	1.923	0.0044	0.0079	2.00

เอกสารไม่ควบคุม



DQE Services Co.,Ltd.  
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230  
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

  
DQE Services

REPORT OF CALIBRATION

Certificate No. : SP25-001Page 4 of 5


Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7469	0.744	0.0029	0.0057	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8674	0.863	0.0044	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2919	0.290	0.0019	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6430	0.640	0.0030	0.0055	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.  
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230  
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

  
DQE Services

REPORT OF CALIBRATION

Certificate No. : SP25-001Page 5 of 5

Wavelength Accuracy :


CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.72	241.1	0.62	0.18	2.00
279.45	279.0	0.45	0.18	2.00
287.81	287.3	0.51	0.18	2.00
334.06	333.8	0.26	0.18	2.00
360.93	360.6	0.33	0.18	2.00
418.59	418.2	0.39	0.18	2.00
445.94	445.5	0.44	0.18	2.00
453.66	453.4	0.26	0.18	2.00
460.02	459.8	0.22	0.18	2.00
536.59	536.6	-0.01	0.18	2.00
637.98	637.7	0.28	0.18	2.00
431.38	431.1	0.28	0.18	2.00
472.50	472.3	0.20	0.18	2.00
513.47	513.4	0.07	0.18	2.00
528.88	528.9	-0.02	0.18	2.00
573.17	573.3	-0.13	0.18	2.00
585.35	585.1	0.25	0.20	2.00
684.40	684.5	-0.10	0.18	2.00
740.72	741.0	-0.28	0.20	2.00
748.55	748.8	-0.25	0.18	2.00
807.03	807.3	-0.27	0.18	2.00
879.28	879.6	-0.32	0.18	2.00

Remark : - UUC = Unit Under Calibration  
- N/A = Not Available  
- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k,  
which for a normal distribution corresponds to a coverage probability of approximately 95%  
- End of Certificate -

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.  
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230  
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

  
DQE Services

CERTIFICATE OF CALIBRATION

Certificate No. : SP25-019Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Instrument room (207)

Equipment : UV-Vis Spectrophotometer

Manufacturer : Agilent Technologies

Model : Cary 60

Serial No. : MY15410009


ID No. : UAE.WAT.020/2558


Received Date : 26 May 2025

Calibration Date : 26 May 2025

Issue Date : 29 May 2025

Condition Instrument : Good

Calibrated by :   
( Mr.Tanawut Rittidach )  
Technical Manager

Approved by :   
( Ms.Chonticha Sangnorn )  
Quality Manager


The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the DQE Services Co., Ltd.

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.  
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230  
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

  
DQE Services

REPORT OF CALIBRATION

Certificate No. : SP25-019Page 2 of 5

Environment Condition : Ambient Temperature 25 ± 5 °C  
Relative humidity 55 ± 20 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	115663	25 October 2025
Absorbance Standard set	25757	115638	25 October 2025
Wavelength Standard set	25806	115657	25 October 2025
Wavelength Standard set	25758	115665	25 October 2025

Traceability : This certification is traceable to the International System of Unit maintained at National -  
Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 1.5 nm.

Scan Speed of UUC : 60 nm/min

Scan Interval of UUC : 0.15 nm.

Resolution of UUC : Photometric 0.0001 Abs.

Wavelength 0.1 nm.

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.

DQE Services

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

ISO 9001:2015

ISO 17025

CALIBRATION DATA

REPORT OF CALIBRATION

Certificate No. : SP25-019

Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.0000	0.0000	0.0028	2.00
	0.5780	0.5739	0.0041	0.0031	2.00
	1.0484	1.0430	0.0054	0.0029	2.00
	2.1876	2.1876	0.0000	0.0084	2.00
440	0.0000	0.0000	0.0000	0.0028	2.00
	0.5595	0.5581	0.0014	0.0034	2.00
	1.0239	1.0219	0.0020	0.0035	2.00
	2.1230	2.1207	0.0023	0.0085	2.00
465	0.0000	0.0000	0.0000	0.0028	2.00
	0.5230	0.5190	0.0040	0.0029	2.00
	0.9633	0.9609	0.0024	0.0029	2.00
	1.9753	1.9719	0.0034	0.0079	2.00
546.1	0.0000	0.0000	0.0000	0.0028	2.00
	0.5181	0.5161	0.0020	0.0031	2.00
	1.0002	0.9979	0.0023	0.0033	2.00
	1.9973	2.0021	-0.0048	0.0102	2.00
590	0.0000	0.0000	0.0000	0.0028	2.00
	0.5517	0.5503	0.0014	0.0030	2.00
	1.0803	1.0808	-0.0005	0.0031	2.00
	2.0373	2.0324	0.0049	0.0105	2.00
635	0.0000	0.0000	0.0000	0.0028	2.00
	0.5591	0.5583	0.0008	0.0031	2.00
	1.0518	1.0513	0.0005	0.0030	2.00
	1.9274	1.9281	-0.0007	0.0102	2.00

เอกสารไม่ควบคุม

PM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.

DQE Services

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

ISO 9001:2015

ISO 17025

CALIBRATION DATA

REPORT OF CALIBRATION

Certificate No. : SP25-019

Page 4 of 5

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.0000	0.0000	0.0050	2.00
	0.7469	0.7488	-0.0019	0.0063	2.00
257	0.0000	0.0000	0.0000	0.0050	2.00
	0.8674	0.8663	0.0011	0.0067	2.00
313	0.0000	0.0000	0.0000	0.0050	2.00
	0.2919	0.2902	0.0017	0.0052	2.00
350	0.0000	0.0000	0.0000	0.0050	2.00
	0.6430	0.6428	0.0002	0.0063	2.00

เอกสารไม่ควบคุม

PM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.

DQE Services

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

ISO 9001:2015

ISO 17025

CALIBRATION DATA

REPORT OF CALIBRATION

Certificate No. : SP25-019

Page 5 of 5

Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.72	242.0	-0.28	0.18	2.00
279.45	279.5	-0.05	0.18	2.00
287.81	287.6	0.21	0.18	2.00
334.06	333.8	0.26	0.18	2.00
360.93	360.5	0.43	0.18	2.00
418.59	417.9	0.69	0.18	2.00
445.94	445.4	0.54	0.18	2.00
453.66	453.2	0.46	0.18	2.00
460.02	459.6	0.42	0.18	2.00
536.59	536.5	0.09	0.18	2.00
637.98	638.5	-0.52	0.18	2.00
431.38	430.7	0.68	0.18	2.00
472.50	472.3	0.20	0.18	2.00
513.47	513.5	-0.03	0.18	2.00
528.88	528.9	-0.02	0.18	2.00
573.17	573.8	-0.63	0.18	2.00
585.35	585.2	0.15	0.20	2.00
684.40	685.1	-0.70	0.18	2.00
740.72	741.1	-0.38	0.20	2.00
748.55	748.9	-0.35	0.18	2.00
807.03	807.1	-0.07	0.18	2.00
879.28	879.1	0.18	0.18	2.00

เอกสารไม่ควบคุม

PM-708-02 R01 1/11/2021

Technology

Service Report

TO	FOR
Company: United Analyst and Engineering Consultant Co., Ltd. _ Bangkok-HQ Address: 700/2 หมู่ที่ 1 Phrakhanong District, Bangkok, 10260	Work Order Number: WO-0074079 Contact: Kamphong Boonpuang Email: kamphong.b@uaeconsultant.co.th Tel: +66 2763 2828 (7021), +66 8 6347 7390

WORK ORDER INFORMATION			
Top-Level		Order Type	Preventive Maintenance
Installed Product ID	IB-00105024	Billing Type	Chargeable
Product	SKALAR 2SAN59000 SAN++ Classic CFA 230V 2SAN59000	PO No.	HPO-250400209
Serial No.	182688	Warranty No.	
		Contract No.	

PRODUCTS SERVICED		
Installed Product Id	Serial Number	Product
IB-00105024	182688	SKALAR 2SAN59000 SAN++ Classic CFA 230V 2SAN59000

PROBLEM DESCRIPTION	
PM 1 ครั้ง/ปี **ใบเสนอราคาเลขที่ Q-120095	

Line Number	Engineer	Start Date And Time	End Date And Time	Billable Labor Hour	Billable Travel Hour	Travel KM
WL-00342192	Yongyuth Chanphong	05/23/2025 9:30 AM	05/23/2025 6:00 PM	8.5		
Total				8.5	0	0

1 Reach us at DKSH Service-Hotline : +66 2 639 7000  
2533 Sukhumvit Road, Bangkok, 10260, Phrakhanong, Bangkok, Thailand  
Phone +66 2 639 7000 Fax +66 2 333 1026

เอกสารไม่ควบคุม

Page 1 of 2

Delivering Growth - in Asia and beyond



Line Number	Work Description		
WL-00342192	- ฟ้า PM เสร็จแล้ว, เครื่องพร้อมใช้งาน		
PARTS CONSUMED			
Part No	Part Description		Quantity
EXPENSES			
Part No	Expense Type	Description	Line Quantity
RECOMMENDED PARTS			
อะไหล่สำรองที่ควรสั่งซื้อทั้งหมด 7 รายการ คือ Pump tube 3 รายการ (SA3028, SA3032 และ SA3034), หลอดไฟ Halogen 6V/10W (90020012) 1 รายการ จำนวน 2 หลอด, Tubing polyethylene 3 รายการ (SA3142, SA5141 และ SA5142)			
REMARKS			

Travel Time Disclaimer:  
Please note that the travel time in this report only includes time taken to reach the installed equipment location. It does not include our engineer's return travel time.

Customer Signature: 

Technician: Yongyuth Chanphong  
Job Title: Service Manager  
Email: yongyuth.yc@dksh.com

Customer Signature \_\_\_\_\_

Date: 06/06/2025



Job No. WO-00074079

Test Report			
Customers	United Analyst and Engineering Consultant Co., Ltd.		
Equipment	Continuous Flow Analyzer	Manufacturer	SKALAR
Controller Mdel	SA5000	Auto Sample Model	SA1052
Controller Serial No.	182688	Auto Sample Serial No.	181729
Date of test	23-May-2025	Period	12 Month
Environment temperature	24.3 °C	Humidity	54.4 %RH

Instrument Checked		Results					
Item	Characteristic	Before		After		Remark	
1	Visual inspect	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail		
2	Power supply (210 - 240 VAC)	220	VAC	220	VAC		
3	Computer	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail		
4	Program	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail		
5	Auto sampler	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail		
6	Module holder	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail		
	- Motor pump	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail		
	- Pump tube	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	*	
	- Air-injection	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	*	
	- Chemistry manifolds, Switching valve, Coil, Membrane	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail		
7	Detector	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail		
	- Filter	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail		
	- Flow cell	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail		
	- Lamp	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail		
8	Interface	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail		
9	Rinsing valves	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	N/A	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	N/A
10	Temperature / Reactor	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	N/A	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	N/A
11	Flame photometer	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	N/A	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	N/A
12	UPS / Stabilizer	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	N/A	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	N/A

Warning and Error Checked		Before	After
Item	Event	<input type="checkbox"/> None <input type="checkbox"/> Appear : _____	<input type="checkbox"/> None <input type="checkbox"/> Appear : _____
13	Error list		



Item	Characteristic	Before	After	Remark
14	Base Line Test	<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> N/A	
15	Detector Signal Test	<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> N/A	

Summary of checked

- ☒ The instrument can work normally and efficiently. (เครื่องมือวัดสามารถทำงานได้ปกติและมีประสิทธิภาพ)
- ☐ The instrument can work but it's requiring to maintenance. (เครื่องมือวัดสามารถทำงานได้แต่ต้องบำรุงรักษา)
- ☐ The instrument could not work it's requiring to repair. (เครื่องมือวัดไม่สามารถทำงานได้ต้องทำการซ่อมบำรุง)

Remark :

\* Pump tube, Tubing polyethylene และ Air tube เป็นอะไหล่ที่เปลี่ยนบ่อย ไม่จำเป็นต้องใส่ในใบแจ้งยอดแล้วแต่ตามระยะเวลาใช้งาน

หมายเหตุ อะไหล่อะไหล่ที่ควรสั่งซื้อทั้งหมด 7 รายการ ดังนี้

1. อะไหล่ สารเคมีของ Ammonia จำนวน 3 รายการ (SA3032, SA5141 และ 90020012)

2. อะไหล่ สารเคมีของ Phenol และ Cyanide จำนวน 6 รายการ (SA3028, SA3034, SA3142, SA5142 และ 90020012 )

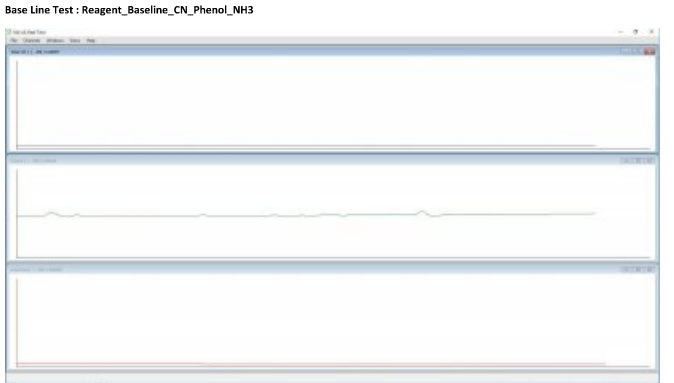
Standard Equipment Used		
Equipment	Equipment I.D.	
Digital multi meter	S/N 57600592	Due date : 19-Jun-2025
Thermo hygrometer	S/N 39520444/904	Due date : 27-Dec-2025

Test By :  ( Mr. Yongyuth Chanphong )

Approved by :  ( Mr. Eknasong Wankiang )

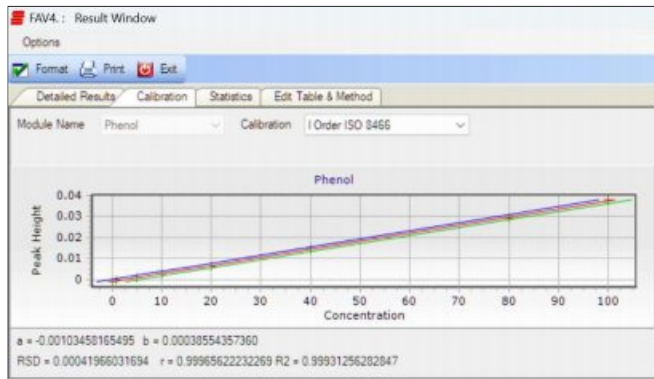
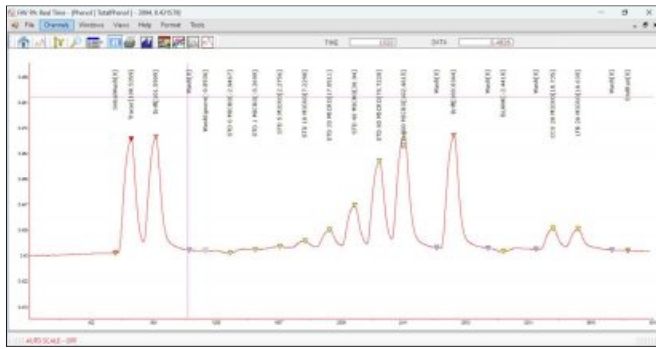
Position : Supervisor, Technical Service

