# *ภาคผนวก ค : เอกสารสอบเทียบความถูกต้องของเครื่องมือเก็บตัวอย่าง*

# *ภาคผนวก ค-1 : เอกสารสอบเทียบความถูกต้องของเครื่องมือเก็บตัวอย่าง บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด*

**DIGITAL LIGHT METER**

**Model : LX-72**

**Serial No. : Q606371**

CALIBRATION LABORATORY CO., LTD.
2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com

# CERTIFICATE OF CALIBRATION

## FOR

| | | |
|---|---|---|
| NOMENCLATURE | : | DIGITAL LIGHT METER |
| MANUFACTURER | : | DIGICON |
| MODEL / TYPE | : | LX-72 |
| SERIAL NO. | : | Q606371 [NO.3] |
| CLID. NO. | : | 252401365 |
| JOB CONTROL NO. | : | 250609065733 |
| CALIBRATION SERVICE | : | ☑ IN-LABORATORY ☐ ON-SITE |

CUSTOMER : EASTERN THAI CONSULTING 1992 CO., LTD.
683 MOO 11, SUKHAPIBARN 8 RD,
NONGKHAM, SRIRACHA, CHONBURI 20230

DATE OF RECEIVED : 09 June 2025 DATE OF ISSUED : 12 June 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Suwit Phuanbusabong
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory
12 June 2025

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

COPY



ค-1-2

CALIBRATION LABORATORY CO., LTD.
2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com

# REPORT OF CALIBRATION

## FOR

| | | |
|---|---|---|
| NOMENCLATURE | : | DIGITAL LIGHT METER |
| MANUFACTURER | : | DIGICON |
| MODEL / TYPE | : | LX-72 |
| SERIAL NO. | : | Q606371 [NO.3] |
| DATE OF CALIBRATION | : | 11 June 2025 |

### ENVIRONMENT CONDITIONS :

Temperature : (23 ± 2) °C Relative Humidity : (55 ± 15) %RH

### PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPEE-18 by comparison with Photometer/Radiometer & Illuminance Sensor which maintained by the Calibration Laboratory Co., Ltd.

### REFERENCE STANDARD USED :

Photometer/Radiometer & Illuminance Sensor, Bentham Model ORM400/DH400VL S/N. 27710/1/27585/3.

### TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Optical Test and Calibration Ltd. Certificate No. 158628/ABU, Due Date 01 May 2027.

### UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k$ = 2,00 which for a normal distribution corresponds to a coverage probability of approximately 95 %. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

COPY

CALIBRATION LABORATORY CO., LTD.
2/10-11, M.55 Soi Praserl Manukit 29 Yaek 4 Praserl Manukit Rd. Ladphrao, Bangkok 10
Tel 02-578-0355-4 Fax 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.
CLC Accredited ISO/IEC 17025

**CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION**

**MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment**

**CALIBRATION DATA**

**DIGITAL LIGHT METER RESULT**

| STD Applied ( lux ) | DUC Reading ( lux ) | Correction ( lux ) | Uncertainty ± ( % of rdg. ) |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | - |
| 10.00 | 12.94 | -2.94 | 3.2 |
| 50.0 | 54.6 | -4.6 | 2.6 |
| 100.0 | 115.5 | -15.5 | 2.6 |
| 200.0 | 211.4 | -11.4 | 2.6 |
| 300.0 | 322.6 | -22.6 | 2.6 |
| 400 | 415 | -15 | 2.6 |
| 500 | 532 | -32 | 2.6 |
| 1000 | 1084 | -84 | 2.6 |
| 2000 | 2166 | -166 | 2.6 |
| 3000 | 3283 | -283 | 3.8 |
| 4000 | 4350 | -350 | 3.8 |
| 5000 | 5450 | -450 | 3.8 |

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 56 of 68

ค-1-3

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

**### End of Certificate ###**

COPY

**Certificate No. Q25065733**

**F3-011-05/12-23**

**SOUND LEVEL CALIBRATOR**

**MODEL : NC-75**

**SERIAL No. : 34745929**

**SITHIPORN ASSOCIATES CO., LTD.**
**CALIBRATION LABORATORY**

451-451/1 Sirinthorn Road, Bangbumru, Bongplud, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email : calibration@sithiphorn.com

SITHIPORN associates

NSC-TISI-TIS 17025
CALIBRATION 0394

Cert. No. : ACC25046
Pages : 1 of 3

# Calibration Certificate

**Equipment :** SOUND CALIBRATOR
**Manufacturer :** RION
**Model :** NC-75
**Serial No.:** 34745929
**ID No.:** -

**Condition As Found :** GOOD

**Customer :** EASTERN THAI CONSULTING 1992 CO., LTD.
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

ค-1-5

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

**Received Date :** 18 AUGUST 2025
**Calibration Date :** 01 SEPTEMBER 2025
**Date of Issue :** 02 SEPTEMBER 2025

**Calibrated by :** Nathakorn Pisutpaisan

**Approved by :** NITINUN. S.

( Nitinun Srihawan )

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

COPY



**Calibration Procedure :** CP-AC-03

**Calibration Method :**

This equipment was calibrated by follow on IEC-60942-2003 Standard.
The sound pressure level, frequency and total distortion of the sound calibrator was measured using the reference microphone.

**Condition of this result of calibration :**

1. Reference Standard Instruments :

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|
| Waveform Generator | 33511B | MY52302742 | EF-0012-25 | 11-FEB-26 |
| Digital Multimeter | 33461A | MY53220104 | EEL.BP 24/0268 | 22-APR-26 |
| Digital Multimeter | 33461A | MY53220076 | EEL.BP 23/0268 | 22-APR-26 |
| Digital Multimeter | 33461A | MY60024273 | CA2025120EA | 18-MAR-26 |
| Programmable Attenuator | MAT-1070 | 62100114 | EF-0006-25 | 11-FEB-26 |
| Condenser Microphone | 4180 | 2977900 | AA-1002-25 | 19-FEB-26 |
| Measuring Amplifier | NA-42KAI | 34560495 | AA-3002-25 | 19-FEB-26 |
| Audio Analyzer | AVR-3360A | V744B6069 | EF-0013-25 | 13-FEB-26 |

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.
3. This certificate is traceable to the international system of unit maintained at :
   - 3.1 National Institute of Metrology (Thailand).
   - 3.2 Thailand Institute of Scientific and Technological Research (TISTR).
   - 3.3 Electrical And Electronics Institute (EEI).

COPY

NITINUN. S.

Cert. No. : ACC25046
Job No. : VC68AC0165
Pages : 3 of 3

**Result of calibration :**

**1. Sound pressure level**

| Specified sound pressure level (dB) | Measured value (dB) | Deviated value (dB) | Uncertainty (dB) | Acceptance limit (dB) |
|---|---|---|---|---|
| 94 | 93.95 | -0.05 | 0.15 | 0.40 |

**2. Frequency**

| Specified Frequency (Hz) | Measured value (Hz) | Deviated value ( % ) | Uncertainty ( % ) | Acceptance limit ( % ) |
|---|---|---|---|---|
| 1000 | 1000.0 | 0.0 | 0.1 | 1.0 |

**3. Total distortion**

| Measured value ( % ) | Uncertainty ( % ) | Acceptance limit ( % ) |
|---|---|---|
| 0.58 | 0.10 | 3.0 |

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

**End of Calibration Certificate**

COPY

**SOUND LEVEL METER**

**MODEL : NL-42A**

**SERIAL No. : 00322751**

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

451-451/1 Sirinthorn Road, Bangbumru, Bangplud, Bangkok, 10700 Thailand
Tel. +66 2433 9331 Email : calibration@sithiporn.com

SITHIPORN

ISO/IEC 17025 CALIBRATION 0391

Cert. No. : ACL26117
Pages : 1 of 8

# Calibration Certificate

| | |
|---|---|
| **Equipment :** | SOUND LEVEL METER |
| **Manufacturer :** | RION |
| **Model :** | NL-42A / Microphone UC-52 / Preamplifier NH-24 |
| **Serial No.:** | 00322751 / 196474 / 15483 |
| **ID No.:** | - |

| | |
|---|---|
| **Condition As Found :** | GOOD |

| | |
|---|---|
| **Customer :** | EASTERN THAI CONSULTING 1992 CO., LTD.<br>SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,<br>NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND. |

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

| | |
|---|---|
| **Received Date :** | 07 JANUARY 2026 |
| **Calibration Date :** | 30 JANUARY 2026 |
| **Date of Issue :** | 02 FEBRUARY 2026 |

**Calibrated by :** Nathakorn Pisutpaisan

**Approved by :**

( Nitinun Srihawan )

COPY

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



SITHIPORN

SITHIPORN ASSOCIATES
CALIBRATION LABORATORY



**Calibration Procedure :** CP AC-01

Calibration Method :

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

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

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

**Condition of this result of calibration :**

1. Reference Standard Instruments :

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|
| Waveform Generator | 33210A | MY48017076 | EF-0011-25 | 11-FEB-26 |
| Waveform Generator | 33511B | MY52302742 | EF-0012-25 | 11-FEB-26 |
| Digital Multimeter | 33461A | MY53220104 | EEI.BP 24/0268 | 22-APR-26 |
| Digital Multimeter | 33461A | MY53220076 | EEI.BP 23/0268 | 22-APR-26 |
| Digital Multimeter | 34461A | MY60024273 | CA2025120EA | 18-MAR-26 |
| Programmable Attenuator | MAT-1070 | 62100114 | EF-0006-25 | 11-FEB-26 |
| Condenser Microphone | 4180 | 2977900 | AA-1002-25 | 19-FEB-26 |
| Measuring Amplifier | NA-42KAI | 34560495 | AA-3002-25 | 19-FEB-26 |

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.
3. This certificate is traceable to the international system of unit maintained at :
   - 3.1 National Institute of Metrology (Thailand).
   - 3.2 Thailand Institute of Scientific and Technological Research (TISTR).
   - 3.3 Electrical And Electronics Institute (EEI).

COPY

Cert. No. : ACL26117
Job No. : VC69AC0048
Pages : 3 of 8

**Summary of Measurement Result :**

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



COPY

SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

**Result of calibration :**

**1. Absolute sensitivity**

| Reference Acoustic Signal ( dB ) | Measured Value ( dB ) | Deviation ( dB ) | Acceptance Limit ( dB ) |
|---|---|---|---|
| 93.9 (93.94) | 93.9 | 0.0 | ±0.3 |

**2. Self-generated noise**

2.1 Normal test

| Measured Value ( dB ) |
|---|
| 14.2 |

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

| Frequency Weighting | Weighting ( dB ) |
|---|---|
| A - weight | 10.8 |
| C - weight | 17.3 |
| Flat | 23.0 |

**3. Acoustical signal tests of frequency weightings**

Meter free field acoustic response at a level of 94 dB

| Frequency ( Hz ) | Deviation from various frequency weighting response curve (dB) | | | |
|---|---|---|---|---|
| | Flat | C-weight | A-weight | Acceptance Limits |
| 125 | 0.2 | 0.2 | 0.3 | ± 1.5 |
| 1000 | 0.0 | 0.0 | 0.0 | ± 1.0 |
| 8000 | -0.4 | -0.3 | -0.3 | ±5.0 |

COPY

**4. Electrical signal tests of frequency weightings**

Weighting network response with relative to 1 kHz.

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

**5. Frequency and time weightings at 1 kHz**

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

**6. Long - term stability**

| Frequency Weighting | SLM Display at initial ( dB ) | SLM Display at final ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| A - weight | 94.0 | 94.0 | 0.0 | ± 0.3 |

COPY



SITHIPORN
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY



**7. Level linearity on the reference level range**

| Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|
| 137.0 | 137.0 | 0.0 | ± 1.1 |
| 136.0 | 136.0 | 0.0 | ± 1.1 |
| 135.0 | 135.0 | 0.0 | ± 1.1 |
| 134.0 | 134.0 | 0.0 | ± 1.1 |
| 133.0 | 133.0 | 0.0 | ± 1.1 |
| 132.0 | 132.0 | 0.0 | ± 1.1 |
| 131.0 | 131.0 | 0.0 | ± 1.1 |
| 129.0 | 129.0 | 0.0 | ± 1.1 |
| 124.0 | 124.0 | 0.0 | ± 1.1 |
| 119.0 | 119.0 | 0.0 | ± 1.1 |
| 114.0 | 114.0 | 0.0 | ± 1.1 |
| 109.0 | 109.0 | 0.0 | ± 1.1 |
| 104.0 | 104.0 | 0.0 | ± 1.1 |
| 99.0 | 99.0 | 0.0 | ± 1.1 |
| 94.0 | 94.0 | 0.0 | ± 1.1 |
| 89.0 | 89.0 | 0.0 | ± 1.1 |
| 84.0 | 84.0 | 0.0 | ± 1.1 |
| 79.0 | 79.0 | 0.0 | ± 1.1 |
| 74.0 | 74.0 | 0.0 | ± 1.1 |
| 69.0 | 69.0 | 0.0 | ± 1.1 |
| 64.0 | 64.0 | 0.0 | ± 1.1 |
| 59.0 | 59.0 | 0.0 | ± 1.1 |
| 54.0 | 53.9 | -0.1 | ± 1.1 |
| 49.0 | 49.0 | 0.0 | ± 1.1 |
| 44.0 | 44.0 | 0.0 | ± 1.1 |
| 39.0 | 38.9 | -0.1 | ± 1.1 |
| 34.0 | 34.0 | 0.0 | ± 1.1 |
| 30.0 | 29.9 | -0.1 | ± 1.1 |
| 29.0 | 28.9 | -0.1 | ± 1.1 |
| 28.0 | 27.9 | -0.1 | ± 1.1 |
| 27.0 | 26.9 | -0.1 | ± 1.1 |
| 26.0 | 25.9 | -0.1 | ± 1.1 |
| 25.0 | 24.9 | -0.1 | ± 1.1 |

COPY

Cert. No. : ACL26117
Job No. : VC69AC0048
Pages : 7 of 8

**8. Level linearity including the level range control**

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 94.0 | 94.0 | 0.0 | ±1.1 |

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 29.0 | 28.9 | -0.1 | ±1.1 |

9. Tone burst response

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

COPY

SITHIPORN

SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26117
Job No. : VC69AC0048
Pages : 8 of 8

10. Peak C sound level

| Number of cycle in test signal | Anticipated Value ( dB ) | Measured Value, Lcpeak ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| Continuous | 130.0 | 130.0 | 0.0 | ±3.0 |
| One | 133.4 | 133.3 | -0.1 | ±3.0 |

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

**11. Overload indication**

| Measured value ( dB ) | | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|
| Positive one-half cycle | Negative one-half cycle | | |
| 89.6 | 89.6 | 0.0 | ±1.5 |

**12. High level stability**

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

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

**End of Calibration Certificate**

COPY

**SOUND LEVEL METER**

**MODEL : NL-42A**

**SERIAL No. : 00322747**

**SITHIPORN ASSOCIATES CO., LTD.**
**CALIBRATION LABORATORY**

451-451/1 Sirinthorn Road, Bangbumru, Bangplud, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email : calibration@sithiphorn.com

SITHIPORN associates

ilac-MRA

NSC-TISI-TIS 17025 CALIBRATION 0594

Cert. No. : ACL26008
Pages : 1 of 8

# Calibration Certificate

**Equipment :** SOUND LEVEL METER
**Manufacturer :** RION
**Model :** NL-42A / Microphone UC-52 / Preamplifier NH-24
**Serial No.:** 00322747 / 196470 / 15479
**ID No.:** -

**Condition As Found :** GOOD

**Customer :** EASTERN THAI CONSULTING 1992 CO., LTD.
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

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

**Received Date :** 26 DECEMBER 2025
**Calibration Date :** 05 - 07 JANUARY 2026
**Date of Issue :** 07 JANUARY 2026

**Calibrated by :** Nathakorn Pisutpaisan

**Approved by :**

( Nitinun Sribawan )

COPY

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

P-1-13

SITHIPORN associates

SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26008
Job No. : VC69AC0048
Pages : 2 of 8

**Calibration Procedure :** CP-AC-01

**Calibration Method :**

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

**Condition of this result of calibration :**

1. Reference Standard Instruments :

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|
| Waveform Generator | 33210A | MY48017076 | EF-0011-25 | 11-FEB-26 |
| Waveform Generator | 33511B | MY52302742 | EF-0012-25 | 11-FEB-26 |
| Digital Multimeter | 33461A | MY53220104 | EEL.BP 24/0268 | 22-APR-26 |
| Digital Multimeter | 33461A | MY53220076 | EEL.BP 23/0268 | 22-APR-26 |
| Digital Multimeter | 34461A | MY60024273 | CA2025120EA | 18-MAR-26 |
| Programmable Attenuator | MAT-1070 | 62100114 | EF-0006-25 | 11-FEB-26 |
| Condenser Microphone | 4180 | 2977900 | AA-1002-25 | 19-FEB-26 |
| Measuring Amplifier | NA-42KAI | 34560495 | AA-3002-25 | 19-FEB-26 |

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.
3. This certificate is traceable to the international system of unit maintained at :
   3.1 National Institute of Metrology (Thailand).
   3.2 Thailand Institute of Scientific and Technological Research (TISTR).
   3.3 Electrical And Electronics Institute (EEI).

COPY

Cert. No. : ACL26008
Job No. : VC69AC0048
Pages : 3 of 8

**Summary of Measurement Result :**

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

P-1-14

COPY

SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26008
Job No. : VC69AC0048
Page : 4 of 8

**Result of calibration :**

**1. Absolute sensitivity**

| Reference Acoustic Signal ( dB ) | Measured Value ( dB ) | Deviation ( dB ) | Acceptance Limit ( dB ) |
|---|---|---|---|
| 93.9 (93.94) | 93.9 | 0.0 | ±0.3 |

**2. Self-generated noise**

2.1 Normal test

| Measured Value ( dB ) |
|---|
| 15.1 |

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

| Frequency Weighting | Weighting ( dB ) |
|---|---|
| A - weight | 11.6 |
| C - weight | 18.1 |
| Flat | 23.6 |

**3. Acoustical signal tests of frequency weightings**

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

| Frequency ( Hz ) | Deviation from various frequency weighting response curve (dB) | | | |
|---|---|---|---|---|
| | Flat | C-weight | A-weight | Acceptance Limits |
| 125 | 0.2 | 0.2 | 0.1 | ± 1.5 |
| 1000 | 0.0 | 0.0 | 0.0 | ± 1.0 |
| 8000 | 0.6 | 0.7 | 0.7 | ±5.0 |

COPY

Cert. No. : ACL26008
Job No. : VC69AC0048
Pages : 5 of 8

**4. Electrical signal tests of frequency weightings**

Weighting network response with relative to 1 kHz.

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

**5. Frequency and time weightings at 1 kHz**

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

**6. Long - term stability**

| Frequency Weighting | SLM Display at initial (dB) | SLM Display at final (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---|---|---|---|---|
| A - weight | 94.0 | 94.0 | 0.0 | ± 0.3 |

COPY



SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26008
Job No. : VC69AC0048
Pages : 6 of 8

**7. Level linearity on the reference level range**

| Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---|---|---|---|
| 137.0 | 137.0 | 0.0 | ± 1.1 |
| 136.0 | 136.0 | 0.0 | ± 1.1 |
| 135.0 | 135.0 | 0.0 | ± 1.1 |
| 134.0 | 134.0 | 0.0 | ± 1.1 |
| 133.0 | 133.0 | 0.0 | ± 1.1 |
| 132.0 | 132.0 | 0.0 | ± 1.1 |
| 131.0 | 131.0 | 0.0 | ± 1.1 |
| 129.0 | 129.0 | 0.0 | ± 1.1 |
| 124.0 | 124.0 | 0.0 | ± 1.1 |
| 119.0 | 119.0 | 0.0 | ± 1.1 |
| 114.0 | 114.0 | 0.0 | ± 1.1 |
| 109.0 | 109.0 | 0.0 | ± 1.1 |
| 104.0 | 104.0 | 0.0 | ± 1.1 |
| 99.0 | 99.0 | 0.0 | ± 1.1 |
| 94.0 | 94.0 | 0.0 | ± 1.1 |
| 89.0 | 89.0 | 0.0 | ± 1.1 |
| 84.0 | 84.0 | 0.0 | ± 1.1 |
| 79.0 | 79.0 | 0.0 | ± 1.1 |
| 74.0 | 74.0 | 0.0 | ± 1.1 |
| 69.0 | 69.0 | 0.0 | ± 1.1 |
| 64.0 | 64.0 | 0.0 | ± 1.1 |
| 59.0 | 59.0 | 0.0 | ± 1.1 |
| 54.0 | 53.9 | -0.1 | ± 1.1 |
| 49.0 | 49.0 | 0.0 | ± 1.1 |
| 44.0 | 44.0 | 0.0 | ± 1.1 |
| 39.0 | 38.9 | -0.1 | ± 1.1 |
| 34.0 | 34.0 | 0.0 | ± 1.1 |
| 30.0 | 30.0 | 0.0 | ± 1.1 |
| 29.0 | 29.0 | 0.0 | ± 1.1 |
| 28.0 | 28.1 | 0.1 | ± 1.1 |
| 27.0 | 27.1 | 0.1 | ± 1.1 |
| 26.0 | 26.1 | 0.1 | ± 1.1 |
| 25.0 | 25.1 | 0.1 | ± 1.1 |

COPY

Cert. No. : ACL26008
Job No. : VC69AC0048
Pages : 7 of 8

**8. Level linearity including the level range control**

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 94.0 | 94.0 | 0.0 | ±1.1 |

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 29.0 | 29.0 | 0.0 | ±1.1 |

**9. Tone burst response**

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

COPY

SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26008
Job No. : VC69AC0048
Pages : 8 of 8

**10. Peak C sound level**

| Number of cycle in test signal | Anticipated Value ( dB ) | Measured Value, Lcpeak ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| Continuous | 130.0 | 130.0 | 0.0 | ±3.0 |
| One | 133.4 | 133.3 | -0.1 | ±3.0 |

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

**11. Overload indication**

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

**12. High level stability**

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

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

**End of Calibration Certificate**

COPY

**SOUND LEVEL METER**

**MODEL : NL-42A**

**SERIAL No. : 00222593**

**SITHIPORN ASSOCIATES CO., LTD.**
**CALIBRATION LABORATORY**

451-451/1 Sirinthorn Road, Bangbumru, Bangplud, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email : calibration@sithiphorn.com

Cert. No. : ACL26004
Pages : 1 of 8

# Calibration Certificate

**Equipment :** SOUND LEVEL METER
**Manufacturer :** RION
**Model :** NL-42A / Microphone UC-52 / Preamplifier NH-24
**Serial No.:** 00222593 / 195906 / 15426
**ID No.:** -

**Condition As Found :** GOOD

**Customer :** EASTERN THAI CONSULTING 1992 CO., LTD.
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

ค1-18

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

**Received Date :** 26 DECEMBER 2025
**Calibration Date :** 05 - 07 JANUARY 2026
**Date of Issue :** 07 JANUARY 2026

**Calibrated by :** Nathakorn Pisutpaisan

**Approved by :**

( Nitinun Srihawan )

COPY

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



Cert. No. : ACL26004
Job No. : VC69AC0048
Pages : 2 of 8

**Calibration Procedure :** CP-AC-01

**Calibration Method :**

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

**Condition of this result of calibration :**

1. Reference Standard Instruments :

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|
| Waveform Generator | 33210A | MY48017076 | EF-0011-25 | 11-FEB-26 |
| Waveform Generator | 33511B | MY52302742 | EF-0012-25 | 11-FEB-26 |
| Digital Multimeter | 33461A | MY53220104 | EEI_BP 24/0268 | 22-APR-26 |
| Digital Multimeter | 33461A | MY53220076 | EEI_BP 23/0268 | 22-APR-26 |
| Digital Multimeter | 34461A | MY60024273 | CA2025120EA | 18-MAR-26 |
| Programmable Attenuator | MAT-1070 | 62100114 | EF-0006-25 | 11-FEB-26 |
| Condenser Microphone | 4180 | 2977900 | AA-1002-25 | 19-FEB-26 |
| Measuring Amplifier | NA-42KAI | 34560495 | AA-3002-25 | 19-FEB-26 |

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.
3. This certificate is traceable to the international system of unit maintained at :
   3.1 National Institute of Metrology (Thailand).
   3.2 Thailand Institute of Scientific and Technological Research (TISTR).
   3.3 Electrical And Electronics Institute (EEI).

COPY

Cert. No. : ACL26004
Job No. : VC69AC0048
Pages : 3 of 8

**Summary of Measurement Result :**

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

P1-19

COPY

SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26004
Job No. : VC69AC0048
Page : 4 of 8

**Result of calibration :**

**1. Absolute sensitivity**

| Reference Acoustic Signal ( dB ) | Measured Value ( dB ) | Deviation ( dB ) | Acceptance Limit ( dB ) |
|---|---|---|---|
| 93.9 (93.94) | 93.9 | 0.0 | ±0.3 |

**2. Self-generated noise**

2.1 Normal test

| Measured Value ( dB ) |
|---|
| 14.2 |

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

| Frequency Weighting | Weighting ( dB ) |
|---|---|
| A - weight | 9.9 |
| C - weight | 16.6 |
| Flat | 22.3 |

**3. Acoustical signal tests of frequency weightings**

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

| Frequency ( Hz ) | Deviation from various frequency weighting response curve (dB) | | | |
|---|---|---|---|---|
| | Flat | C-weight | A-weight | Acceptance Limits |
| 125 | 0.3 | 0.3 | 0.3 | ± 1.5 |
| 1000 | 0.1 | 0.1 | 0.1 | ± 1.0 |
| 8000 | 0.8 | 0.8 | 0.8 | ±5.0 |

COPY

Cert. No. : ACL26004
Job No. : VC69AC0048
Pages : 5 of 8

**4. Electrical signal tests of frequency weightings**

Weighting network response with relative to 1 kHz.

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

**5. Frequency and time weightings at 1 kHz**

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

**6. Long - term stability**

| Frequency Weighting | SLM Display at initial (dB) | SLM Display at final (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---|---|---|---|---|
| A - weight | 94.0 | 94.0 | 0.0 | ± 0.3 |

COPY



SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26004
Job No. : VC69AC0048
Pages : 6 of 8

**7. Level linearity on the reference level range**

| Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---|---|---|---|
| 137.0 | 137.0 | 0.0 | ± 1.1 |
| 136.0 | 136.0 | 0.0 | ± 1.1 |
| 135.0 | 135.0 | 0.0 | ± 1.1 |
| 134.0 | 134.0 | 0.0 | ± 1.1 |
| 133.0 | 133.0 | 0.0 | ± 1.1 |
| 132.0 | 132.0 | 0.0 | ± 1.1 |
| 131.0 | 131.0 | 0.0 | ± 1.1 |
| 129.0 | 129.0 | 0.0 | ± 1.1 |
| 124.0 | 124.0 | 0.0 | ± 1.1 |
| 119.0 | 119.0 | 0.0 | ± 1.1 |
| 114.0 | 114.0 | 0.0 | ± 1.1 |
| 109.0 | 109.0 | 0.0 | ± 1.1 |
| 104.0 | 104.0 | 0.0 | ± 1.1 |
| 99.0 | 99.0 | 0.0 | ± 1.1 |
| 94.0 | 94.0 | 0.0 | ± 1.1 |
| 89.0 | 89.0 | 0.0 | ± 1.1 |
| 84.0 | 84.0 | 0.0 | ± 1.1 |
| 79.0 | 79.0 | 0.0 | ± 1.1 |
| 74.0 | 74.0 | 0.0 | ± 1.1 |
| 69.0 | 69.0 | 0.0 | ± 1.1 |
| 64.0 | 64.0 | 0.0 | ± 1.1 |
| 59.0 | 59.0 | 0.0 | ± 1.1 |
| 54.0 | 54.0 | 0.0 | ± 1.1 |
| 49.0 | 49.0 | 0.0 | ± 1.1 |
| 44.0 | 44.0 | 0.0 | ± 1.1 |
| 39.0 | 39.0 | 0.0 | ± 1.1 |
| 34.0 | 34.0 | 0.0 | ± 1.1 |
| 30.0 | 30.1 | 0.1 | ± 1.1 |
| 29.0 | 29.1 | 0.1 | ± 1.1 |
| 28.0 | 28.0 | 0.0 | ± 1.1 |
| 27.0 | 27.1 | 0.1 | ± 1.1 |
| 26.0 | 26.1 | 0.1 | ± 1.1 |
| 25.0 | 25.1 | 0.1 | ± 1.1 |

COPY

Cert. No. : ACL26004
Job No. : VC69AC0048
Pages : 7 of 8

**8. Level linearity including the level range control**

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 94.0 | 94.0 | 0.0 | ±1.1 |

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 29.0 | 28.8 | -0.2 | ±1.1 |

**9. Tone burst response**

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

COPY



SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26004
Job No. : VC69AC0048
Pages : 8 of 8

**10. Peak C sound level**

| Number of cycle in test signal | Anticipated Value ( dB ) | Measured Value, Lcpeak ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| Continuous | 130.0 | 130.0 | 0.0 | ±3.0 |
| One | 133.4 | 133.4 | 0.0 | ±3.0 |

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

**11. Overload indication**

| Measured value ( dB ) | | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|
| Positive one-half cycle | Negative one-half cycle | | |
| 89.5 | 89.5 | 0.0 | ±1.5 |

**12. High level stability**

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

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

**End of Calibration Certificate**

COPY

**SOUND LEVEL METER**

**MODEL : NL-42A**

**SERIAL No. : 00322754**

**SITHIPORN ASSOCIATES CO., LTD.**
**CALIBRATION LABORATORY**

451-451/1 Sirinthorn Road, Bangbumru, Bangplud, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email : calibration@sithiphorn.com

SITHIPORN associates

ilac-MRA

NSC-TISI-TIS 17025
CALIBRATION 0394

Cert. No. : ACL25267
Pages : 1 of 8

# Calibration Certificate

| | |
|---|---|
| **Equipment :** | SOUND LEVEL METER |
| **Manufacturer :** | RION |
| **Model :** | NL-42A / Microphone UC-52 / Preamplifier NH-24 |
| **Serial No.:** | 00322754 / 196477 / 15486 |
| **ID No.:** | - |

**Condition As Found :** GOOD

**Customer :** EASTERN THAI CONSULTING 1992 CO., LTD.
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

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

| | |
|---|---|
| **Received Date :** | 26 JUNE 2025 |
| **Calibration Date :** | 08 JULY 2025 |
| **Date of Issue :** | 09 JULY 2025 |

**Calibrated by :** Nathakorn Pisutpaisan

**Approved by :** Wichok B

( Wichok Ekpongpradit )

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

COPY

P1-1-23

SITHIPORN associates

SITHIPORN ASSOCIATES
CALIBRATION LABORATORY



**Calibration Procedure :** CP-AC-01

**Calibration Method :**

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

**Condition of this result of calibration :**

1. Reference Standard Instruments :

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|
| Waveform Generator | 33210A | MY48017076 | EF-0011-25 | 11-FEB-26 |
| Waveform Generator | 33511B | MY52302742 | EF-0012-25 | 11-FEB-26 |
| Digital Multimeter | 33461A | MY53220104 | EEL.BP 24/0268 | 22-APR-26 |
| Digital Multimeter | 33461A | MY53220076 | EEL.BP 23/0268 | 22-APR-26 |
| Digital Multimeter | 34461A | MY60024273 | CA2025120EA | 18-MAR-26 |
| Programmable Attenuator | MAT-1070 | 62100114 | EF-0006-25 | 11-FEB-26 |
| Condenser Microphone | 4180 | 2977900 | AA-1002-25 | 19-FEB-26 |
| Measuring Amplifier | NA-42KAI | 34560495 | AA-3002-25 | 19-FEB-26 |

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.
3. This certificate is traceable to the international system of unit maintained at :
   - 3.1 National Institute of Metrology (Thailand).
   - 3.2 Thailand Institute of Scientific and Technological Research (TISTR).
   - 3.3 Electrical And Electronics Institute (EEI).

COPY

Wichok

Cert. No. : ACL25267
Job No. : VC68AC009(
Pages : 3 of 8

## Summary of Measurement Result :

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

fr-1-24

COPY

SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL25267
Job No. : VC68AC0096
Page : 4 of 8

## Result of calibration :

### 1. Absolute sensitivity

| Reference Acoustic Signal ( dB ) | Measured Value ( dB ) | Deviation ( dB ) | Acceptance Limit ( dB ) |
|---|---|---|---|
| 93.9 (93.94) | 93.9 | 0.0 | ±0.3 |

### 2. Self-generated noise

2.1 Normal test

| Measured Value ( dB ) |
|---|
| 17.50000003 |

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

| Frequency Weighting | Weighting ( dB ) |
|---|---|
| A - weight | 12.7 |
| C - weight | 19.6 |
| Flat | 25.4 |

### 3. Acoustical signal tests of frequency weightings

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

| Frequency ( Hz ) | Deviation from various frequency weighting response curve (dB) | | | |
|---|---|---|---|---|
| | Flat | C-weight | A-weight | Acceptance Limits |
| 125 | 0.0 | 0.1 | 0.1 | ± 1.5 |
| 1000 | 0.0 | 0.0 | 0.0 | ± 1.0 |
| 8000 | 0.6 | 0.6 | 0.6 | ±5.0 |

COPY

Cert. No. : ACL25267
Job No. : VC68AC009(
Pages : 5 of 8

**4. Electrical signal tests of frequency weightings**

Weighting network response with relative to 1 kHz.