Position : Manager, Technical Services





## Detector Signal Test : Phenol



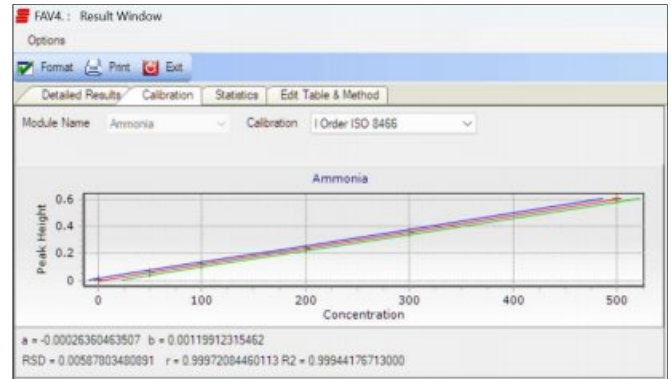
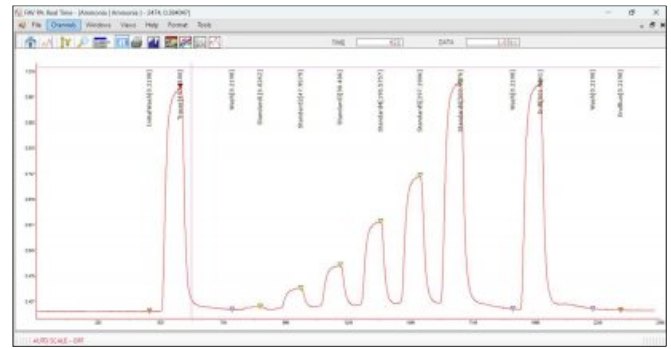
DKSH Technology Limited (Head office)  
2533 Sukhumvit Road, Bangkok, Phrakhanong, Bangkok, 10260  
Phone +66 2 639 7000, Mobile +66 93 813 8681, yongyuth-yc@dksh.com, www.dksh.com

Delivering Growth – In Asia and Beyond

เอกสารไม่ควบคุม

Page 4/2

## Detector Signal Test : NH3



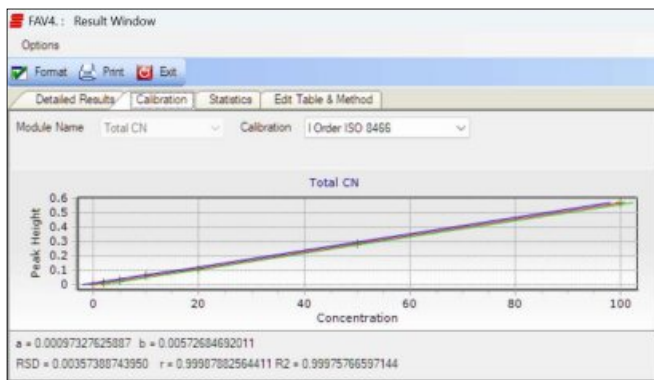
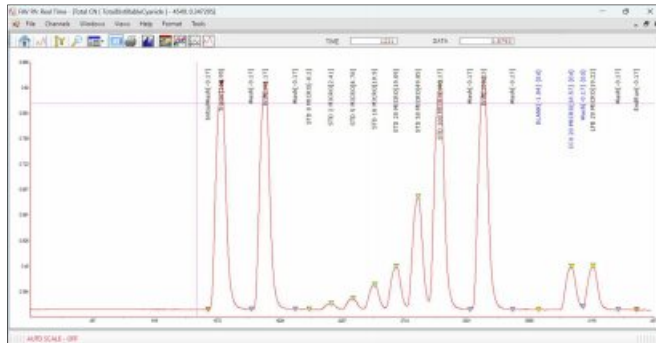
DKSH Technology Limited (Head office)  
2533 Sukhumvit Road, Bangkok, Phrakhanong, Bangkok, 10260  
Phone +66 2 639 7000, Mobile +66 93 813 8681, yongyuth-yc@dksh.com, www.dksh.com

Delivering Growth – In Asia and Beyond

เอกสารไม่ควบคุม

Page 5/2

## Detector Signal Test : CN



DKSH Technology Limited (Head office)  
2533 Sukhumvit Road, Bangkok, Phrakhanong, Bangkok, 10260  
Phone +66 2 639 7000, Mobile +66 93 813 8681, yongyuth-yc@dksh.com, www.dksh.com

Delivering Growth – In Asia and Beyond

เอกสารไม่ควบคุม

Page 6/2

 <b>TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)</b> CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES 534/4 PATTANAKARN ROAD SOI 18, SUANLIANG, SUANLIANG BANGKOK 10250 TEL 0-2717-3000-29 FAX 0-2719-9484		 
<b>Certificate of Calibration</b>		Cert. No.: 24TM1113 Page : 1 of 3
Equipment :	BOD Incubator	
Manufacturer :	ARCO	
Model :	UC4-1320	
Serial No. :	-	
ID No. :	UAE.WAO.002/2550	
Submitted by :	United Analyst and Engineering Consultant Co.,Ltd. 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260	
Location :	Lab Floor 2	
Received Order :	11 July 2024	
Calibration Date :	11 July 2024	
Ambient Temperature :	( 26 ± 10 ) °C	
Relative Humidity :	( 50 ± 30 ) %	
Calibrated by :	Tawatchai Pama	
Approved by :	 Approved Signatory	
( ) Ponpan Paipim		
(✓) Suwit Imjai		
( ) Kunchit Promprat		
Issue Date :	14 July 2024	
The Uncertainties are for a confidence probability of approximately 95% This certificate may not be reproduced other than in full, except with the prior written Approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.		

เอกสารไม่ควบคุม



Equipment : BOD Incubator  
Condition As-Received : Used Item  
Reference : 2407-0243OC-1

Cert. No.: 24TM1113  
Page : 2 of 3

#### Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector ( RTD ).  
The temperature scale used was based on ITS-90.

#### Condition of this result of calibration

##### 1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1 ) Data Acquisition	MY49023932	23LM122	TPA	26 Jul 2024

2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association ( Thailand - Japan )

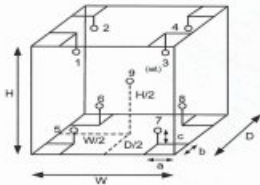
Result of Calibration :- ( \* ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	29	32
REL.Humid. ( % )	78	65
AC Supply ( Volt )	233	234

Position :	Ref. Std. ID No.:
1	19-16RTD-01
2	19-16RTD-02
3	19-16RTD-03
4	19-16RTD-04
5	19-16RTD-05
6	19-16RTD-06
7	21-16RTD-07
8	19-16RTD-08
9 (ref.)	19-16RTD-09



#### Probe Installation Details :

Dimension of Chamber :	
a = 10 cm	D = 0.62 m
b = 10 cm	W = 1.2 m
c = 10 cm	H = 1.2 m
	Capacity = 0.89 m <sup>3</sup>



Equipment : BOD Incubator  
Condition As-Received : Used Item  
Reference : 2407-0243OC-1  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Not Available

Cert. No.: 24TM1113  
Page : 3 of 3

Calibration Point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Temperature stability ( ± °C )	Temperature uniformity ( °C )	Overall Variation ( °C )	Coverage Factor k
20.0	20.0	19.8	0.55	0.66	1.5	2

Calibration Point ( °C )	Measured Temperature ( °C )									Uncertainty ( ± °C )
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	20.210	20.331	20.162	19.645	20.287	20.070	19.838	19.781	19.954	0.79

Average\* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC\* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

-000-

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLIANG, SUANLIANG BANGKOK 10250  
TEL.0-2717-3000-29 FAX.0-2719-9484



Cert.No.: 25CH163  
Page.: 2 of 3

## Certificate of Calibration

Cert.No.: 25CH163  
Page.: 1 of 3

Equipment : pH Meter  
Manufacturer : EcoSense  
Model : pH100A  
Serial No. : JC03335  
ID No. : UAE.EFM.062/2562(ENV.pH.02/62)  
Condition As-Received: Used Item  
Received Date : 04 February 2025  
Calibration Date : 05 February 2025  
Reference : 2502-0105WSC-1  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong, Bangkok 10260

Ambient Temperature : (25 ± 2.5) °C  
Relative Humidity : (50 ± 15) %  
Calibration Procedure : In - house method :  
- CP-CH5 by direct measurement with DC voltage standard and direct measurement with certified reference material (CRM)  
- CP-CH8 by comparison with temperature standard

Calibrated by : Warakorn Lemgagitrakul

Approved by : \_\_\_\_\_  
Approved Signatory

( ) Chakrit Waewwanjua  
( ) Ponpan Paipim  
(✓) Saithip Meangmai

Issue Date : 06 February 2025

#### Condition of this calibration result

##### 1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	24E2759	25 Aug 2025
2) Ref. Standard Thermometer	4982054	110RC044	24I757	14 July 2025

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

##### 2. Certified Reference Materials

:The measurement results are traceable to SI through Hach Lenge GmbH Ltd.,  
Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00  
: 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 4.007	CPA chem	1066665	18 Jan 2027
pH 6.999	Hach Lenge GmbH	C03220	29 Oct 2026
pH 10.010	CPA chem	1066669	18 Jan 2026

3. This certificate is valid only to the item calibrated on date and place of calibration.

#### Calibration Results

Function : mV Measurement

Performing standard curve by Document Process Calibrator at pH (4.7)(7.10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement ( ± mV )	Coverage factor k
	pH	mV	mV	pH		
pH Meter S/N.: JC03335	4.00	177.48	177	4.01	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	10.00	-177.48	-177	10.01	0.58	2.00

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.





Cert.No.: 25CH163  
Page.: 3 of 3

#### Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4.7)(7.10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement ( $\pm$ )	Coverage factor $k$
pH Electrode S/N.: 231018SIA605377	4.007	4.01	173	0.0079	2.00
	6.999	7.00	-2	0.0092	2.00
	6.999	7.00	-2	0.0085	2.00
	10.010	10.01	-177	0.0092	2.00

Function : Temperature Measurement

(\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : -  
- Serial No. : 231018SIA605377  
Dimension of probe  
- Length : 110 mm.  
- Diameter : 12 mm.  
- Immersion Depth : 100 mm.

Calibration Point ( $^{\circ}\text{C}$ )	Standard Temperature ( $^{\circ}\text{C}$ )	UUC* Reading ( $^{\circ}\text{C}$ )	Error ( $^{\circ}\text{C}$ )	Uncertainty of measurement ( $\pm$ $^{\circ}\text{C}$ )	Coverage factor $k$
15.0	15.003	15.1	0.097	0.13	2.00
30.0	30.002	30.1	0.098	0.13	2.00
45.0	45.002	45.1	0.098	0.13	2.00

Remark - UUC\* = Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k$ , providing a level of confidence of approximately 95 %.

-o0o-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000 FAX. 0-2719-9484

## Certificate of Testing

Cert.No.: 25TW29  
Page.: 1 of 2

Equipment : DO Meter  
Manufacturer : YSI  
Model : 5100  
Serial No. : 11B 101863  
ID No. : UAE.WAO.004/2554  
Received Date : 14 February 2025  
Test Date : 17 February 2025  
Reference : 2502-0473DSC-1  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260  
Laboratory Condition : Temperature (  $25 \pm 5$  )  $^{\circ}\text{C}$   
Humidity (  $50 \pm 20$  ) %  
Test Procedure : In - house method : CP-CH9  
by Comparison Technique with Azide Modification Method  
Tested by : Walalak Sirithean  
Approved by :   
Approved Signatory  
( ) Chakrit Waewwanjua  
( ) Ponpan Paipim  
(☒) Saitthip Meangmail  
Issue Date : 18 February 2025

เอกสารไม่ควบคุม



Cert.No.: 25TW29  
Page.: 2 of 2

#### Condition of this result of calibration

##### 1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1. Burette	-	130BU10	23CG1172	22 Mar 2025
2. Balance	14233821	110RC001	24MM131	04 July 2025

##### 2. Standard Material >

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate 5-Hydrate AR	KEMAUS	2203162447	99.6%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %  
Dissolved Oxygen Probe No.: 24F100202

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.22	8.22	0.0055

This report was certified only for the instrument we tested. It is allowable to use for study  
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-

เอกสารไม่ควบคุม

เอกสารนี้จัดทำขึ้นเพื่อใช้ในการสอบเทียบเท่านั้น ไม่สามารถนำเอกสารนี้ไปใช้ในการโฆษณาหรือการค้าในลักษณะอื่นใดได้

ใบยืนยันการสอบเทียบ (Verification of Certificate)									
Certificate No.: 25TW29			Equipment : Do Meter						
Brand : YSI			Model : 5100						
Serial No.: 11B 101863			ID No.: UAE.WAO.004/2554						
Calibration results									
Titration Method (mg/L)	Standard Deviation (mg/L)	Do meter Reading (mg/L)	Error/ (mg/L)	Correction/ (mg/L)	Total Error (mg/L)	Judgement ( $\pm$ mg/L)	Total Error < Judgement > (mg/L)		
							pass		
8.22	0.0055	8.22	0.0000	0.0000	0.0	0.02			
ผู้สอบเทียบ: น.ส. วาลาลก สิริเทียน									
วันที่: 25.02.2025									
สถานที่: .....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									
.....									

เอกสารไม่ควบคุม



## Agilent 55 240 280 Series Atomic Absorption Spectroscopy Systems

### Preventive Maintenance Checklist

Agilent Preventive Maintenance provides factory recommended service for your analytical systems 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 everything you need to reduce unplanned downtime and keep your systems operating at their peak. This checklist will be completed at the end of the service and provided to you as a record of the installation.

**Note:** While non-current production AA instrument and/or accessory models are not covered specifically in this document it can be used as a basic reference.

For more information about Agilent Technologies services please visit our web site using the following URL: <http://www.agilent.com/en-us/services>

### 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.
- 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.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



### Important Customer Web Links

- For more information about Agilent Technologies services, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- 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.
- A useful Agilent Resource Center web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>
- Need technical support, FAQs, supplies? – visit our Support Home page at <http://www.agilent.com/search/support>
- Get answers. Share insights. Build connections: Join the Agilent Community at <https://community.agilent.com/welcome>

### Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Confirm the ability of the instrument to deliver continued safe operation as established via the Agilent AA safe operation flow chart. (Refer directly to the AA 55/240/280 Preventive Maintenance Scope of Work to make this decision.)
- 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 "Section not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance 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.
- Complete the total number of pages field in the Service Completion section.
- Ask the customer to sign the Service Completion section including the customer's and your signature.

This information is subject to change without notice.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



### Instrument Maintenance

#### System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	240 FS AAS
Instrument System Site and Location	United Analyst and Engineering Consultant

List System Component Product Numbers	List the Serial Numbers of each Component
1. G 8432 A	M1 13160001
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

### Preparation, Safe operation and Initial performance checks

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



- ☐ Agilent AA safe operation flow chart inspections (to determine if the PM can be performed).

**NOTE: If by following the flow chart the instrument is deemed to be unsafe for continued use you MUST NOT continue PM work. Inform the customer immediately of the Agilent recommendation that use of the instrument be discontinued.**

- ☒ Discuss any specific issues with the customer before starting.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it. ☒
- ☒ 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, settings as defined by current Service Notes
- ☒ Check for required firmware updates and verify with customers if they would like them installed.
- ☒ Use SVD to perform a Full Wavelength Scan for Cu HCL - "As found test\_1"
- ☒ Perform a Basic Cu ABS test - "As found test\_2"
- ☒ Print the Details page or screen captures of the test results and attach to the end of this checklist.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



## Preventive Maintenance Procedures

### FLAME SYSTEM section

☐ Section not applicable

#### Electronic components

- ☒ Review and confirm instrument configuration data in SVD
- ☒ Confirm power supply voltages using the **SVD Power Supply diagnostic**.
- ☒ For Dual Beam instruments - Confirm RBC frequency using the **SVD RBC frequency diagnostic**.

#### Mechanical components

- ☒ Check the burner adjuster controls for complete and free movement. If the burner adjuster needs lubrication, use Molykote 321 or mineral-based molybdenum disulphide grease.
- ☒ Run SVD tests to exercise all motor drives over the full range of their travel:
  - ☒ Monochromator drive
  - ☒ Slit drive
  - ☒ Lamp selector
  - ☐ ABA

#### Optics components

- ☒ Check that external optical surfaces are clean – Clean or replace as required.
- ☒ Use SVD and perform **Mono Wavelength Correction**.
- ☒ Use SVD and perform **Slit Calibration**.
- ☒ Use SVD and perform **Grating Squareness Diagnostic**.
- ☒ Use SVD and perform **Zero Order Offset/Mono Correction**.
- ☒ Use SVD and perform **Wavelength Repeatability**.
- ☒ Physically inspect selected HC lamps (customer to supply per their choice) and measure the % Gain for each lamp. Advise customer if lamps are showing emission degradation due to age.
- ☒ Check that the signal energy of the D2 and HC lamps track properly. Advise customer if their D2 lamp is showing emission degradation due to age.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



เอกสารไม่ควบคุม

### Sample Introduction and Atomization

- ☒ Inspect the burner interlock plate to ensure that the interlock pin is secure and correct for the burner type.
- ☒ Clean the burner slot with a clean white card.
- ☒ Check the uniformity of the slot width.
- ☒ Clean the burner if required.
- ☒ Change the burner o-ring.
- ☒ Clean the nebulizer, spray chamber and liquid trap.
- ☒ Change all o-rings and seals in the nebulizer, nebulizer block and spray chamber.
- ☒ Check that the pressure relief bung releases readily.
- ☒ Change o-rings on the fuel and oxidant delivery bars.
- ☒ Leave the liquid trap EMPTY and verify the flame will not ignite in this state.
- ☒ Refill liquid trap and check that overflow drains freely into the drain/waste tube.
- ☒ Check the drain/waste tube for good drainage. It should not have tight bends, kinks or loops and the lower end must be above the liquid level in the waste vessel
- ☒ Check and clean the igniter electrode

### Gas handling components and safety interlocks

- ☒ Pressure test for leaks
- ☒ Leak test gasbox internal components and connections
- ☒ Check safety interlock status and operation using the **SVD Interlock monitoring diagnostic**.

### Analytical performance for Flame systems

- ☒ Ignite a flame.
- ☒ Check that you can adjust the nebulizer uptake rate from 4 to 6.5 mL per minute.
- ☒ Optimize the instrument ready to perform Cu sensitivity test.
- ☒ Create a manual method to perform a Basic Cu ABS test - "Final Performance Testing"
- ☒ Run a PM completed sensitivity test for a 5 ppm copper sample and record the results in the AA PM Performance test results and measurements table.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



เอกสารไม่ควบคุม

### FURNACE SYSTEM section

☒ Section not applicable

#### Electronic components

- ☐ Review and confirm instrument configuration data in SVD
- ☐ Confirm power supply voltages using the **SVD Power Supply diagnostic**.

#### Mechanical components

- ☐ Run SVD tests to exercise all motor drives over the full range of their travel:
  - ☐ Monochromator drive
  - ☐ Slit drive
  - ☐ Lamp selector

#### Optics components

- ☐ Check that external optical surfaces are clean – Clean or replace as required.
- ☐ Use SVD and perform **Mono Wavelength Correction**.
- ☐ Use SVD and perform **Slit Calibration**.
- ☐ Use SVD and perform **Grating Squareness Diagnostic**.
- ☐ Use SVD and perform **Zero Order Offset/Mono Correction**.
- ☐ Use SVD and perform **Wavelength Repeatability**.
- ☐ Physically inspect selected HC lamps (customer to supply per their choice) and measure the % Gain for each lamp. Advise customer if lamps are showing emission degradation due to age.

#### Gas handling, water system and workhead component checks

- ☐ Inspect the GTA workhead gas hoses and connections for leaks.
- ☐ Pressure test for gas leaks
- ☐ If the cooler system is accessible (stand-alone) check for correct operation and coolant/water level – this includes any temperature and pressure settings plus filter cleaning (air flow and water).
- ☐ Inspect the GTA workhead water hoses and connections for leaks.
- ☐ Check all graphite components and replace if necessary.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



เอกสารไม่ควบคุม

- ☐ Tube
- ☐ Electrodes
- ☐ Shroud

### Analytical performance for Furnace systems

- ☐ Optimize the instrument ready to perform Cu sensitivity test.
- ☐ Run the sensitivity test for a 25 ppb copper sample and record the results in the results table.

### PSD autosampler accessory for Furnace systems

- ☒ Section NOT Applicable
- ☐ Check condition of the PSD capillary – replace if necessary
- ☐ Check condition and operation of PSD syringe – ensure it does not have air locks and bubbles.
- ☐ Change PSD rinse bottle o-ring.
- ☐ Check and clean the rinse vessel.
- ☐ Check the drain tube for good drainage. It should not have tight bends, kinks or loops and the lower end must be above the liquid level in the waste vessel.
- ☐ Ensure that the waste vessel is suitable for use with the furnace system.

### Sample introduction pump system (SIPS) accessory

- ☒ Section NOT Applicable
- ☐ Re-torque screws securing the hubs, presser arms and pump rotors.
- ☐ Adjust each roller so that it rotates freely.
- ☐ Wipe clean the pump rotor rollers and pump bands with a dry clean cloth.
- ☐ Ensure that the presser arms and the surfaces near the pump are free from dirt and spills.
- ☐ Remove the pump module rear cover and check for the incursion of liquids and any signs of corrosion.
- ☐ Re-torque the nuts that fasten the motor mounting plates to the chassis.
- ☐ Check clips securing the diluents holder and replace if necessary.
- ☐ Disconnect, clean T-piece, and reassemble the tubing using the following steps.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



เอกสารไม่ควบคุม



- ☐ Remove the T-piece by disconnecting the pump tubes, the pump bands and all other tubing.
- ☐ Place the T-piece in an ultrasonic bath containing strong detergent 1-5% Decon 30 or similar, for approximately 5-10 minutes.
- ☐ Wash the T-piece under a tap with a strong flow of water.
- ☐ Rinse with distilled water through all of the inlets in the reverse direction to normal sample flow.
- ☐ Reassemble.

#### Sample preparation system (SPS 4) accessory

##### ☒ Section NOT Applicable

The Agilent SPS 4 autosampler is designed to need minimal maintenance.

The following maintenance requirements are suggested to maintain the performance of the autosampler.

- ☐ Cleaning the spill tray, rack location mat, end frames and chassis accessories with a damp soft cloth and diluted mild detergent.
- ☐ Cleaning the autosampler cover panels with domestic window cleaner.
- ☐ Checking 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 edge or damaged connectors.

**NOTE: The autosampler requires no extra lubrication throughout its lifetime.**

For further details refer to the SPS 4 service manual G8410-90050.

#### Sample preparation system (SPS 3) accessory

##### ☒ Section NOT Applicable

- ☐ Check the x-axis and z-axis timing belts – Replace if there is any cracks, splits or color deterioration and belt tension.
- ☐ Check belt tensions - adjust if required
- ☐ Check the lubrication pad for single x-axis shaft. If pad is dry or customer has observed any vibration or erratic movements of the x-axis carriage, add 1 mL of Dow Corning 200 @ Fluid, 200 CS into the well.
- ☐ Check the auto-sampler ability to find tube positions - Calibrate if required.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



#### Vapor generation accessory VGA (hydride generator)

##### ☒ Section NOT Applicable

- ☐ Inspect VGA gas supply hose.
- ☐ Inspect/replace VGA pump tubing.
- ☐ Check low gas pressure interlock setting – adjust if required.
- ☐ Check precision orifice gas flow setting – adjust if required.
- ☐ Check gas regulator pressure to 46 psi (325 kPa) – adjust if required.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

#### UltrAA lamp accessory (external)

##### ☒ Section NOT Applicable

- ☐ Check the condition of the power cable.
- ☐ Clean the exterior surfaces of the accessory with soft lint free cloth. This cloth can be dampened with warm water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

#### Restore System

- ☐ If you have altered the customer's instrumentation during the course of PM, restore to the original status to allow the customer to conduct their normal activities (e.g., reload the customer's method.)

#### 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.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



### Signature Page

#### Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ 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 or if necessary, in the customer's IQ records.

#### Test Results

Test Description	Expected Test Result	Actual Test Result
<b>Flame optics PMT Gain test</b>		
For copper at 324.8 nm, 4 mA, 0.5 nm slit width	< 55 %	49.7
<b>Flame performance test with 5 ppm copper sample</b>		
Air /acetylene, mixing paddle removed	Abs value > 0.5	0.559%
Air /acetylene, mixing paddle installed, 10 replicates	%RSD < 1.0	0.2
<b>Deuterium furnace optics PMT Gain test</b>		
For copper at 324.8 nm, 4 mA, 0.5 nm slit width	< 55 %	—
<b>Deuterium furnace performance test with 25 ppb copper sample (324.8 nm)</b>		
Precision %RSD	≤ 4.0%	—
Abs value	≥ 0.15	—
<b>Zeeman furnace analytical performance: 25 ppb copper sample (327.4 nm)</b>		
Precision %RSD	≤ 4.0%	—
Abs value	≥ 0.10	—
MSR%	≥ 70 %	—

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021



#### AA consumable and parts list table

Part Description	Part Number	Product/Model # where used	PM supplied or Consumable	Instrument-Type
Test Solution – Cu 5ppm solution	6610030100	50 55 140 240 280	PM supplied	Common
Test Solution - Blank solution	5190-7001	50 55 140 240 280	PM supplied	Common
Copper, 1000 ug/ml, 100ml	5190-8279	50 55 140 240 280	*	Common
Kit, Mk 7 O-rings, aqueous, complete set	9910093400	50 55 140 240 280	PM supplied	Flame
Organic Kit	9910093500	50 55 140 240 280	PM supplied	Flame
Wire Nebulizer Cleaning	9910024700	50 55 140 240 280	consumable	Flame
Tubing-Capillary Std Nebs	9910024800	50 55 140 240 280	consumable	Flame
Capillary Tube Hivac Neb (3) (organics only)	9910044000	50 55 140 240 280	consumable	Flame
Glass impact beads (5/pk)	9910025700	50 55 140 240 280	consumable	Flame
Teflon impact beads (5/pk) (organics only)	9910053300	50 55 140 240 280	consumable	Flame
Burner cleaning strip (100/pk)	9910053900	50 55 140 240 280	consumable	Flame
Window UV silica – round (right side)	2010082600	50 55 140 240 280	PM supplied	Common
Window UV silica – rectangular (left side)	2010082500	50 55 140 240 280	PM supplied	Common
Pad adhesive window (round)	4910012700	50 55 140 240 280	PM supplied	Common
Pad adhesive window (rectangular)	4910012800	50 55 140 240 280	PM supplied	Common
Electrode kit (1 pr) (D2)	6310003400	GTA120	PM supplied	Furnace
Shroud (D2)	6310003100	GTA120	PM supplied	Furnace
Zeeman electrode kit (1 pr)	6310003500	GTA120	PM supplied	Furnace
Zeeman shroud	6310003600	GTA120	PM supplied	Furnace
O-ring PSD rinse bottle	6910025900	PSD120	PM supplied	Furnace

\* For engineers who only service AA instruments 5190-8279 can be used as a cheaper alternative for 6610030100.

Items classified as PM supplied in the above table are included in the standard PM

Those classified as consumable should be provided by the customer or charged to the customer if supplied by the Agilent service engineer.

Revision: 10.00, Issued: November 2021

© Agilent Technologies, Inc. 2021





### Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

### Service Completion

Service request number 6007549143 Date service completed 30 Jan 2025  
 Agilent signature Kanyakorn S. Customer signature David Y.  
 Total number of pages in this document 13



### Frequency:

Averaging Period: 30.0  
 Datapoint Count: 20  
 Upper Limit: 51.00  
 Lower Limit: 49.00  
 Average Frequency: 50.00  
 Highest Measured Frequency: 50.00  
 Lowest Measured Frequency: 50.00  
 Result: **Passed**

### Power Supply:

	Lower Limit (V)	Actual (V)	Upper Limit (V)	Result:
12.00 V Rail	10.80	12.12	13.20	<b>Passed</b>
-12.00 V Rail	-13.20	-11.90	-10.80	<b>Passed</b>
5.00 V Rail	4.50	5.04	5.50	<b>Passed</b>
310.00 V Rail	270.00	330.00	341.00	<b>Passed</b>

## SVD Results Report



Report ID: 2 Diagnostic Start Time: 1/30/2025 9:13:26 AM Diagnostic End Time: 1/30/2025 9:47:25 AM  
 Customer: UAE Service Engineer: Kanyakorn S.  
 Address: Soi Udomsuk 41, Sukhumvit Rd. Contact Details: 02637636381  
 Bangkok

### Instrument Configuration

Configuration:  
 Serial Number: MY13100001 Turret Type: Automatic  
 Instrument Model: Varian AA140/240/280 Number Of Lamps: 4  
 Flame Instrument: True Mono Type: Automatic  
 Furnace Instrument: True Gasbox Type: Y Gas Box  
 Zeeman Present: False Auto Burner Adjuster: False  
 Internal Zeeman: False Mains Frequency: 50  
 Internal UltraAA: False Firmware Version: 2.11  
 Optics Type: Double Beam Photomultiplier Type: Normal(900nm)  
 D2 BG Correction Fitted: True PWB Version: 45  
 Boot Block Version: 1.09

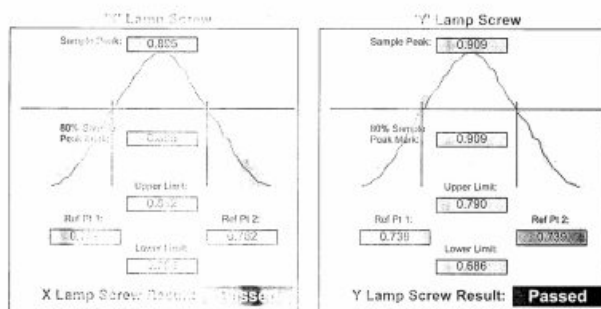
### EEPROM Data:

Instrument Run Hours: 69918.180 D2 Run Hours: 53396.500  
 Zero Wavelength Offset: 30.133 D2 Serial Number: not set 1  
 Mono Correction: 0.770 D2 Install Date: 1/1/1970  
 Flame Hours: 32411.834 D2 Original Intensity: 1.000  
 D2 Last Intensity: 475.000