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

**5. Frequency and time weightings at 1 kHz**

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

**6. Long - term stability**

| Frequency Weighting | SLM Display at initial ( dB ) | SLM Display at final ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| A - weight | 94.0 | 94.0 | 0.0 | ± 0.3 |

COPY

P-1-25

SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL25267
Job No. : VC68AC0096
Pages : 6 of 8

**7. Level linearity on the reference level range**

| Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|
| 137.0 | 137.0 | 0.0 | ± 1.1 |
| 136.0 | 136.0 | 0.0 | ± 1.1 |
| 135.0 | 135.0 | 0.0 | ± 1.1 |
| 134.0 | 134.0 | 0.0 | ± 1.1 |
| 133.0 | 133.0 | 0.0 | ± 1.1 |
| 132.0 | 132.0 | 0.0 | ± 1.1 |
| 131.0 | 131.0 | 0.0 | ± 1.1 |
| 129.0 | 129.0 | 0.0 | ± 1.1 |
| 124.0 | 124.0 | 0.0 | ± 1.1 |
| 119.0 | 119.0 | 0.0 | ± 1.1 |
| 114.0 | 114.0 | 0.0 | ± 1.1 |
| 109.0 | 109.0 | 0.0 | ± 1.1 |
| 104.0 | 104.0 | 0.0 | ± 1.1 |
| 99.0 | 99.0 | 0.0 | ± 1.1 |
| 94.0 | 94.0 | 0.0 | ± 1.1 |
| 89.0 | 89.0 | 0.0 | ± 1.1 |
| 84.0 | 84.0 | 0.0 | ± 1.1 |
| 79.0 | 79.0 | 0.0 | ± 1.1 |
| 74.0 | 74.0 | 0.0 | ± 1.1 |
| 69.0 | 69.0 | 0.0 | ± 1.1 |
| 64.0 | 64.0 | 0.0 | ± 1.1 |
| 59.0 | 59.0 | 0.0 | ± 1.1 |
| 54.0 | 54.0 | 0.0 | ± 1.1 |
| 49.0 | 49.0 | 0.0 | ± 1.1 |
| 44.0 | 44.0 | 0.0 | ± 1.1 |
| 39.0 | 39.0 | 0.0 | ± 1.1 |
| 34.0 | 34.0 | 0.0 | ± 1.1 |
| 30.0 | 30.1 | 0.1 | ± 1.1 |
| 29.0 | 29.1 | 0.1 | ± 1.1 |
| 28.0 | 28.1 | 0.1 | ± 1.1 |
| 27.0 | 27.2 | 0.2 | ± 1.1 |
| 26.0 | 26.2 | 0.2 | ± 1.1 |
| 25.0 | 25.3 | 0.3 | ± 1.1 |

COPY

Cert. No. : ACL25267
Job No. : VC68AC009
Pages : 7 of 8

**8. Level linearity including the level range control**

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 94.0 | 94.0 | 0.0 | ±1.1 |

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 29.0 | 28.9 | -0.1 | ±1.1 |

**9. Tone burst response**

| Time Weighting | Tone burst duration, Tb ( ms ) | Cycle | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|---|---|
| Fast | 0.25 | 1 | 108.0 | 107.9 | -0.1 | 1.5 ; -5.0 |
| | 2 | 8 | 117.0 | 117.0 | 0.0 | 1.0 ; -2.5 |
| | 200 | 800 | 134.0 | 134.1 | 0.1 | ±1.0 |
| Slow | 2 | 8 | 108.0 | 108.0 | 0.0 | 1.0 ; -5.0 |
| | 200 | 800 | 127.6 | 127.6 | 0.0 | ±1.0 |
| SEL | 0.25 | 1 | 99.0 | 98.9 | -0.1 | 1.5 ; -5.0 |
| | 2 | 8 | 108.0 | 108.0 | 0.0 | 1.0 ; -2.5 |
| | 200 | 800 | 128.0 | 128.1 | 0.1 | ±1.0 |

P1-26

COPY

SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL25267
Job No. : VC68AC009
Pages : 8 of 8

**10. Peak C sound level**

| Number of cycle in test signal | Anticipated Value ( dB ) | Measured Value, Lcpeak ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| Continuous | 130.0 | 130.0 | 0.0 | ±3.0 |
| One | 133.4 | 133.3 | -0.1 | ±3.0 |

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

**11. Overload indication**

| Measured value ( dB ) | | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|
| Positive one-half cycle | Negative one-half cycle | | |
| 89.6 | 89.6 | 0.0 | ±1.5 |

**12. High level stability**

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

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

**End of Calibration Certificate**

COPY

**SOUND LEVEL METER**

**MODEL : NL-42A**

**SERIAL No. : 00322753**

**SITHIPORN ASSOCIATES CO., LTD.**
**CALIBRATION LABORATORY**

451-451/1 Sirinthorn Road, Bangbumru, Bangplud, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email : calibration@sithiphorn.com

SITHIPORN associates

ilac-MRA

NSC-TISI-TIS 17025
CALIBRATION 0394

Cert. No. : ACL25180
Pages : 1 of 8

# Calibration Certificate

**Equipment :** SOUND LEVEL METER
**Manufacturer :** RION
**Model :** NL-42A / Microphone UC-52 / Preamplifier NH-24
**Serial No.:** 00322753 / 196476 / 15485
**ID No.:** -

**Condition As Found :** GOOD

**Customer :** EASTERN THAI CONSULTING 1992 CO., LTD.
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

ค1-28

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

**Received Date :** 02 APRIL 2025
**Calibration Date :** 28 APRIL 2025
**Date of Issue :** 02 MAY 2025

**Calibrated by :** Nathakorn Pisutpaisan

**Approved by :** T. Petch.
( Thanakul Petchurai )

COPY

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



**Calibration Procedure :** CP-AC-01

**Calibration Method :**

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

**Condition of this result of calibration :**

1. Reference Standard Instruments :

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|
| Waveform Generator | 33210A | MY48017076 | EF-0011-25 | 11-FEB-26 |
| Waveform Generator | 33511B | MY52302742 | EF-0012-25 | 11-FEB-26 |
| Digital Multimeter | 34461A | MY60024273 | CA2025120EA | 18-MAR-26 |
| Programmable Attenuator | MAT-1070 | 62100114 | EF-0006-25 | 11-FEB-26 |
| Condenser Microphone | 4180 | 2977900 | AA-1002-25 | 19-FEB-26 |
| Measuring Amplifier | NA-42KAI | 34560495 | AA-3002-25 | 19-FEB-26 |

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.
3. This certificate is traceable to the international system of unit maintained at :
   3.1 National Institute of Metrology (Thailand).
   3.2 Electrical And Electronics Institute (EEI).

COPY

T. Petch.

Cert. No. : ACL25180
Job No. : VC68AC0077
Pages : 3 of 8

**Summary of Measurement Result :**

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

COPY

SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL25180
Job No. : VC68AC0077
Page : 4 of 8

**Result of calibration :**

**1. Absolute sensitivity**

| Reference Acoustic Signal ( dB ) | Measured Value ( dB ) | Deviation ( dB ) | Acceptance Limit ( dB ) |
|---|---|---|---|
| 93.9 (93.94) | 93.9 | 0.0 | ±0.3 |

**2. Self-generated noise**

2.1 Normal test

| Measured Value ( dB ) |
|---|
| 14.8 |

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

| Frequency Weighting | Weighting ( dB ) |
|---|---|
| A - weight | 11.6 |
| C - weight | 17.5 |
| Flat | 23.2 |

**3. Acoustical signal tests of frequency weightings**

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

| Frequency ( Hz ) | Deviation from various frequency weighting response curve (dB) | | | |
|---|---|---|---|---|
| | Flat | C-weight | A-weight | Acceptance Limits |
| 125 | 0.3 | 0.4 | 0.4 | ± 1.5 |
| 1000 | 0.2 | 0.2 | 0.2 | ± 1.0 |
| 8000 | 1.0 | 1.1 | 1.1 | ±5.0 |

COPY

Cert. No. : ACL25180
Job No. : VC68AC0077
Pages : 5 of 8

**4. Electrical signal tests of frequency weightings**

Weighting network response with relative to 1 kHz.

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

P-1-30

**5. Frequency and time weightings at 1 kHz**

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

**6. Long - term stability**

| Frequency Weighting | SLM Display at initial (dB) | SLM Display at final (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---|---|---|---|---|
| A - weight | 94.0 | 94.0 | 0.0 | ± 0.3 |

COPY

SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL25180
Job No. : VC68AC0077
Pages : 6 of 8

7. Level linearity on the reference level range

| Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---|---|---|---|
| 137.0 | 137.0 | 0.0 | ± 1.1 |
| 136.0 | 136.0 | 0.0 | ± 1.1 |
| 135.0 | 135.0 | 0.0 | ± 1.1 |
| 134.0 | 134.0 | 0.0 | ± 1.1 |
| 133.0 | 133.0 | 0.0 | ± 1.1 |
| 132.0 | 132.0 | 0.0 | ± 1.1 |
| 131.0 | 131.0 | 0.0 | ± 1.1 |
| 129.0 | 129.0 | 0.0 | ± 1.1 |
| 124.0 | 124.0 | 0.0 | ± 1.1 |
| 119.0 | 119.0 | 0.0 | ± 1.1 |
| 114.0 | 114.0 | 0.0 | ± 1.1 |
| 109.0 | 109.0 | 0.0 | ± 1.1 |
| 104.0 | 104.0 | 0.0 | ± 1.1 |
| 99.0 | 99.0 | 0.0 | ± 1.1 |
| 94.0 | 94.0 | 0.0 | ± 1.1 |
| 89.0 | 89.0 | 0.0 | ± 1.1 |
| 84.0 | 84.0 | 0.0 | ± 1.1 |
| 79.0 | 79.0 | 0.0 | ± 1.1 |
| 74.0 | 74.0 | 0.0 | ± 1.1 |
| 69.0 | 69.0 | 0.0 | ± 1.1 |
| 64.0 | 64.0 | 0.0 | ± 1.1 |
| 59.0 | 59.0 | 0.0 | ± 1.1 |
| 54.0 | 54.0 | 0.0 | ± 1.1 |
| 49.0 | 49.0 | 0.0 | ± 1.1 |
| 44.0 | 44.0 | 0.0 | ± 1.1 |
| 39.0 | 39.0 | 0.0 | ± 1.1 |
| 34.0 | 34.0 | 0.0 | ± 1.1 |
| 30.0 | 29.9 | -0.1 | ± 1.1 |
| 29.0 | 29.0 | 0.0 | ± 1.1 |
| 28.0 | 28.0 | 0.0 | ± 1.1 |
| 27.0 | 26.9 | -0.1 | ± 1.1 |
| 26.0 | 25.9 | -0.1 | ± 1.1 |
| 25.0 | 24.9 | -0.1 | ± 1.1 |

COPY

Cert. No. : ACL25180
Job No. : VC68AC0077
Pages : 7 of 8

**8. Level linearity including the level range control**

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 94.0 | 94.0 | 0.0 | ±1.1 |

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 29.0 | 29.0 | 0.0 | ±1.1 |

F-T-31

**9. Tone burst response**

| Time Weighting | Tone burst duration, Tb ( ms ) | Cycle | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|---|---|
| Fast | 0.25 | 1 | 108.0 | 107.9 | -0.1 | 1.5 ; -5.0 |
| | 2 | 8 | 117.0 | 117.0 | 0.0 | 1.0 ; -2.5 |
| | 200 | 800 | 134.0 | 134.1 | 0.1 | ±1.0 |
| Slow | 2 | 8 | 108.0 | 108.0 | 0.0 | 1.0 ; -5.0 |
| | 200 | 800 | 127.6 | 127.6 | 0.0 | ±1.0 |
| SEL | 0.25 | 1 | 99.0 | 98.9 | -0.1 | 1.5 ; -5.0 |
| | 2 | 8 | 108.0 | 108.0 | 0.0 | 1.0 ; -2.5 |
| | 200 | 800 | 128.0 | 128.0 | 0.0 | ±1.0 |

COPY

SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL25180
Job No. : VC68AC0077
Pages : 8 of 8

**10. Peak C sound level**

| Number of cycle in test signal | Anticipated Value ( dB ) | Measured Value, Lcpeak ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| Continuous | 130.0 | 130.0 | 0.0 | ±3.0 |
| One | 133.4 | 133.2 | -0.2 | ±3.0 |

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

**11. Overload indication**

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

**12. High level stability**

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

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

**End of Calibration Certificate**

COPY

**SOUND LEVEL METER**

**MODEL : NL-42A**

**SERIAL No. : 00222594**

**SITHIPORN ASSOCIATES CO., LTD.**
**CALIBRATION LABORATORY**

451-451/1 Sirinthorn Road, Bangbumru, Bangplud, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email : calibration@sithiphorn.com

SITHIPORN associates

ilac-MRA

NSC-TISI-TIS 17025 CALIBRATION 0394

Cert. No. : ACL26005
Pages : 1 of 8

# Calibration Certificate

| | |
|---|---|
| **Equipment :** | SOUND LEVEL METER |
| **Manufacturer :** | RION |
| **Model :** | NL-42A / Microphone UC-52 / Preamplifier NH-24 |
| **Serial No.:** | 00222594 / 195905 / 15425 |
| **ID No.:** | - |
| **Condition As Found :** | GOOD |
| **Customer :** | EASTERN THAI CONSULTING 1992 CO., LTD.<br>SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,<br>NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND. |
| **Location :** | - |
| **Ambient Temperature :** | ( 23.0 ± 3 ) °C |
| **Pressure :** | ( 101.3 ± 3 ) kPa |
| **Relative Humidity :** | ( 50.0 ± 20 ) % |
| **Received Date :** | 26 DECEMBER 2025 |
| **Calibration Date :** | 05 - 07 JANUARY 2026 |
| **Date of Issue :** | 07 JANUARY 2026 |

**Calibrated by :** Nathakorn Pisutpaisan

**Approved by :**

( Nitinun Srihawan )

COPY

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

P1-1-33



**Calibration Procedure :** CP-AC-01

**Calibration Method :**

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

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

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

**Condition of this result of calibration :**

1. Reference Standard Instruments :

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|
| Waveform Generator | 33210A | MY48017076 | EF-0011-25 | 11-FEB-26 |
| Waveform Generator | 33511B | MY52302742 | EF-0012-25 | 11-FEB-26 |
| Digital Multimeter | 33461A | MY53220104 | EEL.BP 24/0268 | 22-APR-26 |
| Digital Multimeter | 33461A | MY53220076 | EEL.BP 23/0268 | 22-APR-26 |
| Digital Multimeter | 34461A | MY60024273 | CA2025120EA | 18-MAR-26 |
| Programmable Attenuator | MAT-1070 | 62100114 | EF-0006-25 | 11-FEB-26 |
| Condenser Microphone | 4180 | 2977900 | AA-1002-25 | 19-FEB-26 |
| Measuring Amplifier | NA-42KAI | 34560495 | AA-3002-25 | 19-FEB-26 |

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.
3. This certificate is traceable to the international system of unit maintained at :
   - 3.1 National Institute of Metrology (Thailand).
   - 3.2 Thailand Institute of Scientific and Technological Research (TISTR).
   - 3.3 Electrical And Electronics Institute (EEI).

COPY

Cert. No. : ACL26005
Job No. : VC69AC0048
Pages : 3 of 8

**Summary of Measurement Result :**

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

P1-34

COPY

SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26005
Job No. : VC69AC0048
Page : 4 of 8

**Result of calibration :**

**1. Absolute sensitivity**

| Reference Acoustic Signal ( dB ) | Measured Value ( dB ) | Deviation ( dB ) | Acceptance Limit ( dB ) |
|---|---|---|---|
| 93.9 (93.94) | 93.9 | 0.0 | ±0.3 |

**2. Self-generated noise**

2.1 Normal test

| Measured Value ( dB ) |
|---|
| 13.8 |

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

| Frequency Weighting | Weighting ( dB ) |
|---|---|
| A - weight | 9.9 |
| C - weight | 16.5 |
| Flat | 22.2 |

**3. Acoustical signal tests of frequency weightings**

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

| Frequency ( Hz ) | Deviation from various frequency weighting response curve (dB) | | | |
|---|---|---|---|---|
| | Flat | C-weight | A-weight | Acceptance Limits |
| 125 | 0.2 | 0.2 | 0.2 | ± 1.5 |
| 1000 | 0.0 | 0.0 | 0.0 | ± 1.0 |
| 8000 | 0.4 | 0.5 | 0.5 | ±5.0 |

COPY

Cert. No. : ACL26005
Job No. : VC69AC0048
Pages : 5 of 8

**4. Electrical signal tests of frequency weightings**

Weighting network response with relative to 1 kHz.

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

**5. Frequency and time weightings at 1 kHz**

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

**6. Long - term stability**

| Frequency Weighting | SLM Display at initial (dB) | SLM Display at final (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---|---|---|---|---|
| A - weight | 94.0 | 94.0 | 0.0 | ± 0.3 |

COPY



SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26005
Job No. : VC69AC0048
Pages : 6 of 8

**7. Level linearity on the reference level range**

| Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---|---|---|---|
| 137.0 | 137.0 | 0.0 | ± 1.1 |
| 136.0 | 136.0 | 0.0 | ± 1.1 |
| 135.0 | 135.0 | 0.0 | ± 1.1 |
| 134.0 | 134.1 | 0.1 | ± 1.1 |
| 133.0 | 133.0 | 0.0 | ± 1.1 |
| 132.0 | 132.0 | 0.0 | ± 1.1 |
| 131.0 | 131.0 | 0.0 | ± 1.1 |
| 129.0 | 129.0 | 0.0 | ± 1.1 |
| 124.0 | 124.0 | 0.0 | ± 1.1 |
| 119.0 | 119.1 | 0.1 | ± 1.1 |
| 114.0 | 114.1 | 0.1 | ± 1.1 |
| 109.0 | 109.0 | 0.0 | ± 1.1 |
| 104.0 | 104.1 | 0.1 | ± 1.1 |
| 99.0 | 99.0 | 0.0 | ± 1.1 |
| 94.0 | 94.0 | 0.0 | ± 1.1 |
| 89.0 | 89.0 | 0.0 | ± 1.1 |
| 84.0 | 84.0 | 0.0 | ± 1.1 |
| 79.0 | 79.0 | 0.0 | ± 1.1 |
| 74.0 | 74.0 | 0.0 | ± 1.1 |
| 69.0 | 69.0 | 0.0 | ± 1.1 |
| 64.0 | 64.0 | 0.0 | ± 1.1 |
| 59.0 | 59.0 | 0.0 | ± 1.1 |
| 54.0 | 54.0 | 0.0 | ± 1.1 |
| 49.0 | 49.0 | 0.0 | ± 1.1 |
| 44.0 | 44.0 | 0.0 | ± 1.1 |
| 39.0 | 39.0 | 0.0 | ± 1.1 |
| 34.0 | 34.0 | 0.0 | ± 1.1 |
| 30.0 | 30.0 | 0.0 | ± 1.1 |
| 29.0 | 29.1 | 0.1 | ± 1.1 |
| 28.0 | 28.0 | 0.0 | ± 1.1 |
| 27.0 | 27.0 | 0.0 | ± 1.1 |
| 26.0 | 26.1 | 0.1 | ± 1.1 |
| 25.0 | 25.1 | 0.1 | ± 1.1 |

COPY

**8. Level linearity including the level range control**

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 94.0 | 94.0 | 0.0 | ±1.1 |

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 29.0 | 28.9 | -0.1 | ±1.1 |