### Optics

#### Beam Balance:

Lamp Type: Copper  
 Lamp Socket Used: 3  
 Peak Selected: 324.80  
 Lamp Alignment: **Performed**



### Grating Scan

Lamp Element(s):	Copper			
Lamp Turret Position:	3			
Lamp Current(nA):	4.00			
SLW Wavelength(nm):	0.5			
1st Order Wavelength(nm):	324.80			
Lamp Alignment:	<b>Performed</b>			
	Lower Limit (nm)	Passed (nm)	Upper Limit (nm)	Result:
Zero Order	-8.10	0.00	0.10	<b>Passed</b>
First Order	324.45	324.75	325.15	<b>Passed</b>
Second Order	648.90	649.50	649.97	<b>Passed</b>

**Wavelength Repeatable Error:**

Lamp Used: Copper  
Peak Used(nm): 324.759  
Connected to Socket: 3

Lamp Current(mA): 4  
Slit Width(nm): 0.2  
Slit Height: Normal

Lamp Alignment:

Lower Limit(nm): 324.775  
Upper Limit(nm): 324.888

(Typical from Zero Error) (Typical from end)

Sample 1: 324.823  
Sample 2: 324.823  
Sample 3: 324.873  
Sample 4: 324.823  
Sample 5: 324.823  
Sample 6: 324.819  
Sample 7: 324.819  
Sample 8: 324.819  
Sample 9: 324.823  
Sample 10: 324.819

Mean: 324.823  
Standard Deviation: 0.003

Result:

เอกสารไม่ควบคุม

**Auto Lamp Recognition:**

Lamp 1: Unpopulated Lamp/Not Connected  
Lamp 2: 67 - Silver Cadmium Lamp/Dec(Ultra) (Ag/C Lamp) 6: Not Supported  
Lamp 3: 14 - Copper (Cu)  
Lamp 4: Unpopulated Lamp/Not Connected  
Lamp 5: Not Supported  
Lamp 6: Not Supported  
Lamp 7: Not Supported  
Lamp 8: Not Supported

Result:

**GTA Temperature Monitoring:**

**Notes:**

**Signatures:**

\_\_\_\_\_  
Date

เอกสารไม่ควบคุม

**Wavelength Drive:**

**Slit Drive:**

**Turret Drive:**

**Auto Burner Adjuster:**

**Signal Processing Linearity:**

On-Scale - Scale: New Date Mode

	Lower Limit	Actual	Upper Limit	Result:
S2	114	3	297	
S3	118	14	191	
S4	271	1.2	332	
S5	474	7	578	
S6	835	11	1008	
S7	1435	18	1754	
S8	2438	1.29	3053	
S9	4747	1.71	5313	

**Interlocks:**

Burner Flame:

NO Burner Flame:

Flame Off:

Gas Control Flame:

Pressure Release Gas Flame:

Liquid Trap Flame:

Flame Detect:

SCU Active:

Oxidant Pressure:

Oxidant Changeover:

Ignition:

เอกสารไม่ควบคุม

**Sequential by time report** 1/30/2025 10:53 AM Page 1 of 1 SpectraAA

**Analyst:** 1/30/2025 10:33 AM GMT: 1/30/2025 3:33 AM

**Date Started:** Sensitivity Test 01

**Worksheet:**

**Comment:**

**Methods:** Cu

**Computer name:** DESKTOP-RSUIFRS

**Serial Number:** MY13160001

**Method:** Cu (Flame)

Sample ID	Conc mg/L	%RSD	Mean Abs		
CAL Z1110	0.000	38.8	0.0002		
	Readings				
	0.0002	0.0003	0.0001	1/30/2025	10:51:48 AM
STANDARD 1	5.000	0.1	0.5571		
	Readings				
	0.5571	0.5563	0.5575	1/30/2025	10:52:22 AM

**Abs** Linear Origin - Cal Set 1

**Curve Fit:**

- Linear Origin
- Characteristic Conc = 0.038 mg/L
- r = 1.0000
- Calculated Conc = 0.002 5.000
- Residuals = -0.007 0.000

**Abs = 0.11141 x C**

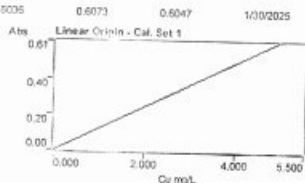
5 ppm Cu					
	5.000	0.3	0.5598		
	Readings				
	0.5592	0.5596	0.5615	1/30/2025	10:52:54 AM

เอกสารไม่ควบคุม

Analyst  
Date Started 1/30/2025 10:33 AM GMT; 1/30/2025 3:33 AM  
Worksheet Precision Test  
Comment  
Methods Cu  
Computer name DESKTOP-BSUFRS  
Serial Number MY13160001

Method: Cu (Flame)

Sample ID	Conc. mg/L	%RSD	Mean Abs
CAL ZERO	0.000	64.1	-0.0002
Readings			
	-0.0003	-0.0003	-0.0001
STANDARD 1	5.000	0.3	0.6052
Readings			
	0.5035	0.6073	0.6047



Curve Fit = Linear Origin  
Characteristic Conc = 0.039 mg/L  
r = 1.0000  
Calculated Conc = -0.002 5.000  
Residuals = 0.002 0.000

Abs = 0.12105 x C

5 ppm Cu	5.007	0.2	0.0051
Readings			
	0.6065	0.6052	0.6047
	0.6055	0.6076	0.6064
		0.6079	0.6042
			0.6079
			1/30/2025 10:48:32 AM

SPS 4

Gold Tube

Back 1 1

Type 1 1

Gold Tube

Down height 0 1.23 (mm)

Pump speed Medium

Key to tube colors

- Sample
- Calibration
- Calibration/QC
- Sample/QC
- Not Assigned

Align Probe

Focus

Stop/Save

Park

Optimize Lamp

Optimize Sign

Rescale

Inst Zero

Gain 49 %

Ok

Optimization: Lamp

HC Lamp 1.30

1.00

0.50

0.00

0.917

Sensitivity Check 1.5 mg/L gives about 0.2 Abs at 324.8 nm, A/A burner

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



## PinAAcle 900F Preventive Maintenance Report

Company Name: UAE Consultant Co., LTD.

Instrument Location: 41 Sukumvit Rd.,

Phra Khanong, Bangkok 10260

Instrument Serial No.: PFB520031902

Date: 29-Apr-2025

### PinAAcle 900F Preventive Maintenance (PM)

Company Name:	United Analyst and Engineering Consultant Co., LTD.		
Address (Instrument Location):	41 Sukumvit Rd., Phra Khanong, Bangkok 10260		
Serial Number:	PFB520031902	PM Number:	1 of 2
Customer Name (if applicable):	K. Yinda	Telephone Number:	095-5580049
Customer Support Engineer Name:	K. Chayanon	Service Order Number:	WO-03126047
Date PM Performed: (DD-MM-YYYY)	29-Apr-2025	Next PM Due Date: (DD-MM-YYYY)	29-Oct-2025
Standard Labor Hours to Complete PM :		5 hours	

Part Number	Release	Publication Date	
09370145 Rev.9	A	January 2018	

#### Scope

The purpose of this PM is to ensure the continued functionality of the PinAAcle 900F by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer.

The customer should save their method before the PM begins.

#### General Instructions:

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM.

Always check with the customer before making any changes that may affect the customer's analysis or calibration, including a current back-up of system software and/or data files.

The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer.

Update the PM sticker and instrument logbook as required.

#### Copyright Information

This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this publication may be reproduced in any form whatsoever or translated into any language without the prior, written permission of PerkinElmer, Inc. Copyright © 2013 PerkinElmer, Inc.

#### Trademarks

Registered names, trademarks, etc. used in this document, even when not specifically marked as such, are protected by law. PerkinElmer is a registered trademark of PerkinElmer, Inc. All other trademarks and registered trademarks not owned by PerkinElmer, Inc. or its subsidiaries that are depicted herein are the property of their respective owners. Except as specifically set forth in its terms and conditions of sale, PerkinElmer makes no Warranty of any kind with regard to this document, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. PerkinElmer shall not be liable for incidental or consequential damages in connection with the furnishing or use of this document.

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



## Component List

Component / Specific Model	Serial #	Configuration Notes
PinAAcle900F	PFBS20031902	Syngistix V4.0.1.1935
FIAS100	100524040501	

## Parts Lists

Parts Included with the PM		
Part Number (if applicable)	Description	Quantity
B0501696	Fan Filters	2
N3160156	O-Ring Kits for Sampling Introduction (Stainless Steels Nebulizer)	N/A
N3160157	O-Ring Kits for Sampling Introduction (Plastic Nebulizer)	1
N9301714	Replacement Acetylene Filter Cartridge	1
TH001022	Replacement Air Filter Cartridge	1

Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quality	Batch/Lot #	Expired Date (MM/YY)
N9300183	1000 mg/L Copper Standard	AR	27-39CUY1	Nov 2025

Additional Reagents and Standards Required for PM (Customer Support Solution)				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A	DI Water	250 mL	AR	AR
N/A	0.5% HNO <sub>3</sub>	250 mL	AR	AR

เอกสารไม่ควบคุม

## Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

### 1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.
- ☒ Inspect the customer log book and make any appropriate PM entries.
- ☒ Perform general inspection of system for cleanliness.

### 2. PC Instrument Software:

- ☒ Instrument Software user files/databases archived, packed, and/or deleted as needed.

### 3. Mechanical:

- ☒ Inspect and clean all fans and filters. Replace filters if necessary.
- ☒ Inspect all gas lines for leaks and/or wear. Replace if needed.
- ☒ Clean exterior of the instrument.
- ☒ Inspect the burner head, burner chamber, and nebulizer. Clean if needed as stated in the Hardware Guide.
- ☒ Check burner head dimensions with the feeler gauge as stated in the Hardware Guide in the Maintenance chapter section on cleaning the burner head and checking sloth width. Replace if out of specification.
- ☒ Check the condition of the end cap, burner head, and nebulizer O-rings. Replace if necessary.
- ☒ Check the drain system for signs of wear. Replace worn or damaged parts.
- ☒ Visually check for proper flame conditions when igniting the Air-C2H2 and N2O-C2H2 flames (if applicable).

### 4. Electrical:

- ☒ Inspect PC boards. Clean if necessary.
- ☒ Carefully check all internal and external cable connections.
- ☒ Check instrument firmware revisions upgrade to current levels (if necessary).
- ☒ Run Diagnostics Test within the Advanced function of the Spectrometer page. Check the results in the service log folder in the Spectrometer BM Log Viewer.

### 5. Optics:

- ☒ Inspect and clean the sample compartment windows, if needed.
- ☒ Inspect optics. Clean or replace if necessary.

### 6. Gasses:

- ☒ Verify that the Gasses supplied to the instrument are within the pressure and purity specifications found in the PinAAcle 900 Series Pre-Installation Checklist SDB.
- ☒ Verify that the acetylene filter and air filter element is dry. Replace if necessary.

เอกสารไม่ควบคุม

## Additional Tools Required for PM

Part Number (if applicable)	Description	Quantity	Serial #
N1013000	0.2A Neutral density filter	1	101N0089015
N1013002	1.0A Neutral density filter	1	101N0089015
03030997	System 2 EDL Driver	1	03030997
N3050605	As System 2 EDL	1	16148
N3050121	Cu Lumina HCL	1	060419-030180
N3050109	Ba Lumina HCL	1	061219-020041
N3050139	K Lumina HCL	1	030819-010130
N3050152	Ni Lumina HCL	1	052719-020020

เอกสารไม่ควบคุม

### 7. Flame Interlock Check:

Description: Check to ensure that all safety interlocks are closed.

Parameter	Specification	Test Results	Pass/Fail
Flame Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
Drain Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
Nebulizer Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
C <sub>2</sub> H <sub>2</sub> Pressure Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
Air Pressure Sensor	Air/C <sub>2</sub> H <sub>2</sub> Flame correctly shuts down	Active	Passed
Burner Head Sensor	Choosing Nitrous Oxide as the oxidant should trigger an interlock shuts down	Active	Passed

### 8. After PM Performance tests:

#### 8.1 Detector Linearity with Barium

Description: Ensures that the detector is linear in the Visible Range.

Parameter	Specification	Certificate Value at 553.6 nm (Abs.)	Test Results	Pass/Fail
1.0 A ND Filter	± 5% from Cert.	0.9668	0.9678	Passed
0.2 A ND Filter	± 5% from Cert.	0.1953	0.1876	Passed

#### 8.2 Baseline Noise at 1.0 Absorbance with Barium

Description: Ensures that a high absorbance will not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0005	Passed

#### 8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.001	0.0001	Passed

เอกสารไม่ควบคุม

8.4 D<sub>2</sub> Background Compensation with Copper

Description: Verifies the instruments ability to compensate for Background absorption.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.009	Passed

## 8.5 AA-BG Baseline Noise with Copper

Description: Ensures that background correction does not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0001	Passed

## 8.6 AA-BG Baseline Noise with Arsenic

Description: Ensures that background correction does not produce excessive noise at a low wavelength.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0004	Passed

## 8.7 Flame Sensitivity

Description: Instrument Sensitivity checked against Copper standard.

Standard Copper Sensitivity	Specification	Results (Abs.)	Pass/Fail
5 mg/L Sensitivity SS Neb (if applicable)	> 0.250 Abs.	N/A	Not Applicable
2 mg/L Sensitivity HS Neb (if applicable)	> 0.250 Abs.	N/A	Passed

## 10. Review:

- ☒ Review with the customer PM work performed.  
☒ Review with the customer routine maintenance procedures.  
☒ Discuss recommended customer supplied materials to have on hand.  
☒ Attach PM sticker.

## Additional Comments

Additional Comments Regarding the PM

## Review

The preventive maintenance checks and if applicable performance tests for PinAAcle 900F have been completed.

This PinAAcle 900F ☒ Passes ☐ Fails the preventive maintenance.

## Review of Preventive Maintenance:

Authorized PerkinElmer Representative:	Date: 29 Apr 2025 (DD-MMM-YYYY)
Authorized Customer Representative:	Date: 29 Apr 2025 (DD-MMM-YYYY)

PinAAcle 900F Preventive Maintenance Report (PM)

Page 6 of 7

PinAAcle 900F Preventive Maintenance Report (PM)

Page 7 of 7

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



PerkinElmer Scientific (Thailand) Co., Ltd.  
250 Soi Soorajai 4  
Khwaeng Bangkapi, Khwaeng Huay Kwang  
Bangkok 10310  
Thailand  
Tel: 66 2719 6420 ; Fax: +66 2 319 7900  
http://www.perkinelmer.com

Customer Acknowledgment of receipt of the above repair / replacement.

Special Terms and Conditions: This is not an invoice.

Terms will be applied to your invoice if applicable.

## Service Report

Work Order Number	Activity Code	Billing Type	Requested Start Date	Model	Serial Number
WO-03126047	Planned Maintenance	Contract	10/01/2025 11:35 h.	AAN3300051	PHB55031902
Service Representative Name		Contract Number	Expiry Date	Equipment ID	System ID
Karnan, Chayanon		SC-0039964100	31/10/2025	N/A	N/A
		UCI Number			
		N/A			
Equipment Location		Bill To Name			
บริษัท ทรานส์เทคโนโลยี จำกัด อาคาร 10 ชั้น ถนนสุขุมวิท กรุงเทพมหานคร 10110 TH		บริษัท ทรานส์เทคโนโลยี จำกัด อาคาร 10 ชั้น ถนนสุขุมวิท กรุงเทพมหานคร 10110 TH			
Customer Contact	Phone Number	Fax Number	Email	Purchase Order	
K. ทรานส์เทคโนโลยี (TranTech)	055-5592049	N/A	richakorn.prasert199@gmail.com	HPO-050106002	

## Work Description

- PM 20 (Annual) - Cleaning Cell, Chopper, Filter - Wavelength Calibrate : Pass - Wavelength Scan As.Cu.Ba.K.Ni : Pass - Align cell with Hg : OK	
Start Date	End Date
29/04/2025	05/05/2025

## Tools Used

Quantity	Calibrated Tool	Description	Serial Number	Last Calibration Date	Next Calibration Date
*** No Calibrated Tools Used ***					

## Material Used

Part Number	Part Description	Note	Lot/Serial Number	Quantity
*** No Parts Used ***				

## Labour Details

Part Number	Part Description	Start Date	Quantity
25430013	Preventative maintenance	28/04/2025	4

Work Complete		Customer Signature	Technician Signature
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	ชญาณอน	Chayanon K.
PM/QSPV Left with Customer			
Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	8/5/2568 K. ทรานส์เทคโนโลยี (TranTech)	8/5/2568 Karnan, Chayanon

Terms &amp; Conditions

เอกสารไม่ควบคุม


Page 2 of 2

8/5/2568 WO-03126047

เอกสารไม่ควบคุม

Page 2 of 2

Atomic Absorption/FLAS 100/400 Preventive Maintenance (PM)			
Company Name:	United Analyst and Engineering Consultant Co., LTD.		
Address (Instrument Location):	41 Sukumvit Rd., Phra Khanong, Bangkok 10260		
Room Number:	Lab		
Asset Number (if applicable):	2 of 2W	Customer System ID:	K. Yanida
Service Engineer Name:	K. Chayanan	Service Order Number:	WO-03051971
Date PM Performed: (DD-MM-YYYY)	29-Apr-2025	Next PM Due Date: (DD-MM-YYYY)	29-Oct-2025

Part Number	Release	Publication Date	
09370005	C	January 2013	

#### Scope

The purpose of this PM is to ensure the continued functionality of the Atomic Absorption/FLAS 100/400 by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. The customer should save their method before the PM begins.

#### General Instructions:

Always check with the customer before making any changes that may affect the customer's analysis or calibration. The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer. Update the PM sticker and instrument logbook as required.

#### Copyright Information

This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this publication may be reproduced in any form whatsoever or translated into any language without the prior, written permission of PerkinElmer, Inc. Copyright © 2013 PerkinElmer, Inc.

#### Trademarks

Registered names, trademarks, etc. used in this document, even when not specifically marked as such, are protected by law. PerkinElmer is a registered trademark of PerkinElmer, Inc. All other trademarks and registered trademarks not owned by PerkinElmer, Inc. or its subsidiaries that are depicted herein are the property of their respective owners. Except as specifically set forth in its terms and conditions of sale, PerkinElmer makes no warranty of any kind with regard to this document, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. PerkinElmer shall not be liable for incidental or consequential damages in connection with the furnishing or use of this document.

### Component List

Component / Specific Model	Serial #	Firmware Version	Configuration Notes
FLAS100	100S24040501	2.20	Syngistix V4.0.1.1935

### Parts Lists

Parts Included with the PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
B050 2706	Fan Filter	1	N/A	N/A

Additional Tools Required for PM				
Part Number (if applicable)	Description	Quantity	Serial #	Calibration Due Date (MM/YY)
N/A	Digital Volt Meter	1	N/A	N/A

Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A	N/A	N/A	N/A	N/A

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

### Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

#### 1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.

- ☒ Is the Working Environment Acceptable? If not, document.

- ☐ Visual Damage (if yes, describe)

- ☒ Check incoming AC line voltage for proper levels and grounding.  
☒ Verify Voltage switch on back of instrument is correct.  
☒ Perform general inspection of system for cleanliness. Clean if needed.  
☒ Gas supply cylinders secured, lines leak checked and argon or nitrogen supply pressure verified (45 – 58 psi).  
☒ Inspect the customer log book and make any appropriate PM entries.  
☒ Fan checked and filter cleaned  
☒ Heating mantle or Universal Cell Holder checked

#### 2. Instrument components

- ☒ Non-return valve checked/repairs/replaced if needed (B019 8111). Clean the valve if there is any liquid in it. Replace the rubber sleeve (B013 5123) if it is worn. Check the flow meter for any signs of fluid in it. Clean the flow meter if needed.  
☒ Verify condition of pump pressure adjustment levers (B050 7794 - look for cracks or problems with the springs), pump rollers (B300 0251 check for wear), and thumb screws (B050 7796).  
☒ Check the Multiport valve for proper switching, flow, and insure there are no leaks. Clean valve parts and replace o-rings if needed (large o-ring: B050 1250, small o-ring: B004 5095). Use a squirt bottle & fishing line to try to dislodge clogs.  
☒ Firmware Version checked. Latest is 2.20.

#### 3. Mixing/Separation Assembly & Pump Tubing:

- ☒ Mixing separator assembly checked  
☒ Filter/membrane checked (B050 8306)  
☒ Condition of the pump tubing (replace if necessary), correct pump tubing for the solutions being run. Make sure the correct magazines are being used. B050 7791 for 0.13 – 1.80 mm tubing; B050 7792 for 1.60 – 3.18 mm tubing.

เอกสารไม่ควบคุม

#### 4. Cell, Cell Windows, Transfer Line:

- ☒ Cell checked  
☒ Cell windows checked  
☒ Transfer line checked for moisture (if moisture is a problem, the Nafion dryer might be needed)

#### 5. Operational Tests:

- ☒ Run DI water through the carrier/reductant/sample system. Verify smooth flow of liquid throughout without leaks. Replace tubing & fittings if needed.

#### 6. Review:

- ☒ Review with the customer PM work performed.  
☒ Review with the customer routine maintenance procedures.  
☒ Discuss recommended customer-supplied materials to have on hand.  
☒ Attach PM sticker.  
☒ Update Logbook.

เอกสารไม่ควบคุม



## Additional Comments

Additional Comments Regarding the PM

## Document History

Revision	Description of Change	Page(s)	Date
A	First release		May 2008
B	Addition of Batch/Lot Number, Expiration Date, and Report Fields.	2,7	February 2009
C	Update to new format	All	January 2013

## Review

The preventive maintenance checks and if applicable performance tests for FIAS 100/400 have been completed.	
This FIAS 100/400 Passes <input checked="" type="checkbox"/> Fails <input type="checkbox"/> the preventive maintenance.	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative: <i>Chayman k</i>	Date: 29 Apr 2025 (DD-MMM-YYYY)
Authorized Customer Representative: <i>สุวิทย์ หอคำ</i>	Date: 29 Apr 2025 (DD-MMM-YYYY)

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



PerkinElmer Scientific (Thailand) Co., Ltd.  
290 Soi Soonthorn 4  
Khwang Bangkapi, Khet Huay Kwang  
Bangkok 10310  
Thailand  
Tel: 66 2719 8420 : Fax: +66 2 319 7900  
http://www.perkinelmer.com

Customer Acknowledgment of receipt of the above repair / replacement.  
Special Terms and Conditions: This is not an invoice.  
Terms will be applied to your invoice if applicable.

## Service Report

Work Order Number	Activity Code	Billing Type	Requested Start Date	Model	Serial Number
WO-03051971	Planned Maintenance	Contract	10/03/2568 23.08 u.	B0558570	10024043921
Service Representative Name	Contract Number	Expiry Date	Equipment ID	System ID	
Kanan, Chayman	BC-003889090	24/05/2025	N/A	N/A	
UDI Number					
N/A					
Equipment Location			SB To Name		
บริษัท อีโคโนมิค เซอร์วิส จำกัด อาคารพาณิชย์ 100/100 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10200 TH			บริษัท อีโคโนมิค เซอร์วิส จำกัด อาคารพาณิชย์ 100/100 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10200 TH		
Customer Contact	Phone Number	Fax Number	Email	Purchase Order	
K. Nithakorn amritsu	095-6589069	N/A	perkitosha.n42@gmail.com	HPO-240430211	

Work Description		
- PM 312 Warranty - Clearing Port Valve, Memfold, Tuning - Run Up test : Pass Start Date: 29/04/2025 End Date: 29/04/2025 29/04/2025 29/04/2025		
Work Description		

Tools Used					
Quantity	Calibrated Tool	Description	Serial Number	Last Calibration Date	Next Calibration Date
*** No Calibrated Tools Used ***					

Material Used					
Part Number	Part Description	Note	Lot/Serial Number	Quantity	
*** No Parts Used ***					

Labour Details			
Part Number	Part Description	Start Date	Quantity
SV030013	Preventative maintenance	29/04/2025	3
SV030002	Service Travel	29/04/2025	1

Work Complete	Customer Signature	Technician Signature
Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	<i>สุวิทย์ หอคำ</i>	<i>Chayman k</i>
PM/QOPV Left with Customer Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
95/2568 K. Nithakorn amritsu		95/2568 Kanan, Chayman


Terms & Conditions

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



DQE Services Co.,Ltd.  
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230  
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

  
DQE Services


REPORT OF CALIBRATION

Certificate No. : SP25-001Page 4 of 5

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7469	0.744	0.0029	0.0057	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8674	0.863	0.0044	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2919	0.290	0.0019	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6430	0.640	0.0030	0.0055	2.00

DQE Services Co.,Ltd.  
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230  
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

  
DQE Services

REPORT OF CALIBRATION

Certificate No. : SP25-001Page 5 of 5

Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.72	241.1	0.62	0.18	2.00
279.45	279.0	0.45	0.18	2.00
287.81	287.3	0.51	0.18	2.00
334.06	333.8	0.26	0.18	2.00
360.93	360.6	0.33	0.18	2.00
418.59	418.2	0.39	0.18	2.00
445.94	445.5	0.44	0.18	2.00
453.66	453.4	0.26	0.18	2.00
460.02	459.8	0.22	0.18	2.00
536.59	536.6	-0.01	0.18	2.00
637.98	637.7	0.28	0.18	2.00
431.38	431.1	0.28	0.18	2.00
472.50	472.3	0.20	0.18	2.00
513.47	513.4	0.07	0.18	2.00
528.88	528.9	-0.02	0.18	2.00
573.17	573.3	-0.13	0.18	2.00
585.35	585.1	0.25	0.20	2.00
684.40	684.5	-0.10	0.18	2.00
740.72	741.0	-0.28	0.20	2.00
748.55	748.8	-0.25	0.18	2.00
807.03	807.3	-0.27	0.18	2.00
879.28	879.6	-0.32	0.18	2.00

Remark : - UUC = Unit Under Calibration  
- N/A = Not Available  
- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k ,  
which for a normal distribution corresponds to a coverage probability of approximately 95%  
- End of Certificate -

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

Technology



Service Report

TO	FOR
Company: United Analyst and Engineering Consultant Co., Ltd. _ Bangkok-HQ Address: 700/2 หมู่ที่ 1 Phrakhanong District, Bangkok, 10260	Work Order Number: WO-00074079 Contact: Kamphong Boonpuang Email: kamphong.b@uaeconsultant.co.th Tel: +66 2763 2828 (7021), +66 8 6347 7390

WORK ORDER INFORMATION			
Top-Level		Order Type	Preventive Maintenance
Installed Product ID	IB-00105024	Billing Type	Chargeable
Product	SKALAR 2SAN59000 SAN++ Classic CFA 230V 2SAN59000	PO No.	HPO-250400209
Serial No.	182688	Warranty No.	
		Contract No.	

PRODUCTS SERVICED		
Installed Product Id	Serial Number	Product
IB-00105024	182688	SKALAR 2SAN59000 SAN++ Classic CFA 230V 2SAN59000

PROBLEM DESCRIPTION	
PM 1 ครั้ง/ปี **ในแผนการค่าเลขที่ Q-120095	

Line Number	Engineer	Start Date And Time	End Date And Time	Billable Labor Hour	Billable Travel Hour	Travel KM
WL-00342192	Yongyuth Chanphong	05/23/2025 9:30 AM	05/23/2025 6:00 PM	8.5		
Total				8.5	0	0

เอกสารไม่ควบคุม

Technology



Line Number	Work Description
WL-00342192	- ทำ PM เสริมแล้ว, เครื่องพร้อมใช้งาน

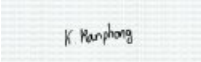
PARTS CONSUMED		
Part No	Part Description	Quantity

EXPENSES			
Part No	Expense Type	Description	Line Quantity

RECOMMENDED PARTS	
อะไหล่สำรองที่ควรสั่งซื้อทั้งหมด 7 รายการ คือ Pump tube 3 รายการ (SA3028, SA3032 และ SA3034), หลอดไฟ Halogen 6V/10W (90020012) 1 รายการ จำนวน 2 หลอด, Tubing polyethylene 3 รายการ (SA3142, SA5141 และ SA5142)	

REMARKS
---------

Travel Time Disclaimer:  
Please note that the travel time in this report only includes time taken to reach the installed equipment location. It does not include our engineer's return travel time.