**9. Tone burst response**

| Time Weighting | Tone burst duration, Tb ( ms ) | Cycle | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|---|---|
| Fast | 0.25 | 1 | 108.0 | 108.0 | 0.0 | 1.5 ; -5.0 |
| | 2 | 8 | 117.0 | 117.0 | 0.0 | 1.0 ; -2.5 |
| | 200 | 800 | 134.0 | 134.1 | 0.1 | ±1.0 |
| Slow | 2 | 8 | 108.0 | 108.1 | 0.1 | 1.0 ; -5.0 |
| | 200 | 800 | 127.6 | 127.7 | 0.1 | ±1.0 |
| SEL | 0.25 | 1 | 99.0 | 98.9 | -0.1 | 1.5 ; -5.0 |
| | 2 | 8 | 108.0 | 108.0 | 0.0 | 1.0 ; -2.5 |
| | 200 | 800 | 128.0 | 128.1 | 0.1 | ±1.0 |

COPY





**10. Peak C sound level**

| Number of cycle in test signal | Anticipated Value ( dB ) | Measured Value, Lcpeak ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| Continuous | 130.0 | 130.0 | 0.0 | ±3.0 |
| One | 133.4 | 133.4 | 0.0 | ±3.0 |

| Number of cycle in test signal | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| Continuous | 133.0 | 133.0 | 0.0 | ±2.0 |
| Positive half cycle | 135.4 | 135.1 | -0.3 | ±2.0 |
| Negative half cycle | 135.4 | 135.1 | -0.3 | ±2.0 |

**11. Overload indication**

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

**12. High level stability**

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

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

**End of Calibration Certificate**

COPY

**SOUND LEVEL METER**

**MODEL : NL-42A**

**SERIAL No. : 00222592**

**SITHIPORN ASSOCIATES CO., LTD.**
**CALIBRATION LABORATORY**

451-451/1 Sirinthorn Road, Bangbumru, Bangplud, Bangkok, 10700 Thailand
Tel. +66 2433 8331 Email : calibration@sithiphorn.com

SITHIPORN associates

ilac-MRA

ISC-TISI-TIS 17025 CALIBRATION 0394

Cert. No. : ACL26003
Pages : 1 of 8

# Calibration Certificate

| | |
|---|---|
| **Equipment :** | SOUND LEVEL METER |
| **Manufacturer :** | RION |
| **Model :** | NL-42A / Microphone UC-52 / Preamplifier NH-24 |
| **Serial No.:** | 00222592 / 195904 / 15424 |
| **ID No.:** | - |
| **Condition As Found :** | GOOD |
| **Customer :** | EASTERN THAI CONSULTING 1992 CO., LTD.<br>SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,<br>NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND. |
| **Location :** | - |
| **Ambient Temperature :** | ( 23.0 ±3 ) °C |
| **Pressure :** | ( 101.3 ±3 ) kPa |
| **Relative Humidity :** | ( 50.0 ±20 ) % |
| **Received Date :** | 26 DECEMBER 2025 |
| **Calibration Date :** | 05 - 07 JANUARY 2026 |
| **Date of Issue :** | 07 JANUARY 2026 |

**Calibrated by :** Nathakorn Pisutpaisan

**Approved by :**

( Nitinun Srihawan )

COPY

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

P1-38

SITHIPORN associates

SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26003
Job No. : VC69AC0048
Pages : 2 of 8

**Calibration Procedure :** CP-AC-01

**Calibration Method :**

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

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

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

**Condition of this result of calibration :**

1. Reference Standard Instruments :

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|
| Waveform Generator | 33210A | MY48017076 | EF-0011-25 | 11-FEB-26 |
| Waveform Generator | 33511B | MY52302742 | EF-0012-25 | 11-FEB-26 |
| Digital Multimeter | 33461A | MY53220104 | EEL.BP 24/0268 | 22-APR-26 |
| Digital Multimeter | 33461A | MY53220076 | EEL.BP 23/0268 | 22-APR-26 |
| Digital Multimeter | 34461A | MY60024273 | CA2025120EA | 18-MAR-26 |
| Programmable Attenuator | MAT-1070 | 62100114 | EF-0006-25 | 11-FEB-26 |
| Condenser Microphone | 4180 | 2977900 | AA-1002-25 | 19-FEB-26 |
| Measuring Amplifier | NA-42KAI | 34560495 | AA-3002-25 | 19-FEB-26 |

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.
3. This certificate is traceable to the international system of unit maintained at :
   - 3.1 National Institute of Metrology (Thailand).
   - 3.2 Thailand Institute of Scientific and Technological Research (TISTR).
   - 3.3 Electrical And Electronics Institute (EEI).

COPY

Cert. No. : ACL26003
Job No. : VC69AC0048
Pages : 3 of 8

**Summary of Measurement Result :**

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

P1-39

COPY

SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26003
Job No. : VC69AC0048
Page : 4 of 8

**Result of calibration :**

**1. Absolute sensitivity**

| Reference Acoustic Signal ( dB ) | Measured Value ( dB ) | Deviation ( dB ) | Acceptance Limit ( dB ) |
|---|---|---|---|
| 93.9 (93.94) | 93.9 | 0.0 | ±0.3 |

**2. Self-generated noise**

2.1 Normal test

| Measured Value ( dB ) |
|---|
| 14.4 |

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

| Frequency Weighting | Weighting ( dB ) |
|---|---|
| A - weight | 10.8 |
| C - weight | 17.1 |
| Flat | 22.9 |

**3. Acoustical signal tests of frequency weightings**

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

| Frequency ( Hz ) | Deviation from various frequency weighting response curve (dB) | | | |
|---|---|---|---|---|
| | Flat | C-weight | A-weight | Acceptance Limits |
| 125 | 0.2 | 0.2 | 0.3 | ± 1.5 |
| 1000 | 0.0 | 0.0 | 0.0 | ± 1.0 |
| 8000 | 1.0 | 1.1 | 1.1 | ±5.0 |

COPY

Cert. No. : ACL26003
Job No. : VC69AC0048
Pages : 5 of 8

**4. Electrical signal tests of frequency weightings**

Weighting network response with relative to 1 kHz.

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

**5. Frequency and time weightings at 1 kHz**

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

**6. Long - term stability**

| Frequency Weighting | SLM Display at initial (dB) | SLM Display at final (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---|---|---|---|---|
| A - weight | 94.0 | 94.0 | 0.0 | ± 0.3 |

COPY



SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26003
Job No. : VC69AC0048
Pages : 6 of 8

**7. Level linearity on the reference level range**

| Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---|---|---|---|
| 137.0 | 137.0 | 0.0 | ± 1.1 |
| 136.0 | 136.0 | 0.0 | ± 1.1 |
| 135.0 | 135.1 | 0.1 | ± 1.1 |
| 134.0 | 134.1 | 0.1 | ± 1.1 |
| 133.0 | 133.0 | 0.0 | ± 1.1 |
| 132.0 | 132.0 | 0.0 | ± 1.1 |
| 131.0 | 131.0 | 0.0 | ± 1.1 |
| 129.0 | 129.0 | 0.0 | ± 1.1 |
| 124.0 | 124.0 | 0.0 | ± 1.1 |
| 119.0 | 119.1 | 0.1 | ± 1.1 |
| 114.0 | 114.1 | 0.1 | ± 1.1 |
| 109.0 | 109.1 | 0.1 | ± 1.1 |
| 104.0 | 104.1 | 0.1 | ± 1.1 |
| 99.0 | 99.1 | 0.1 | ± 1.1 |
| 94.0 | 94.0 | 0.0 | ± 1.1 |
| 89.0 | 89.0 | 0.0 | ± 1.1 |
| 84.0 | 84.0 | 0.0 | ± 1.1 |
| 79.0 | 79.0 | 0.0 | ± 1.1 |
| 74.0 | 74.0 | 0.0 | ± 1.1 |
| 69.0 | 69.0 | 0.0 | ± 1.1 |
| 64.0 | 64.0 | 0.0 | ± 1.1 |
| 59.0 | 59.0 | 0.0 | ± 1.1 |
| 54.0 | 54.0 | 0.0 | ± 1.1 |
| 49.0 | 49.0 | 0.0 | ± 1.1 |
| 44.0 | 44.0 | 0.0 | ± 1.1 |
| 39.0 | 39.0 | 0.0 | ± 1.1 |
| 34.0 | 34.0 | 0.0 | ± 1.1 |
| 30.0 | 30.0 | 0.0 | ± 1.1 |
| 29.0 | 29.0 | 0.0 | ± 1.1 |
| 28.0 | 28.0 | 0.0 | ± 1.1 |
| 27.0 | 27.1 | 0.1 | ± 1.1 |
| 26.0 | 26.1 | 0.1 | ± 1.1 |
| 25.0 | 25.1 | 0.1 | ± 1.1 |

COPY



p1-40

Cert. No. : ACL26003
Job No. : VC69AC0048
Pages : 7 of 8

**8. Level linearity including the level range control**

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 94.0 | 94.0 | 0.0 | ±1.1 |

| Range | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| 130 | 29.0 | 29.0 | 0.0 | ±1.1 |

**9. Tone burst response**

| Time Weighting | Tone burst duration, Tb ( ms ) | Cycle | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|---|---|
| Fast | 0.25 | 1 | 108.0 | 107.9 | -0.1 | 1.5 ; -5.0 |
| | 2 | 8 | 117.0 | 116.9 | -0.1 | 1.0 ; -2.5 |
| | 200 | 800 | 134.0 | 134.0 | 0.0 | ±1.0 |
| Slow | 2 | 8 | 108.0 | 108.0 | 0.0 | 1.0 ; -5.0 |
| | 200 | 800 | 127.6 | 127.6 | 0.0 | ±1.0 |
| SEL | 0.25 | 1 | 99.0 | 98.8 | -0.2 | 1.5 ; -5.0 |
| | 2 | 8 | 108.0 | 108.0 | 0.0 | 1.0 ; -2.5 |
| | 200 | 800 | 128.0 | 128.0 | 0.0 | ±1.0 |

COPY

SITHIPORN associates
SITHIPORN ASSOCIATES
CALIBRATION LABORATORY

Cert. No. : ACL26003
Job No. : VC69AC0048
Pages : 8 of 8

**10. Peak C sound level**

| Number of cycle in test signal | Anticipated Value ( dB ) | Measured Value, Lcpeak ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| Continuous | 130.0 | 130.0 | 0.0 | ±3.0 |
| One | 133.4 | 133.4 | 0.0 | ±3.0 |

| Number of cycle in test signal | Anticipated Value ( dB ) | Measured Value ( dB ) | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|---|
| Continuous | 133.0 | 133.0 | 0.0 | ±2.0 |
| Positive half cycle | 135.4 | 135.1 | -0.3 | ±2.0 |
| Negative half cycle | 135.4 | 135.1 | -0.3 | ±2.0 |

**11. Overload indication**

| Measured value ( dB ) | | Deviated Value ( dB ) | Acceptance Limits ( dB ) |
|---|---|---|---|
| Positive one-half cycle | Negative one-half cycle | | |
| 89.5 | 89.5 | 0.0 | ±1.5 |

**12. High level stability**

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

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

**End of Calibration Certificate**

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0955**

# CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 January 2026** CERTIFICATE NUMBER **257792**

**Cirrus Research plc**
**Acoustic House**
**Bridlington Road**
**Hunmanby**
**North Yorkshire**
**YO14 0PH**
**United Kingdom**



Approved signatory
N.Smith
Electronically signed:

## Dosemeter : IEC 61252-1993+A1:2000

**Instrument information**

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CB0955
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co.,Ltd.
683 Moo 11, Sukaphiban 8 Rd.,
Nongkham, Sriracha, Chonburi 20230

**Test summary**

Date of calibration: 28 January 2026

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

**Test equipment**

| Equipment | Manufacturer | Model | Serial number |
|---|---|---|---|
| Signal Generator | SIGLENT | SDG1032X | SDG1XDDC7R0315 |
| Attenuator | Cirrus Research | ZE:952 | 101223 |
| Environmental Monitor | Comet | T7510 | 16966334 |
| doseBadge Reader | Cirrus Research plc | RC:110A | 109288 |

**Notes**

COPY

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number: **257792**



**Environmental conditions**

The following conditions were recorded at the time of the test:

| | | | | | |
|---|---|---|---|---|---|
| **Before** | Pressure: | 98.67 kPa | Temperature: | 21.2 °C | Humidity: 38.0 % |
| **After** | Pressure: | 98.69 kPa | Temperature: | 21.6 °C | Humidity: 38.5 % |

**Test results summary**

| Test | Result |
|---|---|
| Absolute Acoustic Sensitivity 1995 | Complies |
| Linearity 1995 | Complies |
| Short Duration 1995 | Complies |
| Overload Latching 1995 | Complies |
| Frequency weighting 1995 | Complies |

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0954**

# CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 January 2026** CERTIFICATE NUMBER **257818**

**Cirrus Research plc**
**Acoustic House**
**Bridlington Road**
**Hunmanby**
**North Yorkshire**
**YO14 0PH**
**United Kingdom**



Approved signatory
N.Smith
Electronically signed:

## Dosemeter : IEC 61252-1993+A1:2000

### Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CB0954
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co.,Ltd.
683 Moo 11, Sukaphiban 8 Rd.,
Nongkham, Sriracha, Chonburi 20230

### Test summary

Date of calibration: 28 January 2026

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

### Test equipment

| Equipment | Manufacturer | Model | Serial number |
|---|---|---|---|
| Signal Generator | SIGLENT | SDG1032X | SDG1XDDD7R6629 |
| Attenuator | Cirrus Research | ZE:952 | 96919 |
| Environmental Monitor | Comet | T7510 | 16966334 |
| doseBadge Reader | Cirrus Research plc | RC:110A | 79620 |

### Notes

COPY

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number: **257818**



### Environmental conditions

The following conditions were recorded at the time of the test:

| | | | | | |
|---|---|---|---|---|---|
| **Before** | Pressure: | 98.68 kPa | Temperature: | 21.5 °C | Humidity: 38.0 % |
| **After** | Pressure: | 98.70 kPa | Temperature: | 21.6 °C | Humidity: 39.0 % |

### Test results summary

| Test | Result |
|---|---|
| Absolute Acoustic Sensitivity 1995 | Complies |
| Linearity 1995 | Complies |
| Short Duration 1995 | Complies |
| Overload Latching 1995 | Complies |
| Frequency weighting 1995 | Complies |

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CA8879**

# CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 January 2026** CERTIFICATE NUMBER **257799**

**Cirrus Research plc**
**Acoustic House**
**Bridlington Road**
**Hunmanby**
**North Yorkshire**
**YO14 0PH**
**United Kingdom**



Approved signatory
N.Smith
Electronically signed:

## Dosemeter : IEC 61252-1993+A1:2000

**Instrument information**

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CA8879
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co.,Ltd.
683 Moo 11, Sukaphiban 8 Rd.,
Nongkham, Sriracha, Chonburi 20230

**Test summary**

Date of calibration: 27 January 2026

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

**Test equipment**

| Equipment | Manufacturer | Model | Serial number |
|---|---|---|---|
| Signal Generator | SIGLENT | SDG1032X | SDG1XDDQ6R6307 |
| Attenuator | Cirrus Research | ZE:952 | 101220 |
| Environmental Monitor | Comet | T7510 | 16966334 |
| doseBadge Reader | Cirrus Research plc | UNIDB4A | 109292 |

**Notes**

COPY

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION



**Environmental conditions**

The following conditions were recorded at the time of the test:

| | | | | | | |
|---|---|---|---|---|---|---|
| **Before** | Pressure: | 97.90 kPa | Temperature: | 22.9 °C | Humidity: | 37.8 % |
| **After** | Pressure: | 97.90 kPa | Temperature: | 22.6 °C | Humidity: | 39.2 % |

**Test results summary**

| Test | Result |
|---|---|
| Absolute Acoustic Sensitivity 1995 | Complies |
| Linearity 1995 | Complies |
| Short Duration 1995 | Complies |
| Overload Latching 1995 | Complies |
| Frequency weighting 1995 | Complies |

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CA8886**

# CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 January 2026** CERTIFICATE NUMBER **257812**

**Cirrus Research plc**
**Acoustic House**
**Bridlington Road**
**Hunmanby**
**North Yorkshire**
**YO14 0PH**
**United Kingdom**



Approved signatory
N.Smith
Electronically signed:

## Dosemeter : IEC 61252-1993+A1:2000

### Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CA8886
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co.,Ltd.
683 Moo 11, Sukaphiban 8 Rd.,
Nongkham, Sriracha, Chonburi 20230

### Test summary

Date of calibration: 27 January 2026

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

### Test equipment

| Equipment | Manufacturer | Model | Serial number |
|---|---|---|---|
| Signal Generator | SIGLENT | SDG1032X | SDG1XDDD7R6629 |
| Attenuator | Cirrus Research | ZE:952 | 96919 |
| Environmental Monitor | Cornet | T7510 | 16966334 |
| doseBadge Reader | Cirrus Research plc | RC:110A | 79620 |

### Notes

COPY

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number: **257812**



### Environmental conditions

The following conditions were recorded at the time of the test:

| | | | | | |
|---|---|---|---|---|---|
| **Before** | Pressure: | 97.90 kPa | Temperature: | 22.6 °C | Humidity: 38.5 % |
| **After** | Pressure: | 97.90 kPa | Temperature: | 22.7 °C | Humidity: 39.9 % |

### Test results summary

| Test | Result |
|---|---|
| Absolute Acoustic Sensitivity 1995 | Complies |
| Linearity 1995 | Complies |
| Short Duration 1995 | Complies |
| Overload Latching 1995 | Complies |
| Frequency weighting 1995 | Complies |

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0958**

# CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 January 2026** CERTIFICATE NUMBER **257795**

**Cirrus Research plc**
**Acoustic House**
**Bridlington Road**
**Hunmanby**
**North Yorkshire**
**YO14 0PH**
**United Kingdom**



Approved signatory
N.Smith
Electronically signed:

## Dosemeter : IEC 61252-1993+A1:2000

### Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CB0958
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co.,Ltd.
683 Moo 11, Sukaphiban 8 Rd.,
Nongkham, Sriracha, Chonburi 20230

### Test summary

Date of calibration: 28 January 2026

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

### Test equipment

| Equipment | Manufacturer | Model | Serial number |
|---|---|---|---|
| Signal Generator | SIGLENT | SDG1032X | SDG1XDDC7R0315 |
| Attenuator | Cirrus Research | ZE:952 | 101223 |
| Environmental Monitor | Comet | T7510 | 16966334 |
| doseBadge Reader | Cirrus Research plc | RC:110A | 109288 |

### Notes

COPY

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION



### Environmental conditions

The following conditions were recorded at the time of the test:

| | | | | | |
|---|---|---|---|---|---|
| **Before** | Pressure: | 98.62 kPa | Temperature: | 20.9 °C | Humidity: 37.1 % |
| **After** | Pressure: | 98.66 kPa | Temperature: | 21.3 °C | Humidity: 37.4 % |

### Test results summary

| Test | Result |
|---|---|
| Absolute Acoustic Sensitivity 1995 | Complies |
| Linearity 1995 | Complies |
| Short Duration 1995 | Complies |
| Overload Latching 1995 | Complies |
| Frequency weighting 1995 | Complies |

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0956**

# CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 January 2026** CERTIFICATE NUMBER **257794**

**Cirrus Research plc**
**Acoustic House**
**Bridlington Road**
**Hunmanby**
**North Yorkshire**
**YO14 0PH**
**United Kingdom**



Approved signatory
N.Smith
Electronically signed:

## Dosemeter : IEC 61252-1993+A1:2000

### Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CB0956
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co.,Ltd.
683 Moo 11, Sukaphiban 8 Rd.,
Nongkham, Sriracha, Chonburi 20230

### Test summary

Date of calibration: 28 January 2026

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

### Test equipment

| Equipment | Manufacturer | Model | Serial number |
|---|---|---|---|
| Signal Generator | SIGLENT | SDG1032X | SDG1XDDQ6R6307 |
| Attenuator | Cirrus Research | ZE:952 | 101220 |
| Environmental Monitor | Comet | T7510 | 16966334 |
| doseBadge Reader | Cirrus Research plc | UNIDB4A | 109292 |

### Notes

COPY

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number: **257794**



### Environmental conditions

The following conditions were recorded at the time of the test:

| | | | | | |
|---|---|---|---|---|---|
| **Before** | Pressure: | 98.63 kPa | Temperature: | 21.2 °C | Humidity: 37.0 % |
| **After** | Pressure: | 98.67 kPa | Temperature: | 21.5 °C | Humidity: 37.7 % |

### Test results summary

| Test | Result |
|---|---|
| Absolute Acoustic Sensitivity 1995 | Complies |
| Linearity 1995 | Complies |
| Short Duration 1995 | Complies |
| Overload Latching 1995 | Complies |
| Frequency weighting 1995 | Complies |

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CA8887**

# CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 January 2026** CERTIFICATE NUMBER **257831**

**Cirrus Research plc**
**Acoustic House**
**Bridlington Road**
**Hunmanby**
**North Yorkshire**
**YO14 0PH**
**United Kingdom**



Approved signatory
N.Smith
Electronically signed:

## Dosemeter : IEC 61252-1993+A1:2000

**Instrument information**

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CA8887
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co.,Ltd.
999 Moo.11 Nongkham, Sri Racha, Chonburi 20230

**Test summary**

Date of calibration: 28 January 2026

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

**Test equipment**

| Equipment | Manufacturer | Model | Serial number |
|---|---|---|---|
| Signal Generator | SIGLENT | SDG1032X | SDG1XDDC7R0315 |
| Attenuator | Cirrus Research | ZE:952 | 101223 |
| Environmental Monitor | Comet | T7510 | 16966334 |
| doseBadge Reader | Cirrus Research plc | RC:110A | 109288 |

**Notes**

COPY

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number: **257831**



**Environmental conditions**

The following conditions were recorded at the time of the test:

| | | | | | |
|---|---|---|---|---|---|
| **Before** | Pressure: | 98.74 kPa | Temperature: | 21.9 °C | Humidity: 39.9 % |
| **After** | Pressure: | 98.78 kPa | Temperature: | 22.2 °C | Humidity: 39.7 % |

**Test results summary**

| Test | Result |
|---|---|
| Absolute Acoustic Sensitivity 1995 | Complies |
| Linearity 1995 | Complies |
| Short Duration 1995 | Complies |
| Overload Latching 1995 | Complies |
| Frequency weighting 1995 | Complies |

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CA8888**

# CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 January 2026** CERTIFICATE NUMBER **257802**

**Cirrus Research plc**
**Acoustic House**
**Bridlington Road**
**Hunmanby**
**North Yorkshire**
**YO14 0PH**
**United Kingdom**



Approved signatory
N.Smith
Electronically signed:

## Dosemeter : IEC 61252-1993+A1:2000

### Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CA8888
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co.,Ltd.
683 Moo 11, Sukaphiban 8 Rd.,
Nongkham, Sriracha, Chonburi 20230

### Test summary

Date of calibration: 28 January 2026

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

### Test equipment

| Equipment | Manufacturer | Model | Serial number |
|---|---|---|---|
| Signal Generator | SIGLENT | SDG1032X | SDG1XDDD7R6629 |
| Attenuator | Cirrus Research | ZE:952 | 96919 |
| Environmental Monitor | Comet | T7510 | 16966334 |
| doseBadge Reader | Cirrus Research plc | RC:110A | 79620 |

### Notes

COPY

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION



### Environmental conditions

The following conditions were recorded at the time of the test:

| | | | | | | |
|---|---|---|---|---|---|---|
| **Before** | Pressure: | 98.59 kPa | Temperature: | 20.8 °C | Humidity: | 37.0 % |
| **After** | Pressure: | 98.63 kPa | Temperature: | 21.2 °C | Humidity: | 37.2 % |

### Test results summary

| Test | Result |
|---|---|
| Absolute Acoustic Sensitivity 1995 | Complies |
| Linearity 1995 | Complies |
| Short Duration 1995 | Complies |
| Overload Latching 1995 | Complies |
| Frequency weighting 1995 | Complies |

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CA8889**

# CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 January 2026** CERTIFICATE NUMBER **257798**

**Cirrus Research plc**
**Acoustic House**
**Bridlington Road**
**Hunmanby**
**North Yorkshire**
**YO14 0PH**
**United Kingdom**



Approved signatory
N.Smith
Electronically signed:

## Dosemeter : IEC 61252-1993+A1:2000

### Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CA8889
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co.,Ltd.
683 Moo 11, Sukaphiban 8 Rd.,
Nongkham, Sriracha, Chonburi 20230

### Test summary

Date of calibration: 28 January 2026

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

### Test equipment

| Equipment | Manufacturer | Model | Serial number |
|---|---|---|---|
| Signal Generator | SIGLENT | SDG1032X | SDG1XDDQ6R6307 |
| Attenuator | Cirrus Research | ZE:952 | 101220 |
| Environmental Monitor | Comet | T7510 | 16966334 |
| doseBadge Reader | Cirrus Research plc | UNIDB4A | 109292 |

### Notes

COPY

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number: **257798**



### Environmental conditions

The following conditions were recorded at the time of the test:

| | | | | | | |
|---|---|---|---|---|---|---|
| **Before** | Pressure: | 98.57 kPa | Temperature: | 20.7 °C | Humidity: | 35.7 % |
| **After** | Pressure: | 98.60 kPa | Temperature: | 20.8 °C | Humidity: | 37.5 % |

### Test results summary

| Test | Result |
|---|---|
| Absolute Acoustic Sensitivity 1995 | Complies |
| Linearity 1995 | Complies |
| Short Duration 1995 | Complies |
| Overload Latching 1995 | Complies |
| Frequency weighting 1995 | Complies |

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0957**

# CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 January 2026** CERTIFICATE NUMBER **257815**

**Cirrus Research plc**
**Acoustic House**
**Bridlington Road**
**Hunmanby**
**North Yorkshire**
**YO14 0PH**
**United Kingdom**



Approved signatory
N.Smith
Electronically signed:

## Dosemeter : IEC 61252-1993+A1:2000

### Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CB0957
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co.,Ltd.
683 Moo 11, Sukaphiban 8 Rd.,
Nongkham, Sriracha, Chonburi 20230

### Test summary

Date of calibration: 28 January 2026

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

### Test equipment

| Equipment | Manufacturer | Model | Serial number |
|---|---|---|---|
| Signal Generator | SIGLENT | SDG1032X | SDG1XDDQ6R6307 |
| Attenuator | Cirrus Research | ZE:952 | 101220 |
| Environmental Monitor | Comet | T7510 | 16966334 |
| doseBadge Reader | Cirrus Research plc | UNIDB4A | 109292 |

### Notes

COPY

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION



### Environmental conditions

The following conditions were recorded at the time of the test:

| | | | | | |
|---|---|---|---|---|---|
| **Before** | Pressure: | 98.70 kPa | Temperature: | 21.6 °C | Humidity: 38.5 % |
| **After** | Pressure: | 98.71 kPa | Temperature: | 21.6 °C | Humidity: 38.8 % |

### Test results summary

| Test | Result |
|---|---|
| Absolute Acoustic Sensitivity 1995 | Complies |
| Linearity 1995 | Complies |
| Short Duration 1995 | Complies |
| Overload Latching 1995 | Complies |
| Frequency weighting 1995 | Complies |

COPY

**ANALYTICAL BALANCE (DU)**

**Model : XS205DU**

**Serial No. : B344940005**

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

ilac-MRA THAILAND
NSC-TISI-TIS17025
CALIBRATION 0152

Certificate No. : 25-205716 Page 1 of 4

Sample Code : 25-90375-006

# CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd, Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Analytical Balance Room)

Equipment : ELECTRONIC BALANCE

Manufacturer : METTLER TOLEDO

Model : XS205DU

Serial No. : B344940005

ID No. : LABE 05/3

Date of Receipt : 26 November 2025

Date of Calibration : 26 November 2025

Calibrated by Mr. Thanadol Pholthep
Scientist

Approved by (Mr. Somchai Neampunt)
Signed for Director

Issue date 28 November 2025

COPY

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

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 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 Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).



AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

ilac-MRA THAILAND
NSC-TISI-TIS17025
CALIBRATION 0152

Certificate No. : 25-205716 Page 2 of 4

Sample Code : 25-90375-006

# REPORT OF CALIBRATION

| | |
|---|---|
| Equipment : | ELECTRONIC BALANCE |
| Manufacturer : | METTLER TOLEDO |
| Model : | XS205DU |
| Capacity : | Max 81 g / 200 g |
| Resolution : | 0.00001 g / 0.0001 g |
| Serial No. : | B344940005 |
| ID No. : | LABE 05/3 |

**Result of Calibration**

**1.Test weight and repeatability of reading**

Repeatability is a measure of the ability of a balance to supply the same result in repetitive weighings with one and the same load under the same measurement condition. The measurement of the repeatability must include both the balance specifications and the ambient (vibration, fluctuating air current/temperature/humidity,etc.) Operator handling of the balance is also included in the standard deviation.

| | | | | | | |
|---|---|---|---|---|---|---|
| Unit : g | Range : | 81 | ☐ Before adjustment | | ☐ After adjustment | |
| | Nominal value | | 40 | 80 | - | - |
| ☑ No adjustment | Standard weight | | 40.000087 | 80.000088 | - | - |
| ☐ Adjustment | Average reading of indicator | | 40.00004 | 80.00004 | - | - |
| | Standard deviation | | 0.000007 | 0.000007 | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| Unit : g | Range : | 200 | ☐ Before adjustment | | ☐ After adjustment | |
| | Nominal value | | 100 | 200 | - | - |
| ☑ No adjustment | Standard weight | | 99.999988 | 200.000015 | - | - |
| ☐ Adjustment | Average reading of indicator | | 99.9999 | 199.9997 | - | - |
| | Standard deviation | | 0.00005 | 0.00005 | - | - |

COPY

361 Soi Ladprao 122, Ladprao Road,
Phlabphla, Wang Thonglang, Bangkok 10310
FM-CL-064

TEL 02-516-2422
FAX 02-516-6949
Rev.03

CONTACT@AMARC.CO.TH
WWW.AMARC.CO.TH
Effective Date 15/10/21

# REPORT OF CALIBRATION

## Result of Calibration

2. Sensitivity or value of a scale division

Change in the output variable of a measuring instrument divided by the associated change in the input variable.

Unit : g

| Range : 81 | | Range : 200 | |
|---|---|---|---|
| Test Point | Sensitivity, S | Test Point | Sensitivity, S |
| 0 | 1.00000 | 0 | 1.0000 |
| 40 | 1.00000 | 100 | 1.0000 |
| 80 | 1.00000 | 200 | 1.0000 |

3. Departure of indication from nominal value, Linearity

Unit : g

| Nominal Value | Standard Value | Average Reading of Indicator | Correction Value | Expanded Uncertainty | Coverage Factor ($k$) |
|---|---|---|---|---|---|
| Unload | 0.0000000 | 0.00000 | 0.00000 | 0.000011 | 2.04 |
| 0.01 | 0.0100016 | 0.01000 | 0.00000 | 0.000011 | 2.04 |
| 0.1 | 0.1000056 | 0.10000 | 0.00001 | 0.000012 | 2.02 |
| 1 | 1.0000110 | 1.00000 | 0.00001 | 0.000015 | 2.01 |
| 5 | 4.9999996 | 4.99998 | 0.00002 | 0.000020 | 2.00 |
| 10 | 9.999994 | 9.99999 | 0.00000 | 0.000026 | 2.00 |
| 20 | 20.000042 | 20.00000 | 0.00004 | 0.000037 | 2.00 |
| 50 | 50.000052 | 50.00003 | 0.00002 | 0.000067 | 2.00 |
| 100 | 99.999988 | 100.0000 | 0.0000 | 0.00016 | 2.00 |
| 150 | 150.000040 | 150.0001 | -0.0001 | 0.00022 | 2.00 |
| 200 | 200.000015 | 200.0001 | -0.0001 | 0.00027 | 2.00 |

COPY

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%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003





# REPORT OF CALIBRATION

## Result of Calibration :

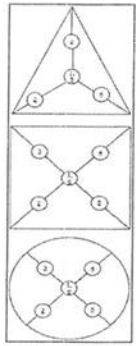
4. Eccentric or off-centre loading

Deviation of the measurement value through off - center (eccentric) loading. The corner load increases with the weight of the load and its removal from the center of the pan support.

Weighing pan ☐ Triangular ☑ Rectangular ☐ Circle

Test weight : 50 and 100
Unit : g

| Range | 81 | 200 |
|---|---|---|
| Position | Reading of indicator | Reading of indicator |
| 1 | 50.00000 | 100.0000 |
| 2 | 49.99997 | 100.0000 |
| 3 | 49.99993 | 99.9999 |
| 4 | 49.99999 | 100.0000 |
| 5 | 50.00003 | 99.9999 |
| 6 | 50.00000 | 100.0000 |
| Maximum difference | 0.00007 | 0.0001 |



## Condition of Calibration

1. Calibration Method : WI-CL-004 base on UKAS LAB 14: 2019
2. This result of calibration was found accurate as shown on date and place of calibration only.
3. Condition of Calibration item: Normal
4. This certification is traceable to the International System of Unit maintained at : - Through the reference standard laboratory of Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (Instrument number 1 ).
5. Reference standard instrument :

| Instrument | Class | ID No. | Certificate No. | Due Date |
|---|---|---|---|---|
| 1) STANDARD WEIGHT 1 mg to 1 kg | E2 | LB-WE-78 | 25-134074 | 18 July 2026 |

6.

| Ambient conditions | Min | Max |
|---|---|---|
| Temperature (°C) | 22.9 | 24.3 |
| Relative Humidity (%Rh) | 45.4 | 47.7 |
| Air pressure (hPa) | 1007.2 | 1011.0 |

- End of Report -

COPY



F-L-04

**ATOMIC ABSORPTION SPECTROPHOTOMETER**

**Model : Pin AAcle 900F**

**Serial No. : PFBS22080801**

# *PinAAcle 900F Preventive Maintenance (PM)*

| | | | |
|---|---|---|---|
| **Company Name:** | Eastern Thai Consulting | | |
| **Address (Instrument Location):** | 683 Moo 11 Nong Kham, Sri Racha, Chonburi 20230 | | |
| **Serial Number:** | PFBS22080801 | **PM Number:** | 2/2 |
| **Customer Name (if applicable):** | K.Thamonwan | **Telephone Number:** | 096-8761232 |
| **Customer Support Engineer Name:** | Prasit | **Service Order Number:** | WO-06379055 |
| **Date PM Performed:** (DD-MMM-YYYY) | 20 OCT 2025 | **Next PM Due Date:** (DD-MMM-YYYY) | 20 APR 2026 |
| **Standard Labor Hours to Complete PM :** | | **5 hours** | |

| Part Number | Release | Publication Date | |
|---|---|---|---|
| 09370145 Rev.9 | A | January 2018 | PerkinElmer® |

**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.

COPY



## Component List

| Component / Specific Model | Serial # | Configuration Notes |
|---|---|---|
| PinAAcle 900F | PFBS22080801 | Syngistix Ver 5.0.1.2029 |
| | | |
| | | |
| | | |

## Parts Lists

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

| 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 | 27-156CUY1 | SEP-2026 |

| 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% $HNO_3$ | 250 ml. | AR | AR |

COPY

| Additional Tools Required for PM | | | |
|---|---|---|---|
| **Part Number (If applicable)** | **Description** | **Quantity** | **Serial #** |
| N1013000 | 0.2A Neutral density filter | 1 | MG0-704 |
| N1013002 | 1.0A Neutral density filter | 1 | MG2-891 |
| 03030997 | System 2 EDL Driver | 1 | 030309-97E |
| N3050605 | As System 2 EDL | 1 | 17986 |
| N3050121 | Cu Lumina HCL | 1 | 000003793D12 |
| N3050109 | Ba Lumina HCL | 1 | 041123-010120 |
| N3050139 | K Lumina HCL | 1 | 0000037B8E1D |
| N3050152 | Ni Lumina HCL | 1 | |

COPY



## 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 N20-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.

COPY

**7. Flame Interlock Check:**

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

| Parameter | Specification | Test Results | Pass/Fail |
|---|---|---|---|
| Flame Sensor | Air/$C_2H_2$ Flame correctly shuts down | Active | Passed |
| Drain Sensor | Air/$C_2H_2$ Flame correctly shuts down | Active | Passed |
| Nebulizer Sensor | Air/$C_2H_2$ Flame correctly shuts down | Active | Passed |
| $C_2H_2$ Pressure Sensor | Air/$C_2H_2$ Flame correctly shuts down | Active | Passed |
| Air Pressure Sensor | Air/$C_2H_2$ 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. | 0.9995 | 0.9641 | Passed |
| 0.2 A ND Filter | ± 5% from Cert. | 0.1886 | 0.1755 | 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 | 0.0013 | Passed |

*8.3 AA Baseline Noise with Copper*

Description: Check baseline noise.