Customer Signature:  
  
Customer Signature

Technician: Yongyuth Chanphong  
Job Title: Service Manager  
Email yongyuth.yc@dksh.com

Date: 06/06/2025

เอกสารไม่ควบคุม



Test Report			
Job No. WO-00074079			
CustomersUnited Analyst and Engineering Consultant Co., Ltd.			
Equipment	Continuous Flow Analyzer	Manufacturer	SKALAR
Controller Mdel	SA5000	Auto Sample Model	SA1052
Controller Serial No.	182688	Auto Sample Serial No.	181729
Date of test	23-May-2025	Period	12 Month
Environment temperature	24.3 °C	Humidity	54.4 %RH

Results

Item	Characteristic	Before		After		Remark
1	Visual inspect	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	
2	Power supply (210 - 240 VAC)	220	VAC	220	VAC	
3	Computer	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	
4	Program	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	
5	Auto sampler	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	
6	Module holder					
	- Motor pump	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	
	- Pump tube	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	*
	- Air-injection	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	*
	- Chemistry manifolds, Switching valve, Coil, Membrane	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	
7	Detector					
	- Filter	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	
	- Flow cell	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	
	- Lamp	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	
8	Interface	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	
9	Rinsing valves	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	N/A
10	Temperature / Reactor	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	N/A
11	Flame photometer	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	N/A
12	UPS / Stabilizer	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	N/A

Warning and Error Checked

Item	Event	Before	After
13	Error list	<input checked="" type="checkbox"/> None <input type="checkbox"/> Appear : _____	<input checked="" type="checkbox"/> None <input type="checkbox"/> Appear : _____

Check with Standard

Item	Characteristic	Before			After			Remark
14	Base Line Test	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A	
15	Detector Signal Test	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A	

Summary of checked

- ☒ The instrument can work normally and efficiently. (เครื่องมือสามารถทำงานได้ปกติและประสิทธิภาพ)
- ☐ The instrument can work but it's requiring to maintenance. (เครื่องมือสามารถทำงานได้แต่ต้องบำรุงรักษา)
- ☐ The instrument could not work it's requiring to repair. (เครื่องมือทำงานไม่ได้ต้องมีการซ่อมบำรุง)

Remark :

\* Pump tube, Tubing polyethylene and Air tube เป็นอะไหล่เก่า ไม่เป็นอะไหล่ใหม่ตามเอกสารการใช้งาน

- หมายเหตุ และอะไหล่ที่ตรวจสอบมีดังนี้ 7 รายการ ดังนี้
- อะไหล่ พาวเวอร์ Ammonia จำนวน 3 รายการ (SA3032, SA5141 และ 90020012)
  - อะไหล่ พาวเวอร์ Phenol and Cyanide จำนวน 6 รายการ (SA3028, SA3034, SA3142, SA5142 และ 90020012 )

Standard Equipment Used

Equipment	Equipment I.D.	
Digital multi meter	S/N 57600592	Due date : 19-Jun-2025
Thermo hygrometer	S/N 39520444/904	Due date : 27-Dec-2025

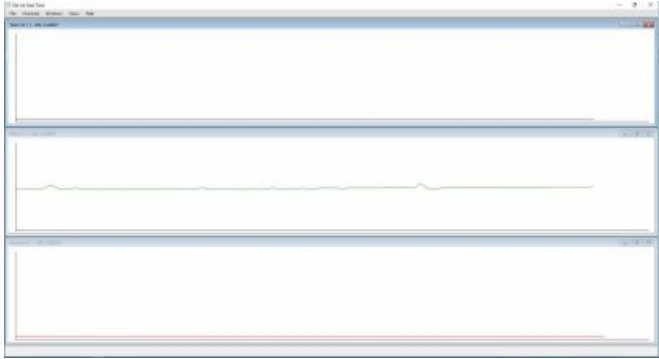
Test By :  ( Mr. Yongyuth Chanphong )

Approved by :  ( Mr. Eknaphong Wankiang )

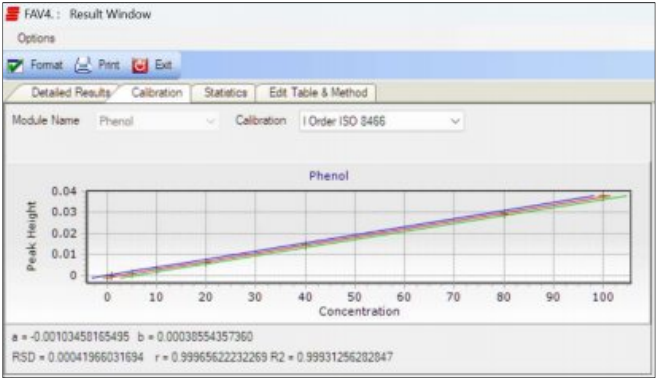
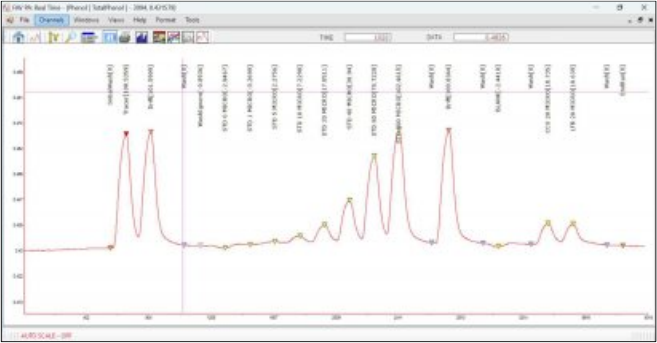
Position : Supervisor, Technical Service

Position : Manager, Technical Services

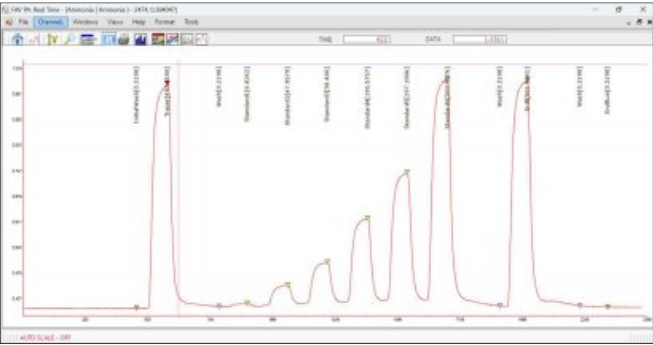
Base Line Test : Reagent\_Baseline\_CN\_Phenol\_NH3



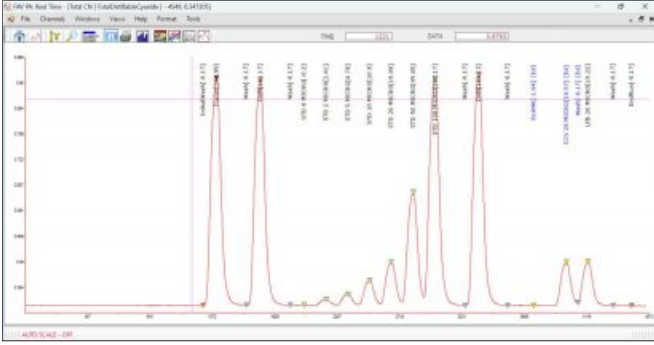
Detector Signal Test : Phenol



Detector Signal Test : NH3



Detector Signal Test : CN



เอกสารแนบ ช  
หนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

---



ที่ อก ๐๓๑๐(๑)/ ๑๔๙๑



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๔ กุมภาพันธ์ ๒๕๖๘

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูโนเด็ค แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๑๘ กุมภาพันธ์ ๒๕๖๘

ตามคำขอที่อ้างถึง บริษัท ยูโนเด็ค แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด  
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๔๕๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท  
แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน  
จำนวน ๓ ราย ได้แก่

- |                            |                             |
|----------------------------|-----------------------------|
| ๑) นายอภิสิทธิ์ ศรีคงแก้ว  | ทะเบียนเลขที่ ๖-๑๔๕๕-๖-๐๐๕๘ |
| ๒) นางสาวนันธิดา พรหมกยถ้ำ | ทะเบียนเลขที่ ๖-๑๔๕๕-๖-๐๑๗๐ |
| ๓) นายภูวดล เป้งมา         | ทะเบียนเลขที่ ๖-๑๔๕๕-๖-๐๑๔๘ |

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายธีรทัศน์ อิศรางกูร ณ อยุธยา)  
รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



นางภัทรา  
ดำเนินถูกต้อง



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่ อก ๐๓๑๐(๑)/ ๑๐๘๙



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐๗ กุมภาพันธ์ ๒๕๖๘

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท ยูโนเด็ค แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๓ ธันวาคม ๒๕๖๗

- สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔๐ ราย  
๒. รายชื่อเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๔๑ ราย  
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม

ตามคำขอที่อ้างถึง บริษัท ยูโนเด็ค แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด ขอต่ออายุ  
หนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๔๕๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑  
ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ยูโนเด็ค แอนนาลิสต์ แอนด์ เอ็นจิเนียริง  
คอนซัลแตนท์ จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

- ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔๐ ราย ตามสิ่งที่ส่งมาด้วย ๑  
ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๔๑ ราย ตามสิ่งที่ส่งมาด้วย ๒  
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำ/น้ำเสีย น้ำใต้ดิน อากาศเสีย  
สิ่งปฏิกลหรือวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กุมภาพันธ์ ๒๕๗๒ หากประสงค์จะต่ออายุหนังสือ  
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงาน  
อุตสาหกรรมภายใน ๖๐ วัน ก่อนวันสิ้นสุดอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายธีรทัศน์ อิศรางกูร ณ อยุธยา)  
รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมโรงงานอุตสาหกรรม

UAE UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED

นางภัทรา  
ดำเนินถูกต้อง

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ยูไนเต็ด แอนาไลสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด เลขทะเบียน ๖-๑๔๕

ที่ ออก ๐๓๑๐(๑)/ ๑ ๐ ๘ ๙ ลงวันที่ ๐๗ กุมภาพันธ์ ๒๕๖๘

ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔๐ ราย

๑) นางสาวกชวรรณ ภักธีรกุล	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๐๑
๒) นายณรงค์ นิพัทธ์	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๐๒
๓) นางสาวนันทิศา บุญไชย	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๐๓
๔) นางปิยะพัชร สุทนต์สงฆ์	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๐๔
๕) นางสาวเบญจวรรณ วิริโยทัย	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๐๖
๖) นายพรรัตน์ วงศ์อนุรักษ์ชัย	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๐๗
๗) นางสาวฉวีวรรณ บุญลา	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๐๘
๘) นายสุวิทย์ จอตนอก	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๐๙
๙) นางสาวโชติภา สมบูรณ์	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๑๐
๑๐) นางสาวบุษกร เลิศภาณุมาศ	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๑๑
๑๑) นางสาววิไลลักษณ์ ศรีสุข	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๑๒
๑๒) นายศิลา บรรจงใจรักษ์	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๑๔
๑๓) นายปฏิกรณ์ คณะนา	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๑๕
๑๔) นายธีรวัฒน์ ชนมัง	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๑๖
๑๕) นางสาวศิริพร ศรีประดิษฐ์	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๑๗
๑๖) นางสาวสาวิตรี ธีรวัจ	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๑๘
๑๗) นางสาวนพวรรณ อูราภิรักษ์	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๑๙
๑๘) นายภูษงค์ พานิชย์เลิศอำไพ	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๒๐
๑๙) นายณัฐวัฒน์ แดงสวัสดิ์	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๒๑
๒๐) นายเอกรัตน์ ปณะคามินทร์	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๒๒
๒๑) นางสาวนิศากรรัตน์ ศรีสกุลสิทธิโชค	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๒๓
๒๒) นางสาวเจตจรินทร์ ทำสะอาด	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๒๔
๒๓) นางสาวสุวรรณา คงทอง	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๒๕
๒๔) นางสาววรรกร พัดสองชั้น	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๒๖
๒๕) นายวิรัชยุทธ โมกแก้ว	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๒๗
๒๖) นายวัชรพงษ์ เทพดนตรี	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๒๘
๒๗) นายอนุศาสน์ ส่วยดี	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๒๙
๒๘) นายกรวิทย์ เจียศิริสกุล	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๓๐
๒๙) นายสุทธธีระ อรุณจันทร์	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๓๓
๓๐) นางสาวทัศนีย์ อ่อนคำ	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๓๔
๓๑) นางพริ้มพรรณ กองสิน	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๓๕
๓๒) นายศุภณัฐ คุณธนกาญจน์	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๓๖
๓๓) นางสาวศิริภาพร เหมือนแร่	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๓๗
๓๔) นางศิวานัส ขำนิล	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๓๘
๓๕) นางสาวพรนิกา ธีระจินดาชล	ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๓๙

๓๖)

๓๖) นายนาเคนทร์...

๓๖) นายนาเคนทร์ พันธุ์ชาติกุล

ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๔๐

๓๗) นายกานต์พงศ์ บุญพวง

ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๔๑

๓๘) นางสาวธรรมา แก้วชื่อนอก

ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๔๒

๓๙) นางสาวสริน ไชยเชษฐ์พิพัฒกุล

ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๔๓

๔๐) นางมานิดา แยมโย

ทะเบียนเลขที่ ๖-๑๔๕-ค-๐๐๔๔

๓๖)



UNITED ANALYST AND ENGINEERING  
CONSULTANT COMPANY LIMITED



UNITED ANALYST AND ENGINEERING  
CONSULTANT COMPANY LIMITED

นางสาวกนกพร  
ตำแหน่งผู้ควบคุมห้องปฏิบัติการ



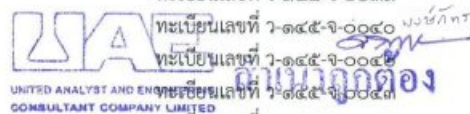
เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ยูไนเต็ด แอนาไลสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด เลขทะเบียน ๖-๑๔๔

ที่ อก ๐๓๑๐(๑) / ๑๐ ๘ ๙ ลงวันที่ ๐๗ กุมภาพันธ์ ๒๕๖๘

ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๔๑ ราย

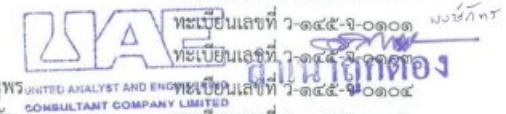
๑) นายสุสันต์ พันสิงห์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๑
๒) นายพีรณัฐ เจริญผล	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๓
๓) นางสาววิไลลักษณ์ เกโรสง	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๔
๔) นายสมชาติ อุทุมรัตน์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๕
๕) นางสาวปรมาภรณ์ ทองแก้ว	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๖
๖) นางสาวกัลยา สมพงษ์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๗
๗) นางสาววรรณิ์ สายบุญเรือน	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๑๐
๘) นายกฤษณพงษ์ นามทิพย์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๑๑
๙) นางสาวอาภรณ์ อ่อนคง	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๑๒
๑๐) นายกิตติศักดิ์ ทรงจำรัส	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๑๓
๑๑) นางสาวอักษรินทร์ บุญคง	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๑๔
๑๒) นางสาวพรพิมล แวนทอง	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๑๕
๑๓) นายอภิวิชญ์ ท่วงที	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๑๗
๑๔) นายมานิตย์ ปานโชติ	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๑๘
๑๕) นายทศพร ธนะพิรุห์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๑๙
๑๖) นางสาวกัลยาณี โยธา	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๒๐
๑๗) นางสาวเกวลี สุทธิ	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๒๑
๑๘) นางสาวชมชนิ์ ภูมิพัทธ์ปภา	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๒๒
๑๙) นายศิริพัชร จงผดุงเกียรติ	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๒๓
๒๐) นางสาวสุภาวดี อินยาศรี	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๒๔
๒๑) นายพงศ์เทพ เหล่าขจร	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๒๕
๒๒) นายขวัญชัย พันทุกข์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๒๖
๒๓) นางสาวพัชจิรา คดีพิศาล	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๒๗
๒๔) นางสาวเมธิกา เสือคำจันทร์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๒๘
๒๕) นายพีระพัฒน์ บุญญิตศิลป์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๓๒
๒๖) นายชัชวาลย์ เลื่อนล่อง	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๓๔
๒๗) นายณกสินธุ์ อุธธรรมรัตน์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๓๖
๒๘) นายกันนิกร ระโส	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๓๗
๒๙) นายปริญญา กลมเกลียว	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๓๘
๓๐) นายธีรวัจน์ มาตรโพธิ์ศรี	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๔๐
๓๑) นายบุญญฤทธิ์ ก้อนสิน	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๔๑
๓๒) นายพรชวุฒิ ไกลสกุล	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๔๓
๓๓) นายอชิษฐ์ แสงจันทร์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๔๔
๓๔) ว่าที่ร้อยตรีณัฐพงศ์ เมืองชัย	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๔๕
๓๕) นายธนัท เลิศประเสริฐ	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๔๖



๓๖) นางสาวนิภาพร จันทเขตต์

๓๖) นางสาวนิภาพร...