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

COPY



*8.4 $D_2$ Background Compensation with Copper*

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

| Parameter | Specification | Results | Pass/Fail |
|---|---|---|---|
| Standard Deviation | ≤ 0.010 | 0.0021 | 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 | 0.0002 | 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 | 0.0002 | 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 Applicab |
| 2 mg/L Sensitivity HS Neb (if applicable) | > 0.250 Abs. | 0.3218 | 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.

COPY



(1-68

## Additional Comments

| Additional Comments Regarding the PM |
| --- |
| |

## Review

| *The preventive maintenance checks and if applicable performance tests for PinAAcle 900F have been completed.*<br><br>*This PinAAcle 900F Passes ☑ Fails ☐ the preventive maintenance.* | |
| --- | --- |
| **Review of Preventive Maintenance:** | |
| Authorized PerkinElmer Representative: Prasit | Date: 20 Oct 2025 (DD-MMM-YYYY) |
| Authorized Customer Representative: [illegible] | Date: 20 OCT 2025 (DD-MMM-YYYY) |

COPY

**AUTOCLAVE**

**Model : FLS-1000**

**Serial No. : 55169083**

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

ilac-MRA THAILAND
NSC-TISI-TIS17025
CALIBRATION 0152

# CERTIFICATE OF CALIBRATION



Certificate No. : 25-118068

Sample Code : 25-51697-004

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Autoclave Room)

Equipment : Autoclave

Manufacturer : TOMY Model : FLS-1000

Serial No. : 55169083 ID No. : LABE 43/2

Date of Receipt : 25 June 2025 Date of Calibration : 25 June 2025

Condition of Calibration

1. Environment
   - 1.1 Ambient temperature : Maximum 32.0 °C ; Minimum 29.7 °C
   - 1.2 Relative humidity : Maximum 68.1 % ; Minimum 65.2 %
   - 1.3 Line voltage supplied : Maximum 222.3 VAC ; Minimum 218.3 VAC

2. Calibration method
   The calibration use in-house method: WI-CL-025 based on BS 2646-1: 2021

3. Reference standard instrument

| Instrument | Model | ID No. | Certificate No. | Due Date |
|---|---|---|---|---|
| 3.1 Temperature Data Logger | HiTemp 140 | LB-TEM-25 | 25-034993 | 12 March 2026 |
| 3.2 Temperature Data Logger | HiTemp 140 | LB-TEM-26 | 25-034994 | 12 March 2026 |
| 3.3 Temperature Data Logger | HiTemp 140 | LB-TEM-27 | 25-034995 | 12 March 2026 |

4. This certificate is traceable to the international system of unit (SI Unit).
   The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.
5. This result of calibration was found accurate as shown on date and place of calibration only.
6. Condition of calibration item : Normal

Calibrated by Mr. Pattanapong Pulngern
Scientist

Approved by (Mr. Somchai Neampunt)
Signed for Director

Issue date 26 June 2025

COPY

The uncertainties are for a confidence probability of approximately 95%.
The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

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 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 Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).



AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

ilac-MRA THAILAND
NSC-TISI-TIS17025
CALIBRATION 0152

# REPORT OF CALIBRATION



Certificate No. : 25-118068

Sample Code : 25-51697-004

## Results of Calibration

Resolution : 1 °C

1. Reporting of Temperature

| Calibration point (°C) | UUC* setting (°C) | UUC* reading | | Measured Temperature at each positions (°C) | | | Uncertainty ± (°C) | Coverage factor *k* |
|---|---|---|---|---|---|---|---|---|
| | | Temperature (°C) | Pressure ( MPa ) | # 1 | # 2 Ref | # 3 | | |
| 121 | 121 | 122 | 0.11 | 121.75 | 121.76 | 121.77 | 0.63 | 2.00 |

2. Characterization results

| Calibration Point (°C) | Stability ± (°C) | Uniformity (°C) | Overall Variation (°C) |
|---|---|---|---|
| 121 | 0.03 | 0.03 | 0.06 |

Notes

1. UUC* = Unit Under Calibration
2. The quoted uncertainty includes" Stability of chamber and loading effect in chamber at 20% of uniformity ".
3. 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.
4. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
5. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
6. UUC* reading - the average reading of indicating device that forms the integral part of the autoclave.
7. Calibration results without adjustment.

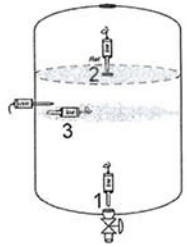



Figure: Example of sensor installation Positions

Standard 1 = In the chamber drain, within 100 mm.
Standard 2 = In the upper half of the chamber.
Standard 3 = Attached to the load temperature probe, within 15 mm.

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%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

- End of Report -

COPY

361 Soi Ladprao 122, Ladprao Road,
Phlabphla, Wang Thonglang, Bangkok 10310
TEL 02-516-2422
FAX 02-516-6949
CONTACT@AMARC.CO.TH
WWW.AMARC.CO.TH

**BAROMETER**

**Serial No. : N/A[S41020124]**

CALIBRATION LABORATORY CO., LTD.
2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com

CLC Accredited ISO/IEC 17025

ilac-MRA

ANAB ANSI National Accreditation Board ACCREDITED CALIBRATION AND DIMENSIONAL MEASUREMENT ACOM 2014

# CERTIFICATE OF CALIBRATION

## FOR

| | | |
|---|---|---|
| NOMENCLATURE | : | BAROMETER |
| MANUFACTURER | : | BARIO |
| MODEL / TYPE | : | N/A |
| SERIAL NO. | : | N/A[S41020124] |
| CLID. NO. | : | 212500828 |
| JOB CONTROL NO. | : | 250507051351 |
| CALIBRATION SERVICE | : | ☑ IN-LABORATORY ☐ ON-SITE |

CUSTOMER : EASTERN THAI CONSULTING 1992 CO., LTD.
683 MOO 11, SUKHAPIBARN 8 RD,
NONGKHAM, SRIRACHA, CHONBURI 20230

DATE OF RECEIVED : 07 May 2025 DATE OF ISSUED : 09 May 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Sittipong Pimdee
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory
09 May 2025

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

Certificate No. Q25051351

F3-011-05/12-23



COPY @clccalibration

CALIBRATION LABORATORY CO., LTD.
2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com

CLC Accredited ISO/IEC 17025

ilac-MRA

ANAB ANSI National Accreditation Board ACCREDITED CALIBRATION AND DIMENSIONAL MEASUREMENT ACOM 2014

# REPORT OF CALIBRATION

## FOR

| | | |
|---|---|---|
| NOMENCLATURE | : | BAROMETER |
| MANUFACTURER | : | BARIO |
| MODEL / TYPE | : | N/A |
| SERIAL NO. | : | N/A[S41020124] |
| DATE OF CALIBRATION | : | 08 May 2025 |

**ENVIRONMENT CONDITIONS :**

Temperature : ( 23 ± 2 ) °C Relative Humidity : ( 55 ± 10 ) %RH

**PROCEDURE USED :**

This instrument was calibrated under procedure No. **CLC-CPPP-08** according to **DKD-R 6-1** as calibration guidelines.

The calibration was performed by direct measurement with Reference Pressure Monitor which maintained by the Calibration Laboratory Co., Ltd.

**REFERENCE STANDARD USED :**

Reference Pressure Monitor, Fluke Model RPM3 S/N. 829.

**TRACEABILITY :**

The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand). Certificate No. MP-0245-24, Due Date 11 November 2025.

**UNCERTAINTY :**

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

Certificate No. Q25051351

F3-011-05/12-23



COPY @clccalibration

CALIBRATION LABORATORY CO., LTD.
2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-570-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com

CLC Accredited

**CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION**

**MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment**

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

**CALIBRATION DATA**

**CORRECTION OF PRESSURE**

| DUC Test point ( hPa ) | STD Reading ( hPa ) | | Correction ( hPa ) | |
|---|---|---|---|---|
| | Up | Down | Up | Down |
| 990 | 990.7 | 990.7 | +0.7 | +0.7 |
| 1000 | 1000.7 | 1000.8 | +0.7 | +0.8 |
| 1010 | 1010.8 | 1010.8 | +0.8 | +0.8 |
| 1020 | 1020.8 | 1020.9 | +0.8 | +0.9 |
| 1030 | 1030.9 | 1030.9 | +0.9 | +0.9 |

Uncertainty of measurement ± 0.7 hPa

Transmitting fluid : Air.

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 44 of 68

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

**### End of Certificate ###**

**Certificate No. Q25051351**

**F3-011-05/12-23**

COPY

@clccalibration

**Hot Air Oven**

**Model : UM 400**

**Serial No. : 900982**

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025 CALIBRATION 0152

# CERTIFICATE OF CALIBRATION



Certificate No. : 25-215652

Sample Code : 25-94507-005

**Customer** : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., Nongkham,
Sriracha, Chonburi 20230

**Location of Calibration** : EASTERN THAI CONSULTING 1992 CO., LTD.
(Hot Lab)

**Equipment** : Temperature controlled enclosures (Hot air oven)

**Manufacturer** : Memmert **Model** : UM 400

**Serial No.** : 900982 **ID No.** : LABE 17/1

**Date of Receipt** : 16 December 2025 **Date of Calibration** : 16 December 2025

**Condition of Calibration**

1. **Environment**
   - 1.1 Ambient temperature : Maximum 27.6 °C ; Minimum 26.4 °C
   - 1.2 Relative humidity : Maximum 61.4 % ; Minimum 54.0 %
   - 1.3 Line voltage supplied : Maximum 229.7 VAC ; Minimum 225.6 VAC

2. **Calibration method**
   TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

3. **Reference standard instrument**

| Instrument | ID No. | Certificate No. | Due Date |
|---|---|---|---|
| Data acquisition with sensor (RTD-Pt100) | LB-DA-20 (RTD-322 to RTD-330) | 25-010526 | 18 February 2026 |

4. **This certificate is traceable to the international system of unit (SI Unit).**
   The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.
5. **This result of calibration was found accurate as shown on date and place of calibration only.**
6. **Condition of calibration item** : Normal

**Calibrated by** Mr. Natthanan Phosri
Scientist

**Approved by** (Mr. Somchai Neampunt)
Signed for Director

**Issue date** 17 December 2025

COPY

The uncertainties are for a confidence probability of approximately 95%.
The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

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 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 Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).



AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025 CALIBRATION 0152

# REPORT OF CALIBRATION



Certificate No. : 25-215652

Sample Code : 25-94507-005

**Results of Calibration**

**Resolution** : 0.1 °C

**1. Reporting of Temperature**

| Calibration point (°C) | UUC* setting (°C) | UUC* reading (°C) | Measured temperature at each positions (°C) | | | | | | | | | Uncertainty ± (°C) | Coverage factor *k* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | $#9^{Ref}$ | | |
| 60 | 60.0 | 60.0 | 61.27 | 61.38 | 61.49 | 60.82 | 59.60 | 59.82 | 59.89 | 59.80 | 60.50 | 0.38 | 2.00 |
| 85 | 85.0 | 85.0 | 85.92 | 86.20 | 85.98 | 85.69 | 83.63 | 83.93 | 84.33 | 84.04 | 84.84 | 0.40 | 2.00 |

**2. Characterization results**

| Calibration point (°C) | Stability ± (°C) | Uniformity (°C) | Overall variation (°C) |
|---|---|---|---|
| 60 | 0.19 | 1.08 | 2.05 |
| 85 | 0.11 | 1.44 | 2.72 |

**Notes**

- UUC* = Unit Under Calibration

COPY



ก-1-76

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025
CALIBRATION 0152

## REPORT OF CALIBRATION



**Certificate No. :** 25-215652

**Sample Code :** 25-94507-005

**Results of Calibration**

**Notes**

1. Sensor installation locations
   - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
   - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :
   W = 40 cm ; D = 28 cm ; H = 39 cm
3. Air valve or fresh air level : Off
4. Fan level : Open
5. The quoted uncertainty includes" Stability of chamber and loading effect in chamber at 20% of uniformity ".

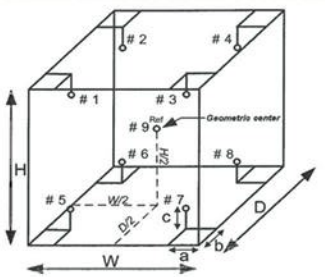



Figure: Example of sensor installation Positions

6. 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.
7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
9. UUC* reading - the average reading of indicating device that forms the integral part of the enclosure.
10. Calibration results without adjustment.

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%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

- End of Report -

COPY



ก-1-77

**ICP-OES/Avio550**

**Serial No. : M81S2210101**

# *ICP-OES/Avio550 Preventive Maintenance (PM)*

| | | | |
|---|---|---|---|
| **Company Name:** | Eastern Thai Consulting 1992 Ci.,Ltd. | | |
| **Address (Instrument Location):** | 683 Moo 11 Sukapibal 8 Rd. Nong Kham,Si Racha, Chonburi 20230 | | |
| **Serial Number:** | M8152210101 | **PM Number:** | 2 of 2 |
| **Customer Name** (if applicable): | | **Telephone Number:** | |
| **Service Engineer Name:** | Khwanchai | **Service Order Number:** | WO-06379056 |
| **Date PM Performed:** (DD-MMM-YYYY) | 20-Oct-2025 | **Next PM Due Date:** (DD-MMM-YYYY) | 20-Apr-2026 |
| **Standard Labor Hours to Complete PM :** | | **4 hours** | |

| Part Number | Release | Publication Date | |
|---|---|---|---|
| TH09370188 Rev.2 | B | July 2020 | PerkinElmer® |

**Scope**
The purpose of this PM is to ensure the continued functionality of the PerkinElmer / Avio550 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.

COPY



P-L-79

## Component List

| Component / Specific Model | Serial # | Configuration Notes |
|---|---|---|
| NA | NA | NA |
| | | |
| | | |
| | | |

## Parts Lists

| Parts Included with the PM | | |
|---|---|---|
| **Part Number (if applicable)** | **Description** | **Quantity** |
| 09995098 | Air Fiter-Spectrometer | N/A |
| N077520 | Air Fiter-RF Generetor | N/A |
| 09992731 | Axial Window | N/A |
| B0810377 | Radial Window | N/A |
| N0770438 | O-ring kit, injector support adapter | N/A |
| N0780437 | O-ring kit, torch | N/A |

| Additional Reagents and Standards Required for PM | | | | |
|---|---|---|---|---|
| **Part Number (if applicable)** | **Description** | **Quality** | **Batch/Lot #** | **Expired Date** (MM/YY) |
| N0691579 | Muti-Element Standard | AR | 64-247CRX1 | 11/2026 |
| N9300221 | DL Standard diluted 100 X | AR | 65-009CRY1 | 11/2026 |
| N0582152 | Wave Cal Solution | AR | 64-241CRX1 | 07/2026 |
| N9302946 | VIS Wavecal Solution | AR | 62-183CRT1 | 08/2026 |

COPY

## Procedure Checklist

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

1. **General:**
   - ☑ Ask customer about unit's performance since last visit.
   - ☑ Check incoming AC line voltage under load for proper levels and grounding.
   - ☑ Is the instrument operational? If not, please comment.

2. **Mechanical:**
   - ☑ Inspect and clean all fans and filters.
   - ☑ Inspect and replace torch components and necessary.

     Torch Components Replaced: ☐Yes ☑No

   - ☐ Inspect all tubing for signs of cracking or leaking and replace as necessary.

     Tubing Replaced: ☐Yes ☑No

   - ☑ Inspect the peristaltic pump for proper operation.
   - ☑ Check and adjust if necessary, the external nitrogen, argon shear gas and water supply pressures.
   - ☑ Check and adjust if necessary, the internal nitrogen, main argon, torch argon and shear gas pressures.

| Regulator | Measured Pressure | Set Pressure |
|---|---|---|
| Nitrogen | NA | NA (calibrated in Factory) |
| Main Argon | 76 | 76 psig |
| Torch Argon | 67 | 67 psig |
| Shear Gas | 65 | 65 psig |
| Water | 35 | 35 psig |

   - ☑ Check shear gas nozzle for blockages and proper, uniform flow.
   - ☑ Inspect nitrogen Hi/Low purge and shear gas solenoids for proper function.
   - ☑ Inspect the function of all spectrometer motors. Drive the motors from the Spectrometer DCM. (slits, XY motor)
   - ☑ Inspect the function of the pneumatic shutter for proper operation.
   - ☑ Perform preventative maintenance on the chiller as required. Make the customer aware of the importance of maintaining the chiller fluid level and filter replacement.
   - ☑ Drain air compressor surge tank.
   - ☑ Clean exterior of instrument.
   - ☑ Visually inspect all PC boards for cleanliness and signs of corrosion.