๓๖) นางสาวนิภาพร จันทเขตต์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๔๗
๓๗) นายรณภพ ภูตระกูลพัฒนา	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๔๘
๓๘) นายสมพงศ์ สกุลไทย	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๕๑
๓๙) นายสุริยัน นิธิเขตขุวงศ์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๕๒
๔๐) นายอัษฎาภรณ์ ยนศิริ	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๕๓
๔๑) นายเอกภูมิ แสนอใจ	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๕๔
๔๒) นายสุสันต์ บุญเลี้ยง	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๕๕
๔๓) นายธเนศ หวานเสนาะ	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๕๖
๔๔) นายอภิสิทธิ์ ศรีคงแก้ว	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๕๘
๔๕) ว่าที่ร้อยตรีอุทัย แก้วราภุมุข	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๖๐
๔๖) นางสาวนารินทร์ สานนท์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๖๑
๔๗) นายศุภกร รินวงศ์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๖๒
๔๘) นางสาวจินตสุภา เปลี่ยนศรี	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๖๕
๔๙) นางสาวเนตรนภา กมลบูรณ์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๖๖
๕๐) นางสาวอารียา ทรากรมย์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๖๗
๕๑) นายจิรวัฒน์ สุขเกษม	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๖๘
๕๒) นายกิตติพงษ์ สอนชัยภูมิ	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๖๙
๕๓) นายจุมพล สวนเพชร	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๗๐
๕๔) นางสาวพัชรภรณ์ แสงฟ้า	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๗๑
๕๕) นายรัตนชัย เหล่ามา	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๗๒
๕๖) นายอิทธิพงษ์ ศรีวิเศษ	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๗๓
๕๗) นางสาวกรรณิการ์ สาสีทา	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๗๔
๕๘) นางสาวณัฐชา พรหมศิริ	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๗๕
๕๙) นายณกสิทธิ์ ศรีพิมพ์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๘๕
๖๐) นางสาวลักขณา จันทสุข	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๘๖
๖๑) นายศักดิ์ศิรินทร์ นุ่มนัม	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๘๙
๖๒) นายวรพงษ์ นนทจันทร์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๙๐
๖๓) นางสาวชนาภา มาคะมาตร	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๙๑
๖๔) นายณัฐชัย พรหมอารักษ์	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๙๖
๖๕) นายชินนทร์ พานแก้ว	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๙๗
๖๖) นายปรัชชาพล โสภา	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๙๘
๖๗) นายวัชรินทร์ แสนงาม	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๐๙๙
๖๘) นายอาทิตย์ อุดมผล	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๑๐๑
๖๙) นายอิทธิเดช ใจบุญ	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๑๐๓
๗๐) นายคณิติน พงษ์อัครานุพร	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๑๐๔
๗๑) นายเสฏฐวุฒิ เอมกลิ่นบัว	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๑๐๖
๗๒) นางสาวนาตาชา แหวนในเมือง	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๑๐๙
๗๓) นางสาวพิมลวรรณ สิมมา	ทะเบียนเลขที่ ๖-๑๔๔-จ-๐๐๑๑๐



๗๔) นายณัฏฐ์...

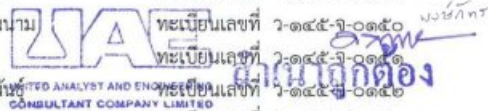
๗๔) นายณัฏฐ์...



๗๔) นายนันท์วัฒน์ วงศ์คำ  
๗๕) นายประพันธ์ฤทธิ์ เมื่อนาง  
๗๖) นางสาวคัมภีร์ ลาจิต  
๗๗) นางสาวนภาพร ชื่นนุกชุม  
๗๘) นางสาวเบญญา มอมงคุณ  
๗๙) นายอมรพล อมรลักษณ์  
๘๐) นางสาวศรีเพชร ทองขาว  
๘๑) นางสาวณิชากร สุขชาติไกรสร  
๘๒) นางสาววิมลวรรณ คำตัน  
๘๓) นายคุณานนท์ ฤทธากานานนท์  
๘๔) นายชาญณรงค์ อ่ำลอย  
๘๕) นางสาวจิตราพร ศรีวรรณ  
๘๖) นายสุจิต ไปขึ้นเงิน  
๘๗) นายเจษฎา ช่วยตรีภ  
๘๘) นายรัชต์ เหมะธูลิน  
๘๙) นายสุโชค หล้าโท  
๙๐) นายชัย บัวสด  
๙๑) นางสาวอรุณา ประสานศรี  
๙๒) นายพนพล เนียมนิยม  
๙๓) นายศุภกร สวนศรี  
๙๔) นายคมพล คิลานนท์  
๙๕) นายโชคชัย พุ่มไสว  
๙๖) นายธีรวัฒน์ ธรรมสุวรรณ  
๙๗) นายนิพนธ์พงศ์ ชะขุนทด  
๙๘) นางสาวณัฐกฤตา พลนิกรกิจ  
๙๙) นางสาวชไมพร ทองบุรณ์  
๑๐๐) นางสาวพรชิตา ขจรเนติยุทธ  
๑๐๑) นางสาวเพ็ญพิชชา รอดทอง  
๑๐๒) นางสาวณัฏฐา แสงสว่าง  
๑๐๓) นายกิตติ สืออาจ  
๑๐๔) นายศุภพร คงศรี  
๑๐๕) นางสาวสุภัทสร่า เอี่ยมเงิน  
๑๐๖) นางสาวพรรณทิพา อะโนนาม  
๑๐๗) นายอนันต์ มุตอ  
๑๐๘) นางสาวพรพิมล ประชาพันธ์  
๑๐๙) นายวิรัชกร บุญญาธิ  
๑๑๐) นางสาวณัฐชา แก้วภาพ  
๑๑๑) นายสิทธิพล พร้อมพ้อชื่นบุญ  
๑๑๒) นางสาวนนท์ทิศา กลิ่นหนู

ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๑๑  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๑๒  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๑๓  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๑๔  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๑๕  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๑๖  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๑๗  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๑๘  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๑๙  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๒๐  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๒๑  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๒๒  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๒๓  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๒๔  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๒๕  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๒๖  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๒๗  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๒๘  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๒๙  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๓๐  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๓๑  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๓๒  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๓๓  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๓๔  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๓๕  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๓๖  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๓๗  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๓๘  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๓๙  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๔๐  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๔๑  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๔๒  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๔๓  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๔๔  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๔๕  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๔๖  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๔๗  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๔๘  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๔๙  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๕๐  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๕๑  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๕๒  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๕๓  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๕๔  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๕๕  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๕๖  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๕๗  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๕๘  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๕๙  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๖๐

๑๑๓) นางสาวปิทยา...



๑๑๓) นางสาวปิทยา ชูเจ็ดเชื้อ  
๑๑๔) นางสาวลัดดาวัลย์ โพธิ์พันธ์  
๑๑๕) นายอาทิตย์ คำภา  
๑๑๖) นางสาวบุญยาพร บุญถนอมศรี  
๑๑๗) นางสาวพัชรารัตน จันธิบุตร  
๑๑๘) นางสาวนฤกร ไก่บ้านกาย  
๑๑๙) นางสาวปวีณา แดนชนบ  
๑๒๐) นางสาวนันธิดา พรหมกยถ้ำ  
๑๒๑) นางสาวกมลชนก ปูนคำ  
๑๒๒) นางสาวปาริฉัตร ทองใบ  
๑๒๓) นายชัยวัฒน์ จันละคร  
๑๒๔) นางสาวกัญญา สิงห์แก้ว  
๑๒๕) นางสาวอารีนา มะดีเยาะ  
๑๒๖) นายธรากรณ์ อนุรา  
๑๒๗) นางสาวชามันดา กิมาคม  
๑๒๘) นายธนบดีนทร์ ยาเหลี่ยม  
๑๒๙) นายวีระพงษ์ แสงท้านัง  
๑๓๐) นางสาวปิยะณัฐชา สำภาพงษ์  
๑๓๑) นางสาวนภัสสร ศรีสถาน  
๑๓๒) นางสาวจรัญรัตน์ โสแทน  
๑๓๓) นายธีรวัฒน์ พรหมลา  
๑๓๔) นายธนวิทย์ ปลั่งกลาง  
๑๓๕) นายณภัทร เตมียบุตร  
๑๓๖) นางสาวจิตาภา ฤาชา  
๑๓๗) นางสาวสุนันทาทิพย์ สังข์ทอง  
๑๓๘) นางสาวชาริสา บาบุญ  
๑๓๙) นายภูวดล เบ่งมา  
๑๔๐) ว่าที่ร้อยตรีณฤศพร ประทุมเขตต์  
๑๔๑) นายอนุสร พลสำโรง

ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๖๐  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๖๑  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๖๒  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๖๓  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๖๔  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๖๕  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๖๖  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๖๗  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๖๘  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๖๙  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๗๐  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๗๑  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๗๒  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๗๓  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๗๔  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๗๕  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๗๖  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๗๗  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๗๘  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๗๙  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๘๐  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๘๑  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๘๒  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๘๓  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๘๔  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๘๕  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๘๖  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๘๗  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๘๘  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๘๙  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๙๐  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๙๑  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๙๒  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๙๓  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๙๔  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๙๕  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๙๖  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๙๗  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๙๘  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๑๙๙  
ทะเบียนเลขที่ ๖-๑๔๕-จ-๐๒๐๐

นางภัท



เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ยูโนเทค แอนนาลิซิส แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด เลขทะเบียน ๖-๑๔๔

ที่ ออ ๐๓๑๐(๑) / ๑๐๘๙ ลงวันที่ ๐๗ กุมภาพันธ์ ๒๕๖๘

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๕๗ รายการ

น้ำ/น้ำเสีย จำนวน 46 รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
2	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
3	Barium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
4	α-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
5	β-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
6	δ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
7	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
8	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method <sup>[4]</sup> 2) 5-Day BOD Test, Membrane Electrode Method <sup>[4]</sup>
9	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
10	Chemical Oxygen Demand	1) Closed Reflux, Titrimetric Method <sup>[4]</sup> 2) Closed Reflux, Colorimetric Method <sup>[4]</sup> 3) Open Reflux, Titrimetric Method <sup>[4]</sup>
11	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
12	Chromium	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
13	Color	ADMI Weighted-Ordinate Spectrophotometric Method <sup>[4]</sup>
14	Copper	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
15	Cyanide	1) Distillation, Colorimetric Method <sup>[4]</sup> 2) Total Cyanide after Distillation, by Flow Injection Analysis Method <sup>[4]</sup>
16	o,p'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
17	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
18	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
19	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
20	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
21	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
22	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
23	Endosulfan sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
24	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>

25 Endrin aldehyde...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
25	Endrin aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
26	Formaldehyde	Distillation, Colorimetric Method <sup>[2]</sup>
27	Free Chlorine	1) Iodometric Method <sup>[4]</sup> 2) DPD Ferrous Titrimetric Method <sup>[4]</sup>
28	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
29	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
30	Hexavalent Chromium	Colorimetric Method <sup>[4]</sup>
31	Lead	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
32	Manganese	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
33	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[4]</sup>
34	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
35	Nickel	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
36	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method <sup>[4]</sup> 2) Soxhlet Extraction Method <sup>[4]</sup>
37	pH	Electrometric Method <sup>[4]</sup>
38	Phenols	1) Distillation, Chloroform Extraction Method <sup>[4]</sup> 2) Distillation, Direct Photometric Method <sup>[4]</sup>
39	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
40	Sulfide	1) Iodometric Method <sup>[4]</sup> 2) Methylene Blue Method <sup>[4]</sup>
41	Temperature	Laboratory and Field Methods <sup>[4]</sup>
42	Total Dissolved Solids	Dried at 180 °C <sup>[4]</sup>
43	Total Kjeldahl Nitrogen	Semi-Micro-Kjeldahl Method <sup>[4]</sup>
44	Total Suspended Solids	Dried from 103 to 105 °C <sup>[4]</sup>
45	Trivalent Chromium	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation <sup>[4]</sup>
46	Zinc	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>

น้ำใต้ดิน...



น้ำใต้ดิน จำนวน 126 รายการ

- ๓ -

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
2	Acetone	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
3	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
4	Anthracene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
5	Antimony	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
6	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
8	Barium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
9	Benz(a)anthracene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
10	Benzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
11	Benzo(b)fluoranthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
12	Benzo(k)fluoranthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
13	Benzoic acid	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

14 Benzo(a)pyrene...

- ๔ -

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
14	Benzo(a)pyrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
15	Benzo(g,h,i)perylene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
16	Beryllium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
19	Bromodichloromethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
20	Bromoform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
21	Butanol	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
22	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
23	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
25	Carbon disulfide	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
26	Carbon tetrachloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
27	Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

29 Chlorobenzene...



ลำดับ	สารมลพิษ	วิธีวิเคราะห์
29	Chlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
30	Chlorodibromomethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
31	Chloroform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
33	Chromium	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
34	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation <sup>[4]</sup>
35	Chromium (VI)	Colorimetric Method <sup>[4]</sup>
36	Chrysene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
37	Cyanide	Distillation, Colorimetric Method <sup>[4]</sup>
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup>
39	DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
40	DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
41	DDT	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
42	Dibenz(a,h)anthracene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

43 Di-n-butyl phthalate...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
43	Di-n-butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
44	1,2-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
45	1,3-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
46	1,4-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
47	3,3'-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
48	1,1-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
49	1,2-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
50	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
51	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
52	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
54	1,2-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
55	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
56	1,3-Dichloropropene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
57	Dieldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
58	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

61 2,4-Dinitrotoluene...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
63	Di-n-Octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
64	Endosulfan	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
65	Endrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
66	Ethylbenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
67	Fluoranthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
68	Fluorene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
69	Heptachlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
70	Heptachlor epoxide	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
72	Hexachloro-1,3-butadiene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
73	n-Hexane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

74  $\alpha$ -HCH...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
74	$\alpha$ -HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
75	$\beta$ -HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
76	$\gamma$ -HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
79	Indeno(1,2,3-cd)pyrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
81	Lead	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method <sup>[4]</sup> 3) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
82	Manganese	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
83	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[4]</sup>
84	Methanol	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
85	Methoxychlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
86	Methyl bromide	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

87 Methylene chloride...



ลำดับ	สารมลพิษ	วิธีวิเคราะห์
87	Methylene chloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
89	2-Methylnaphthalene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
90	Methyl tert-butyl ether	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
91	Naphthalene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
92	Nickel	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
95	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB-1242 - PCB-1248 - PCB-1254 - PCB-1260	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
98	pH	Electrometric Method <sup>[4]</sup>
99	Phenanthrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

100 Phenol...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
100	Phenol	1) Distillation, Chloroform Extraction Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
101	Pyrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
102	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
103	Silver	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
104	Styrene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
105	1,1,2,2-Tetrachloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
106	Tetrachloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
107	Toluene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
108	Toxaphene	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
109	TPH (C <sub>5</sub> - C <sub>8</sub> )	1) Purge and Trap, Gas Chromatographic Method <sup>[12,22]</sup> 2) Purge and Trap, Gas Chromatographic/Mass spectrometric Method <sup>[12,27]</sup>
110	TPH (C <sub>9</sub> - C <sub>16</sub> )	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[9,22]</sup>
111	TPH (C <sub>16</sub> - C <sub>35</sub> )	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[9,22]</sup>
112	1,2,4-Trichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
113	1,1,1-Trichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
114	1,1,2-Trichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
115	Trichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

116 2,4,5-Trichlorophenol...