COPY



3. **Electronical**
   - ☑ Check all RF generator and spectrometer power supply voltages.
   - ☑ Run instrument diagnostic checks from the appropriate Device Control Module.

   ***RF Generator:***
   - ☑ Check the RF generator status screens.
   - ☑ Check the function of all interlocks.

   ***Spectrometer:***
   - ☑ Check the spectrometer status screens. Ensure Ready mode with no fetal errors.
   - ☑ Check the spectrometer optical tub temperatures (top, bottom, fin, optical base).
   - ☑ Check detector temperatures.
   - ☑ Check TEC voltages (6.5VDC)

4. **Optical:**
   - ☑ Clean or replace the axial and radial view windows as necessary.

     Axial Window Replaced: ☐Yes ☑No

     Radial Window Replaced: ☐Yes ☑No

5. **PM Performance Tests:**
   - ☑ Perform View Align.

   ***Test Spectral Resolution:***

   ☑ Measure the spectrometers ability to separate two adjacent wavelengths.

| Parameter | Specification | Test Result | Pass/Fail |
|---|---|---|---|
| As 193.696 - Resolution | ≤0.007 | 0.00531 | Passed |
| Ni 231.604 - Resolution | ≤0.008 | 0.00716 | Passed |
| Ni 341.476 - Resolution | ≤0.012 | 0.00891 | Passed |
| La 408.672 - Resolution | ≤0.020 | 0.01629 | Passed |
| Ba 455.403 - Resolution | ≤0.025 | 0.02144 | Passed |

   ***Test Precision:***

   ☑ Test for reproducibility of a set of measurement.

| Parameter | Specification | Test Result | Pass/Fail |
|---|---|---|---|
| As 193.696 | %RSD ≤ 1 % | 0.34 | Passed |
| Zn 213.856 | %RSD ≤ 1 % | 0.38 | Passed |
| Mn 257.610 | %RSD ≤ 1 % | 0.28 | Passed |
| La 379.478 | %RSD ≤ 1 % | 0.24 | Passed |
| Ba 455.403 | %RSD ≤ 1 % | 0.26 | Passed |
| Ba 493.408 | %RSD ≤ 1 % | 0.28 | Passed |

COPY



T-180

☑ Run an Axial & Radial BEC according to the A&T spec.

***Test Axial BEC Cd:***

Method "BEC-XL" For Samples "IB (2%HNO3)" and "IS (N930-0221/100)", record intensities.

Calculated BEC: BEC = (IB * Conc of Std) / (IS - IB). Where Conc of Std = 500 PPB

| Element | Conc. | IB | IS | |
|---|---|---|---|---|
| Cd 226 | 500 | 1687.2 | 359486.8 | |
| IB*Conc | IS-IB | BEC | Spec | Pass/Fail |
| 843600 | 357799.6 | 2.36 | <150 PPB | Passed |

***Test Radial BEC Mn:***

Method "BEC-RL" For Samples "IB (2%HNO3)" and "IS (N069-1579)", record intensities.

Calculated BEC: BEC = (IB * Conc of Std) / (IS - IB). Where Conc of Std = 1,000 PPB

| Element | Conc. | IB | IS | |
|---|---|---|---|---|
| Mn 257 | 1,000 | 1744.4 | 255911.4 | |
| IB*Conc | IS-IB | BEC | Spec | Pass/Fail |
| 1744400 | 254167 | 6.86 | <45 PPB | Passed |

6. **Review:**
   - ☑ Review with the customer PM work performed.
   - ☑ Discuss recommended customer supplied materials to have on hand.
   - ☑ Attach PM sticker.

COPY



## Additional Comments

| Additional Comments Regarding the PM |
|---|
| None |

## Review

| ***The preventive maintenance checks and if applicable performance tests for ICP-OES/Avio550 have been completed.*** ***This ICP-OES/Avio550 Passes ☑ Fails ☐ the preventive maintenance.*** | |
|---|---|
| **Review of Preventive Maintenance:** | |
| Authorized PerkinElmer Representative: K L S. | Date: 20-Oct-2025 (DD-MMM-YYYY) |
| Authorized Customer Representative: [illegible] | Date: 20-Oct-2025 (DD-MMM-YYYY) |

COPY

**LIQUID IN GLASS THERMOMETER**

**Model / Type : 0-100 °C**

**Serial No. : 43560**

CALIBRATION LABORATORY CO., LTD.
2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com

CLC Accredited ISO/IEC 17025

ilac-MRA

ANAB ANSI National Accreditation Board ACCREDITED ISO/IEC 17025 CALIBRATION AND DIMENSIONAL MEASUREMENT ACDM-2814

# CERTIFICATE OF CALIBRATION

## FOR

| | | |
|---|---|---|
| NOMENCLATURE | : | LIQUID IN GLASS THERMOMETER |
| MANUFACTURER | : | AA PRECISION |
| MODEL / TYPE | : | 0-100 °C |
| SERIAL NO. | : | 43560[LABE 16/1] |
| CLID. NO. | : | 232403905 |
| JOB CONTROL NO. | : | 251115135334 |
| CALIBRATION SERVICE | : | ☑ IN-LABORATORY ☐ ON-SITE |

CUSTOMER : EASTERN THAI CONSULTING 1992 CO., LTD.
683 MOO 11, SUKHAPIBARN 8 RD,
NONGKHAM, SRIRACHA, CHONBURI 20230

DATE OF RECEIVED : 15 November 2025 DATE OF ISSUED : 18 November 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Pimsiri Hemtanon
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory
18 November 2025

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

Certificate No. Q25135334
F3-011-05/12-23

COPY

@clccalibration

CALIBRATION LABORATORY CO., LTD.
2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com

CLC Accredited ISO/IEC 17025

ilac-MRA

ANAB ANSI National Accreditation Board ACCREDITED ISO/IEC 17025 CALIBRATION AND DIMENSIONAL MEASUREMENT ACDM-2814

# REPORT OF CALIBRATION

## FOR

| | | |
|---|---|---|
| NOMENCLATURE | : | LIQUID IN GLASS THERMOMETER |
| MANUFACTURER | : | AA PRECISION |
| MODEL / TYPE | : | 0-100 °C |
| SERIAL NO. | : | 43560[LABE 16/1] |
| DATE OF CALIBRATION | : | 17 November 2025 |

**ENVIRONMENT CONDITIONS :**

Temperature : (23 ± 2) °C Relative Humidity : (55 ± 10) %

**PROCEDURE USED :**

This instrument was calibrated under procedure No. **CLC-CPTH-02** based on **ASTM E 77-07** as calibration guidelines.
The calibration was performed by comparison with Calibration Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

**REFERENCE STANDARD USED :**

1. Calibration Bath, Kambic Model OB-22/2 ULT,OB-22/2 S/N. 17115653,17115654.
2. Precision Thermometer, ASL Model F200-A-8 S/N. 014433/03 with IPRT S/N. L0193A-1-1,PO106346-1-13.

**TRACEABILITY :**

1. The measurements are traceable to International System of Units (SI) , through Calibration Laboratory Co., Ltd. Certificate No. Q24120999,Q25124610. Due Date 26 November 2025,07 November 2026.
2. The measurements are traceable to International System of Units (SI) , through Thailand Institute of Scientific and Technological Research (TISTR) and National Institute of Metrology (Thailand). Certificate No. PSL-T 0177/68,TT-0169-24,TT-1008-25. Due Date 10 February 2026,11 December 2025,04 March 2026.

**UNCERTAINTY :**

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which for a normal distribution corresponds to a coverage probability of approximately 95 %. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q25135334
F3-011-05/12-23

COPY

@clccalibration

P-1-83

# CALIBRATION LABORATORY CO., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com


CLC Accredited ISO/IEC 17025

ilac-MRA

ANAB ANSI National Accreditation Board ACCREDITED ISO/IEC 17025 CALIBRATION AND DIMENSIONAL MEASUREMENT ACDM-2814

**CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION**

**MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment**

The DUC Reading were recorded and the means value were reported of four times measurement in the table below.

**CALIBRATION DATA**

**CORRECTION OF TEMPERATURE**

| STD Reading ( °C ) | DUC Reading ( °C ) | Correction ( °C ) | Uncertainty ± ( °C ) |
|---|---|---|---|
| 0.01 | 0.00 | +0.01 | 0.06 |
| 25.02 | 25.00 | +0.02 | |
| 50.03 | 50.00 | +0.03 | |
| 100.01 | 100.00 | +0.01 | |

Range : 0 °C to 100 °C

Graduation : 0.1 °C

Immersion Type : Total Immersion.

Correction of Reference Temperature ( 0 °C ) = 0.00 °C

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 016 Page 60 of 73

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

**### End of Certificate ###**

**Certificate No. Q25135334**

**F3-011-05/12-23**

COPY

@clccalibration

**MERCURY ANALYZER**

**Model : RA-4500**

**Serial No. : 21780504**

Eastern Thai Consulting 1992

**Automatic Mercury Analyzer**

**Model : RA-4500**

**Preventive Maintenance Report**

| | | |
|---|---|---|
| SERIAL No. RA-4500 | : | 21780504 |
| Soft version | : | Ver 2.0.7 |
| ROM version | : | Ver 2.0.2 |

| | | |
|---|---|---|
| DATE | : | 26 JANUARY 2026 |
| DUE DATE | : | 26 JULY 2026 |

INSPECTED BY : Chayanan T.
( Chayanan T. )

APPROVED BY : Natthaphong P.
( Natthaphong P. )

บริษัท เคเนติก โซลูชั่น จำกัด
KINETIC SOLUTIONS CO.,LTD.

**Kinetic Solutions Company Limited.**
2, Soi Lat Krabang 1, Lat Krabang Subdistrict,
Lat Krabang District, Bangkok 10520
Tel. (+66) 062-789-5221

COPY

P-1-86

## Inspection

| ITEMS | | SPECIFICATIONS | RESULT | JUDGE |
|---|---|---|---|---|
| 1. Quantity | - | Accessories are completed. | GOOD | OK |
| 2. Appearance | 2.1 Overall Appearance | No visible damage. | GOOD | OK |
| | 2.2 Parts / Cables | Correctly placed and connected. | GOOD | |
| 3. Indication | Nameplate / Label | Plate and Label are indicated. | GOOD | OK |
| 4. Self check | | | | |
| 4.1 GLP Counter | Mercury Lamp | 5000 hours | 515 hr | OK |
| | Membrane Filter | 2000 hours or 1 year after replace | 105 hr | OK |
| | Main Pump Tube | 750 hours or 1 year after replace | 105 hr | OK |
| | Absorbed Hg | 1500 mg | < 1 mg | OK |
| | P1 Tube | 2000 hours or 1 year after replace | 15 hr | OK |
| | P2 Tube | 2000 hours or 1 year after replace | > 1 hr | OK |
| | P3 Tube | 2000 hours or 1 year after replace | > 1 hr | OK |
| | P4 Tube | 2000 hours or 1 year after replace | 12 hr | OK |
| | P5 Tube | 2000 hours or 1 year after replace | > 1 hr | OK |
| | P6 Tube | 2000 hours or 1 year after replace | > 3 hr | OK |
| | P7 Tube | 2000 hours or 1 year after replace | > 3 hr | OK |
| | Heater | 2000 hours | 63 hr | OK |
| 4.2 Check/Test | Flow rate Adjustment | Flow rate 0.14 - 0.20 L/min | 0.19 L/min | OK |
| | Signals Detector | V.SIG is 3.5 - 4.5 V. | 3.93 V. | OK |
| | | V.REF is 3.5 - 4.5 V. | 3.90 V. | OK |
| | Cooling Fan | Check the operation of cooling fan | PASS | OK |
| | Color Sensor | signals (R,G,B) at least one nonzero | PASS | OK |
| | Radiation Thermometer | a positive valve form thermometer | PASS | OK |
| | Heater | heater temp rises 4 °C within 5 min. | PASS | OK |
| 5. Heater | Temperature | At 95°C ± 2°C with 30 min. | 94.8°C | OK |
| 6. Calibration Curve | no pretreatment | 0-100 ng : Max.Dev. ≤ 5.0% | 4.80% | OK |
| 7. Repeatability | 50 ug/L, 500ul, 25ng (n=5) | Average: 50ug/L ± 0.05 µg/L | 52.12544 µg/L | OK |
| | | C.V. ≤ 5.0% | 0.88% | OK |
| 8. Blank | no pretreatment | Less than 0.001 (PEAK) | 0.0000047 | OK |

**Apparatus**

| NAME | Date Certified | Expiration |
|---|---|---|
| Mercury ICP Standard (1000 µg/mL)<br>AccuStandard, Inc. Lot 223035027 | March 10, 2023 | March 10, 2028 |

COPY

## Inspection details

**Remark**

1. Cleaning Mercury Analyzer RA-4500

- Body case, Reagent Tube, Cell Detector, Table of Sample , Measurement Probe, Rinse Tube

2. Checking Mercury Analyzer RA-4500

| | |
|---|---|
| - Mercury Lamp | - Outlet Activated Carbon Filter |
| - Membrane Filter | - Flow Sensor |
| - Main Pump Tube | - Valves |
| - Motor Pump | - Heater |
| - Motor Reagent pump | - Cooling Fan |
| - Motor of Arm | - Instrument Performance |
| - Motor of Table | |
| - Motor of Lift | |

3. Inspection Calibration curve and Reproducibility of Mercury Analyzer RA-4500

COPY



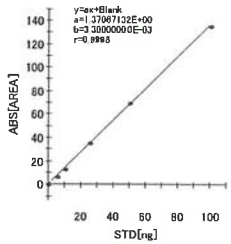
Eastern Thai Consulting 1992 Co., Ltd.

Title : Preventive Maintenance Mercury Analyzer NIC
Model: MA-3000 SN: 21780504
Date : 1/26/2026
Name : Kinetic solutions
Memo : Calibration Curve 0 - 100 ng

Method

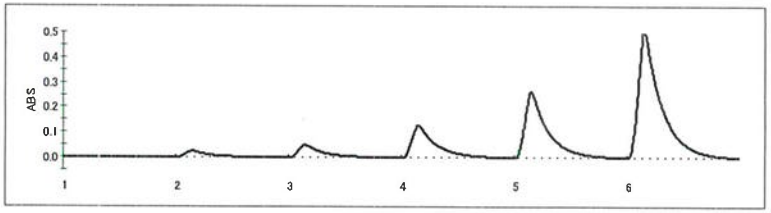
Method1 (Pretreatment:without)
(1+1)H2SO4 : 0.9mL
10w/v% SnCl2 : 0.5mL
Measurement Time(sec) : 120sec

Calib




STD

| No. | STD [ppm] | SVOL [mL] | CVOL [mL] | DVOL [mL] | STD [ng] | AREA [ON] | MEAS [ng] | Dev [%] | Note |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.000 | 5.000 | 5.000 | 5.000 | 0.000 | 0.0033 | 0.0000 | - | |
| 2 | 0.100 | 0.050 | 5.000 | 5.000 | 5.000 | 6.8517 | 4.9964 | 0.1 | |
| 3 | 0.100 | 0.100 | 5.000 | 5.000 | 10.000 | 13.7346 | 10.0179 | 0.2 | |
| 4 | 1.000 | 0.025 | 5.000 | 5.000 | 25.000 | 35.9169 | 26.2015 | 4.8 | |
| 5 | 1.000 | 0.050 | 5.000 | 5.000 | 50.000 | 69.8977 | 50.9928 | 2.0 | |
| 6 | 1.000 | 0.100 | 5.000 | 5.000 | 100.000 | 135.9761 | 99.2016 | 0.8 | |




SMP

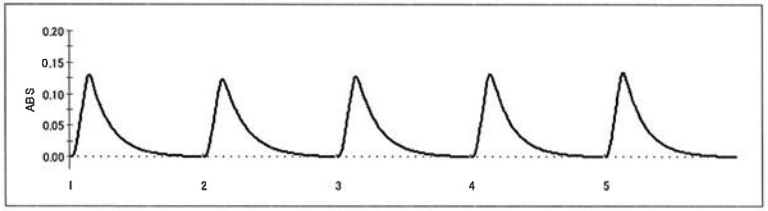
| No. | NAME | SVOL [mL] | CVOL [mL] | DVOL [mL] | AREA [ON] | MEAS [ng] | CONC [ug/L] | Note |
|---|---|---|---|---|---|---|---|---|
| 1 | 50ug/L, 500ul, 25ng | 0.500 | 5.000 | 5.000 | 35.2413 | 25.7086 | 51.4172 | |
| 2 | 50ug/L, 500ul, 25ng | 0.500 | 5.000 | 5.000 | 35.7240 | 26.0607 | 52.1214 | |
| 3 | 50ug/L, 500ul, 25ng | 0.500 | 5.000 | 5.000 | 35.6668 | 26.0190 | 52.0380 | |
| 4 | 50ug/L, 500ul, 25ng | 0.500 | 5.000 | 5.000 | 36.0431 | 26.2935 | 52.5870 | |
| 5 | 50ug/L, 500ul, 25ng | 0.500 | 5.000 | 5.000 | 35.9585 | 26.2318 | 52.4636 | |



COPY
NIC NIPPON INSTRUMENTS CORPORATION

Statistics

| No. | NAME | TRY | AV [ug/L] | SD [ug/L] | Cv [%] |
|---|---|---|---|---|---|
| 1 | 50ug/L, 500ul, 25ng | 5 | 52.12544 | 0.4573445 | 0.88 |