ลำดับ	สารมลพิษ	วิธีวิเคราะห์
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
118	1,3,5-Trimethylbenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
119	Vanadium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
120	Vinyl acetate	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
121	Vinyl chloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
122	m-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
123	o-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
124	p-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
125	Xylene (Total)	Purge and Trap Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
126	Zinc	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>

อากาศเสีย (ปล่อยระบาย) จำนวน 25 รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
2	Arsenic	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
3	Cadmium	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
4	Carbon Monoxide	Instrumental Analyzer Method <sup>[5]</sup>
5	Chlorine	Isokinetic Sampling, Ion Chromatographic Method <sup>[5]</sup>
6	Chromium	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method <sup>[5]</sup>

Chromium (ต่อ)...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
6	Chromium (ต่อ)	2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
7	Cobalt	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
8	Copper	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
9	Cresol	Absorption Sampling, Gas Chromatographic Method <sup>[5]</sup>
10	Dioxins/Furans	Isokinetic Sampling <sup>[5]</sup>
11	Hydrogen Chloride	Isokinetic Sampling, Ion Chromatographic Method <sup>[5]</sup>
12	Hydrogen Fluoride	Isokinetic Sampling, Ion Chromatographic Method <sup>[5]</sup>
13	Hydrogen Sulfide	Absorption Sampling, Iodometric Method <sup>[5]</sup>
14	Lead	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
15	Manganese	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
16	Mercury	Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[5]</sup>
17	Nickel	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
18	Opacity	Ringelmann's Method <sup>[1]</sup>
19	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic acid Method <sup>[5]</sup> 2) Instrumental Analyzer Method <sup>[5]</sup>
20	Selenium	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[5]</sup> 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
21	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method <sup>[5]</sup> 2) Instrumental Analyzer Method <sup>[5]</sup>
22	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method <sup>[5]</sup>

23 Total Suspended Particulate...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
23	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method <sup>[5]</sup>
24	Vanadium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
25	Xylene	1) Bag Sampling, Gas Chromatographic Method <sup>[5]</sup> 2) Adsorption Sampling, Gas Chromatographic Method <sup>[5]</sup>

สิ่งบ่งชี้หรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
3	Arsenic	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[3,6,16]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[7,16]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
6	Cadmium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[3,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>

8 Chromium...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
8	Chromium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[3,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
9	Chromium (III)	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation <sup>[3,6,15,17]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation <sup>[3,6,14,17]</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>[7,8,15,17]</sup> 4) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>[7,8,14,17]</sup>
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method <sup>[3,17]</sup> 2) Alkaline Digestion, Colorimetric Method <sup>[8,17]</sup>
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
12	Copper	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[3,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
13	2,4-D	1) Waste Extraction, Gas Chromatographic Method <sup>[3,26]</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>

15 DDE...



ลำดับ	สารมลพิษ	วิธีวิเคราะห์
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>
17	Dieldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>
20	Lead	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[3,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
21	Lindane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[3,19]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[19]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>

Mercury (ต่อ)...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
22	Mercury (ต่อ)	5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method <sup>[20]</sup>
23	Methoxychlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>
24	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
25	Nickel	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[3,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
26	Polychlorinated Biphenyls - 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	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,24]</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,24]</sup>

**UAE**  
UNITED ANALYST AND ENGINEERING  
CONSULTANT COMPANY LIMITED

นางสาวกชกร  
ดำเนินถูกต้อง

Polychlorinated Biphenyls(ต่อ)...



ลำดับ	สารมลพิษ	วิธีวิเคราะห์
27	Polychlorinated Biphenyls(ต่อ) - 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 Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[3,9,28]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup> Electrometric Method <sup>[31,32]</sup>
28	pH	
29	Selenium	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[3,6,21]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[7,21]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
30	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
31	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>

32 Toxaphene...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
32	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3,9,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>
33	Trichloroethylene	1) Waste Extraction, Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[3,12,27]</sup> 2) Waste Extraction, Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[3,11,27]</sup> 3) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 4) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
35	Zinc	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method <sup>[3,6,15]</sup> 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[3,6,14]</sup> 3) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 4) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>

ดิน จำนวน 125 รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
3	Aldrin	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
4	Anthracene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup>

Anthracene (ต่อ)...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
4	Anthracene (ต่อ)	2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
5	Antimony	Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
6	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[7,16]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
7	Atrazine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
8	Barium	Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
9	Benz(a)anthracene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
10	Benzene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
11	Benzo(b)fluoranthene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
12	Benzo(k)fluoranthene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
13	Benzoic acid	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
14	Benzo(a)pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
15	Benzo(g,h,i)perylene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
16	Beryllium	Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
17	Bis(2-chloroethyl)ether	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
18	Bis(2-ethylhexyl)phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
20	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
21	Butanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
22	Butyl benzyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
23	Cadmium	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
24	Carbazole	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
26	Carbon tetrachloride	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
27	Chlordane	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
28	p-Chloroaniline	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
31	Chloroform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
32	2-Chlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>



ลำดับ	สารมลพิษ	วิธีวิเคราะห์
33	Chromium	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup>
34	Chromium (III)	2) Digestion, Inductively Coupled Plasma Method <sup>[7,16]</sup> 1) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>[7,8,15,17]</sup> 2) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation <sup>[7,8,14,17]</sup>
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method <sup>[8,17]</sup>
36	Chrysene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
37	Cyanide	Extraction, Distillation, Colorimetric Method <sup>[29,30]</sup>
38	2,4-D	Ultrasonic Extraction, Gas Chromatographic Method <sup>[26]</sup>
39	DDD	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
40	DDE	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
41	DDT	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
42	Dibenz(a,h)anthracene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
43	Di-n-butyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>

45 1,3-Dichlorobenzene...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
47	3,3'-Dichlorobenzidine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
48	1,1-Dichloroethane	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
49	1,2-Dichloroethane	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
50	1,1-Dichloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
51	cis-1,2-Dichloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
52	trans-1,2-Dichloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
53	2,4-Dichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
57	Dieldrin	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>

58 Diethyl phthalate...



ลำดับ	สารมลพิษ	วิธีวิเคราะห์
58	Diethyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
59	2,4-Dimethylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
60	2,4-Dinitrophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
61	2,4-Dinitrotoluene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
62	2,6-Dinitrotoluene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
63	Di-n-Octyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
64	Endosulfan	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
65	Endrin	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
66	Ethylbenzene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(11,27)</sup>
67	Fluoranthene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,25)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
68	Fluorene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,25)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
69	Heptachlor	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
70	Heptachlor epoxide	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup>

Heptachlor epoxide (ต่อ)...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
70	Heptachlor epoxide (ต่อ)	2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
71	Hexachlorobenzene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>
73	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(13,27)</sup>
74	α-HCH	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
75	β-HCH	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
76	γ-HCH	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,23)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
77	Hexachlorocyclopentadiene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
78	Hexachloroethane	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
79	Indeno(1,2,3-cd)pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>(10,25)</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
80	Isophorone	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup>
81	Lead	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7,15)</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup>
82	Manganese	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>(7,15)</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup>

83 Mercury...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[19]</sup> 2) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method <sup>[20]</sup>
84	Methanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
85	Methoxychlor	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
86	Methyl bromide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
87	Methylene chloride	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
88	2-Methylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
89	2-Methylnaphthalene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
90	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
91	Naphthalene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
92	Nickel	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,16]</sup>
93	Nitrobenzene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
94	N-Nitrosodiphenylamine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
95	N-Nitrosodi-n-propylamine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
96	Polychlorinated Biphenyls - Aroclor 1016	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,24]</sup>

Polychlorinated Biphenyls(ต่อ)...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
96	<p>Polychlorinated Biphenyls(ต่อ)</p> <ul style="list-style-type: none"> <li>- Aroclor 1221</li> <li>- Aroclor 1232</li> <li>- Aroclor 1242</li> <li>- Aroclor 1248</li> <li>- Aroclor 1254</li> <li>- Aroclor 1260</li> </ul> <p>Polychlorinated Biphenyls</p> <ul style="list-style-type: none"> <li>- 2-Chlorobiphenyl</li> <li>- 2,3-Dichlorobiphenyl</li> <li>- 2,2',5-Trichlorobiphenyl</li> <li>- 2,4',5-Trichlorobiphenyl</li> <li>- 2,2',3,5'-Tetrachlorobiphenyl</li> <li>- 2,2',5,5'-Tetrachlorobiphenyl</li> <li>- 2,3',4,4'-Tetrachlorobiphenyl</li> <li>- 2,2',3,4,5'-</li> </ul> <p>Pentachlorobiphenyl</p> <ul style="list-style-type: none"> <li>- 2,2',4,5,5'-</li> </ul> <p>Pentachlorobiphenyl</p> <ul style="list-style-type: none"> <li>- 2,3,3',4',6-</li> </ul> <p>Pentachlorobiphenyl</p> <ul style="list-style-type: none"> <li>- 2,2',3,4,4',5'-</li> </ul> <p>Hexachlorobiphenyl</p> <ul style="list-style-type: none"> <li>- 2,2',3,4,5,5'-</li> </ul> <p>Hexachlorobiphenyl</p> <ul style="list-style-type: none"> <li>- 2,2',3,5,5',6-</li> </ul> <p>Hexachlorobiphenyl</p> <ul style="list-style-type: none"> <li>- 2,2',4,4',5,5'-</li> </ul> <p>Hexachlorobiphenyl</p> <ul style="list-style-type: none"> <li>- 2,2',3,3',4,4',5-</li> </ul> <p>Heptachlorobiphenyl</p> <ul style="list-style-type: none"> <li>- 2,2',3,4,4',5,5'-</li> </ul> <p>Heptachlorobiphenyl</p> <ul style="list-style-type: none"> <li>- 2,2',3,4,4',5',6-</li> </ul> <p>Heptachlorobiphenyl</p> <ul style="list-style-type: none"> <li>- 2,2',3,4',5,5',6-</li> </ul> <p>Heptachlorobiphenyl</p> <ul style="list-style-type: none"> <li>- 2,2',3,3',4,4',5,5',6-</li> </ul> <p>Nonachlorobiphenyl</p>	<p>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method<sup>[10,28]</sup></p> <p>Ultrasonic Extraction, Gas Chromatographic Method<sup>[10,24]</sup></p>

97 Pentachlorophenol...



ลำดับ	สารมลพิษ	วิธีวิเคราะห์
97	Pentachlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
98	Phenanthrene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
99	Phenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
100	Pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,25]</sup> 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
101	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[7,21]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
102	Silver	Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
103	Styrene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
105	Tetrachloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
106	Toluene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
107	Toxaphene	Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,23]</sup>
108	TPH (C <sub>5</sub> -C <sub>8</sub> )	1) Purge and Trap, Gas Chromatographic Method <sup>[13,22]</sup> 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
109	TPH (C <sub>9</sub> -C <sub>16</sub> )	Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,22]</sup>
110	TPH (C <sub>16</sub> -C <sub>35</sub> )	Ultrasonic Extraction, Gas Chromatographic Method <sup>[10,22]</sup>

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
114	Trichloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
115	2,4,5-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
116	2,4,6-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[10,28]</sup>
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
118	Vanadium	Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>
119	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
120	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup>
121	m-Xylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
122	o-Xylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
123	p-Xylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>
124	Xylene (Total)	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[13,27]</sup> 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>[11,27]</sup>



ลำดับ	สารมลพิษ	วิธีวิเคราะห์
125	Zinc	1) Digestion, Flame Atomic Absorption Spectrometric Method <sup>[7,15]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,14]</sup>

เอกสารอ้างอิง

- กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2549. เรื่อง กำหนดค่าปริมาณเขม่าควันที่เจือปนในอากาศที่ระบายออกจากปล่องของหม้อน้ำโรงสีข้าวที่ใช้ถ่านเป็นเชื้อเพลิง. ราชกิจจานุเบกษา. 4 ธันวาคม 2549. เล่มที่ 123 ตอนพิเศษ 125ง.
- สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4. กรุงเทพฯ: เรือนแก้วการพิมพ์, 2547.
- กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2566. เรื่อง การจัดการสิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว. ราชกิจจานุเบกษา. 31 พฤษภาคม 2566. เล่มที่ 140 ตอนพิเศษ 126 ง.
- APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 24<sup>th</sup> ed. Washington, DC: APHA, 2023.
- United States Environmental Protection Agency. Standards of Performance for New Stationary Sources. 40 CFR 60. Appendix A, 2020.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. SW-846, 2014.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Acid Digestion of Sediments, Sludges, and Soils. SW-846 Method 3050B, 1996.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Alkaline Digestion for Hexavalent Chromium. SW-846 Method 3060A, 1996.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Separatory Funnel Liquid-Liquid Extraction. SW-846 Method 3510C, 1996.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Ultrasonic Extraction. SW-846 Method 3550C, 2007.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis. SW-846 Method 5021A, 2014.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Purge and Trap for Aqueous Samples. SW-846 Method 5030C, 2003.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Closed System Purge and Trap and Extraction for Volatile Organics in Soil and Waste Sample. SW-846 Method 5035A, 2000.

14. United States...

- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Inductively Coupled Plasma-Optical Emission Spectrometry. SW-846 Method 6010D, 2014.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Flame Atomic Absorption Spectrophotometry. SW-846 Method 7000B, 2007.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Arsenic (Atomic Absorption, Gaseous Hydride). SW-846 Method 7061A, 1992.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Chromium, Hexavalent (Colorimetric). SW-846 Method 7196A, 1992.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Mercury in Liquid Waste (Manual Cold Vapor Technique). SW-846 Method 7470A, 1994.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Mercury in Solid or Semisolid Waste (Manual Cold-Vapor Technique). SW-846 Method 7471B, 1998.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Mercury in Solids and Solutions by Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry. SW-846 Method 7473, 2007.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Selenium (Atomic Absorption, Borohydride Reduction). SW-846 Method 7742, 1994.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Nonhalogenated Organics Using GC/FID. SW-846 Method 8015D, 2003.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Organochlorine Pesticides by Gas Chromatography. SW-846 Method 8081B, 2007.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Polychlorinated Biphenyls (PCBs) by Gas Chromatography. SW-846 Method 8082A, 2007.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Organochlorine Pesticides by Gas Chromatography. SW-846 Method 8081B, 2007.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Chlorinated Herbicides by GC Using Methylation or Pentafluorobenzoylation Derivatization. SW-846 Method 8151A, 1996.

27. United States...

27. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Volatile Organic Compounds by Gas Chromatography/ Mass Spectrometry. SW-846 Method 8260D, 2018.

28. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry. SW-846 Method 8270E, 2018.

29. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Cyanide Extraction Procedure for Solids and Oils. SW-846 Method 9013A, 2014.

30. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Cyanide in Waters and Extracts using Titrimetric and Manual Spectrophotometric Procedures. SW-846 Method 9014, 2014.

31. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. pH Electrometric Measurement. SW-846 Method 9040C, 2004.

32. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Soil and Waste pH. SW-846 Method 9045D, 2004.

๗๖



พงษ์ศักดิ์  
ดำเนินถูกต้อง