Self Check

Heat check:PASS!! ( 28.3degC[05:00] -> 32.4degC[03:43])
Sensor check:PASS!! ( 881- 87= 794)
Leak check:PASS!! (0.19L/min)
Sig/Ref check:PASS!! (Sig:3.93V, Ref:3.90V)
Drift check:PASS!! ( 0.0000035 - -0.0000001 = 0.0000037)



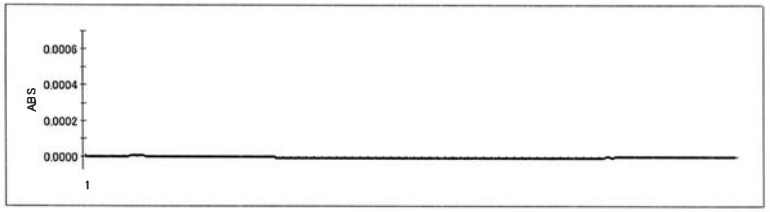
COPY
NIC NIPPON INSTRUMENTS CORPORATION



Title : Preventive Maintenance Mercury Analyzer NIC
Model: MA-3000 SN: 21780504
Date : 1/26/2026
Name : Kinetic solutions
Memo : Blank

SMP

| No. | NAME | SVOL [mL] | CVOL [mL] | DVOL [mL] | PEAK [ON] | MEAS [ng] | CONC [ug/L] | Note |
|---|---|---|---|---|---|---|---|---|
| 1 | Blank | 0.000 | 5.000 | 5.000 | 0.0000047 | -0.0015 | 0.0000 | |






COPY
NIC NIPPON INSTRUMENTS CORPORATION

ก-1-88

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

# CERTIFICATE OF ANALYSIS

## AccuTrace™ Reference Standard

**Catalog No:** ICP-34N-1
**Description:** Mercury ICP Standard
**Element:** Mercury (Hg)
**SRM:** 3133
**Lot:** 223035027
**Matrix:** 10% Nitric acid
**Hazards:** *Refer to SDS for complete safety information*

**Signal Word: Danger**

**Date Certified:** Mar 10, 2023
**Expiration:** Mar 10, 2028
**Density:** 1.052 g/mL
**Sample Size:** 100 mL
**Components:** 1
**Storage Condition:** Ambient (>5 °C)

**Certified Reference Material**

ANAB AR-1463 ilac-MRA

### Certified Concentration: 1000 µg/mL

**Trace Elements in µg/mL**

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ag** | nd<0.02 | **Ce** | nd<0.2 | **Gd** | nd<0.02 | **Lu** | nd<0.02 | **Pb** | nd<0.2 | **Sc** | nd<0.02 | **Ti** | nd<0.02 |
| **Al** | nd<0.02 | **Co** | nd<0.02 | **Ge** | nd<0.2 | **Mg** | nd<0.02 | **Pd** | nd<0.2 | **Se** | nd<0.2 | **Tl** | nd<0.2 |
| **As** | nd<0.2 | **Cr** | nd<0.02 | **Hf** | nd<0.02 | **Mn** | nd<0.02 | **Pr** | nd<0.2 | **Si** | N/A | **Tm** | nd<0.02 |
| **Au** | nd<0.02 | **Cs** | N/A | **Hg** | * | **Mo** | nd<0.02 | **Pt** | nd<0.2 | **Sm** | nd<0.2 | **U** | nd<0.2 |
| **B** | nd<0.2 | **Cu** | nd<0.02 | **Ho** | nd<0.02 | **Na** | nd<0.02 | **Rb** | N/A | **Sn** | nd<0.02 | **V** | nd<0.02 |
| **Ba** | nd<0.02 | **Dy** | nd<0.02 | **In** | nd<0.2 | **Nb** | nd<0.2 | **Re** | nd<0.2 | **Sr** | nd<0.02 | **W** | nd<0.2 |
| **Be** | nd<0.02 | **Er** | nd<0.02 | **Ir** | nd<0.2 | **Nd** | nd<0.02 | **Rh** | nd<0.2 | **Ta** | nd<0.2 | **Y** | nd<0.02 |
| **Bi** | nd<0.2 | **Eu** | nd<0.02 | **K** | nd<0.2 | **Ni** | nd<0.02 | **Ru** | nd<0.02 | **Tb** | nd<0.02 | **Yb** | nd<0.02 |
| **Ca** | nd<0.02 | **Fe** | nd<0.02 | **La** | nd<0.02 | **Os** | N/A | **S** | N/A | **Te** | nd<0.2 | **Zn** | nd<0.02 |
| **Cd** | nd<0.02 | **Ga** | nd<0.02 | **Li** | nd<0.02 | **P** | N/A | **Sb** | nd<0.2 | **Th** | nd<0.02 | **Zr** | nd<0.02 |

This Certified Reference Material was verified in accordance with ISO/IEC 17025 (AT-1339) and ISO 17034 (AR-1463)

This solution was assayed gravimetrically, using a balance calibrated against weight sets, ID #88270, tracaable to NIST

A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.

**This product contains mercury and MUST be disposed of in accordance with all federal, state and local regulations.**

The gravimetric uncertainty for this product is ±0.24%. The CRM uncertainty is ±2.4%.

In order to verify the concentration(s), the final solution was checked by plasma emission spectroscopy (ICP) against material traceable to the above listed NIST SRM(s).

We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as high purity acids and ASTM Type I 18 megohm deionized water.

All trace level elemental impurities were determined via plasma emission spectroscopy on the concentrate.

All weights are traceable through NIST, Test No. 684/291344-18 & 684/292805-19

All glassware used in preparation is Class A.

All bottles are acid leached and triple rinsed with deionized water prior to use.

Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware. Keep bottle tightly capped.

Certified By: Meigan O'Leary, Inorganic QC Manager



*For use in routine laboratory analysis.*

**AccuStandard is accredited to ISO 17034, ISO/IEC 17025 and certified to ISO 9001:2015**

QR ORGANO-001 Rev. 2018

COPY

fr-1-89

1. **Quality Standards:**

   ISO 17034:2016 – General Requirements for the Competence of Reference Material Producers

   ISO/IEC 17025:2017 – General Requirements for the Competence of Testing And Calibration Laboratories

   ISO 9001:2015 -- Quality Management System – Requirements Eagle Registrations

2. **Intended Use:** The product covered by this certificate is designed for calibration or for use in quality control procedures for the specified chemical compounds listed on the reverse side. This product can be used for quantification and/or identification. This product can also be used as a reference material to validate analytical procedures, subject to the conditions under Section 7.

3. **Manufacturing:** All balances are calibrated daily using an in-house procedure with weights that are compared annually to master weights and traceable to NIST. The balances are also calibrated annually by an ISO/IEC 17025 accredited calibration laboratory. Please refer to the NIST test number listed on the front of this certificate. Class A glassware is used in the manufacture and quality control of all standards. Good Laboratory Practices have been used throughout the preparation of this Standard.

4. **Homogeneity:** This product is sufficiently homogeneous and any sample size would be within the uncertainty budget.

5. **Stability:** The manufacturer guarantees the stability of this solution through the expiration date stated on the label, when handled and stored according to the conditions stated on the label

6. **Uncertainty:** The uncertainty values as stated on the face of this certificate have been determined using the EURACHEM/CITAC Guide. We report a combined expanded uncertainty equal to the positive square root of the total variance of the uncertainty of the components using the following formula: $u_x = \sqrt{(u(V))^2 + (u(m))^2 + (u(IV))^2 + (u(RO))^2}$ This formula represents uncertainty components from the mass, volume, short-term stability, long-term stability and homogeneity factors associated with the production of this product. The expanded uncertainty, assumes a normal distribution and a coverage factor of $k=2$ is chosen using approximately a 95% confidence level.

7. **Legal Notice and Limit of Liability:** This product is for routine laboratory analysis and research purposes only. The company's liability will be limited to replacement of product or refund of purchase price. Notice of claims must be made within thirty (30) days from date of delivery.

COPY

**pH Meter**

**Model : SevenCompact S220**

**Serial No. : B448305208**

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025
CALIBRATION 0152

# CERTIFICATE OF CALIBRATION



**Certificate No. :** 25-215648

**Sample Code :** 25-94507-001

| | | | | | |
|---|---|---|---|---|---|
| **Customer** | : | EASTERN THAI CONSULTING 1992 CO., LTD.<br>683 Moo 11, Sukhapibarn 8 Rd., Nongkham,<br>Sriracha, Chonburi 20230 | | | |
| **Location of Calibration** | : | EASTERN THAI CONSULTING 1992 CO., LTD.<br>(Laboratory) | | | |
| **Equipment** | : | pH Meter | | | |
| **Manufacturer** | : | METTLER TOLEDO | **Model** | : | SevenCompact S220 |
| **Serial No.** | : | B448305208 | **ID No.** | : | LABE 11/4 |
| **Date of Receipt** | : | 16 December 2025 | **Date of Calibration** | : | 16 December 2025 |

**Condition of Calibration**

1. **Environment** Ambient temperature : 15.0 to 35.0 °C Relative humidity : 35.0 to 80.0 %RH
   1.1 Start time : 23.3 °C ; End time : 24.0 °C 1.2 Start time : 46.7 %RH ; End time : 45.8 %RH
2. **Calibration method**
   In house method WI-CL-019 : Direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM).
3. **Reference standard / Certified reference material**

| Instrument | ID No. | Certificate No. | Due Date |
|---|---|---|---|
| 3.1 Voltage Calibrator | LB-DPC-01 | LF25-0350 | 22 June 2026 |
| 3.2 Digital Thermometer | LB-DPC-01 | 25-141888 | 29 July 2026 |
| **Certified Reference Material** | **Lot. No.** | **Ref No.** | **Expire Date** |
| 3.3 Buffer Solution pH 4.008 | 1174256 | PH216.L5 | 13 December 2027 |
| 3.4 Buffer Solution pH 7.000 | C03292 | S11M004 | 14 July 2027 |
| 3.5 Buffer Solution pH 10.010 | 1174257 | PH220.L5 | 13 December 2026 |

4. **This certificate is traceable to the international system of unit (SI Unit).**
   4.1 Instrument No. 3.1 through Measuretronix Limited.
   4.2 Instrument No. 3.2 through Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.
   4.3 Buffer Solution No. 3.3 and No. 3.5 traceable to CPA chem (through primary measurement method-Harned cell using calibrated thermometer, barometer, and nanovoltmeter Accredited laboratory ISO/IEC 17025 and ISO 17034).
   4.4 Buffer Solution No. 3.4 traceable to HACH (Certified Reference Material from PTB Certificate Nr. PTB-PHOA-563/30504/23 and Certificate Nr. PTB-PHOB-555/30620/22. According to DIN EN ISO 17034:2017).
5. **This result of calibration was found accurate as shown on date and place of calibration only.**
6. **Condition of calibration item :** Normal

**Calibrated by** Mr. Chakrin Chiangsorn
Scientist

**Approved by** (Mr. Somchai Neampunt)
Signed for Director

**Issue date** 18 December 2025

COPY

The uncertainties are for a confidence probability of approximately 95%.
The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

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 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 Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).





# REPORT OF CALIBRATION



**Certificate No. :** 25-215648

**Sample Code :** 25-94507-001

| | | | | | |
|---|---|---|---|---|---|
| **Equipment** | : | pH Meter | **Resolution** | : | 0.01 pH ; 0.1 mV ; 0.1 °C |
| **Manufacturer** | : | METTLER TOLEDO | **Model** | : | SevenCompact S220 |
| **Serial No.** | : | B448305208 | **ID No.** | : | LABE 11/4 |
| **Range** | : | -2.000 pH to 20.000 pH ; - 2000.0 mV to 2000.0 mV ; -5.0°C to 130.0°C | | | |

**Results of Calibration**

**Part 1. DC Voltage measurement**

pH Meter Serial No. : B448305208

| Nominal Value | Applied DC Voltage | Average indicator reading | | Uncertainty | Coverage factor |
|---|---|---|---|---|---|
| pH | mV | mV | pH | mV | *k* |
| 0 | 414.113 | 414.0 | 0.00 | ± 0.083 | 2.00 |
| 4 | 177.477 | 177.5 | 4.00 | ± 0.083 | 2.00 |
| 7 | 0.000 | 0.1 | 7.00 | ± 0.083 | 2.00 |
| 10 | -177.477 | -177.3 | 10.00 | ± 0.083 | 2.00 |
| 14 | -414.113 | -413.8 | 14.00 | ± 0.083 | 2.00 |

**Part 2. Performance of Electrode system**

Electrode Manufacturer : METTLER TOLEDO Model : InLab Expert Pro-ISM

Electrode Serial No. : 4290677

Three-Point Calibration at pH4 and pH7 Percent Slope : 99.2 , at pH7 and pH10 Percent Slope : 99.7

| Standard Buffer Solution | Average indicator reading | | Error Value | Uncertainty | Coverage factor |
|---|---|---|---|---|---|
| pH (@ 25 °C) | pH | mV | pH | pH | *k* |
| 4.008 | 4.02 | 163.7 | 0.012 | ± 0.0093 | 2.00 |
| 7.000 | 7.01 | -11.6 | 0.010 | ± 0.0093 | 2.00 |
| 10.010 | 10.00 | -187.7 | -0.010 | ± 0.0099 | 2.00 |

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%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

COPY

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025
CALIBRATION 0152

# REPORT OF CALIBRATION



**Certificate No. :** 25-215648

**Sample Code :** 25-94507-001

**Equipment** : pH Meter (Digital Thermometer with sensor)

**Thermometer readout**

**Manufacturer** : METTLER TOLEDO **Model** : SevenCompact S220

**Serial No.** : B448305208 **ID No.** : LABE 11/4

**Resolution** : 0.1 °C **Range** : -5.0 °C to 130.0 °C

**Thermometer sensor**

**Manufacturer** : METTLER TOLEDO **Model** : InLab Expert Pro-ISM

**Serial No.** : 4290677 **ID No.** : N/A

**Condition of Calibration**

**1. Environment**

1.1 Ambient temperature : 24.1 °C ± 0.0 °C

1.2 Relative humidity : 45.0 % ± 0.2 %

**2. Calibration method**

2.1 The calibration use in house method WI-CL-021 : by comparison with standard thermometer

2.2 The calibration by comparison unit under calibration (*UUC*) to the standard thermometer in a calibration bath at the controlled temperature.

2.3 The temperature scale in use of this laboratory is the international temperature scale of 1990 (ITS-90).

**3. Reference standard instrument**

| Instrument | Model | ID. No. | Certificate No. | Due date |
|---|---|---|---|---|
| 3.1 Resistance Thermometer | PT-100 | RTD-366 | 25-141888 | 29 July 2026 |
| 3.2 Thermometer Readout | 753 | LB-DPC-01 | 25-141888 | 29 July 2026 |

**4. This certificate is traceable to the international system of unit (SI Unit).**

Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (Accreditation Under TLAS Laboratory Calibration No.0152)

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

**6. Condition of Calibration item** : Normal

**Results of Calibration**

| Calibration point °C | Average of standard reading °C | Unit under calibration | | | Expanded uncertainty °C | Coverage factor *k* |
|---|---|---|---|---|---|---|
| | | Immersion depth mm | Average reading °C | Correction value °C | | |
| 25 | 25.00 | 100 | 24.9 | + 0.10 | ± 0.14 | 2.00 |

Notes

- Calibration results without adjustment

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%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

- End of report -

COPY

361 Soi Ladprao 122, Ladprao Road,
Phlabphla, Wang Thonglang, Bangkok 10310
TEL 02-516-2422
FAX 02-516-6949
CONTACT@AMARC.CO.TH
WWW.AMARC.CO.TH



ก-1-92

# STANDARD WEIGHT 50 g

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

ilac-MRA THAILAND
NSC-TISI-TIS17025
CALIBRATION 0152

Certificate No. : 24-062445 Page 1 of 3

Sample Code : 24-25551-001

# CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited
(Calibration Laboratory)

Equipment : Standard Weight 50 g

Manufacturer : METTLER TOLEDO

Class : F1

Serial No. : N/A

ID No. : LABE 10/1

Date of Receipt : 23 May 2024

Date of Calibration : 03 June 2024

Calibrated by Mr. Somwang Sangdee
Scientist

Approved by ( Mr. Somchai Neampunt )
Signed for Director

Issue date 04 June 2024

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

COPY

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 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 Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).



ฝ-1-94

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

ilac-MRA THAILAND
NSC-TISI-TIS17025
CALIBRATION 0152

Certificate No. : 24-062445 Page 2 of 3

Sample Code : 24-25551-001

# REPORT OF CALIBRATION

Equipment : Standard Weight 50 g

Manufacturer : METTLER TOLEDO

Class F1

Serial No. : N/A

ID No. : LABE 10/1

**Result of Calibration :** ◉ Without adjustment ○ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature ($t_{ref}$) of 20°C, the conventional mass is the mass of a reference weight of a density ($\rho_{ref}$) of 8000 kg.m$^{-3}$ which it balances in air of a reference density ($\rho_0$) of 1.2 kg.m$^{-3}$

| Description | Deviation (mg) | Conventional Mass | Expanded Uncertainty (mg) | Maximum Permissible Error ± (mg) | ID No. |
|---|---|---|---|---|---|
| 50 g | -0.343 | 49.999657 g | 0.10 | 0.30 | LABE 10/1 |

The result expanded uncertainty of measurement $U$ is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.0$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

COPY

Certificate No. : 24-062445

Sample Code : 24-25551-001



# REPORT OF CALIBRATION

## Condition of Calibration

1. Ambient Conditions : Temperature 20 °C ± 1.5°C, Relative humidity 50% ± 10% and air density 1.19 kg/m$^3$

2. Calibration Method : Direct comparison weighing according to OIML R111-1 : 2004(E)

3. Reference standard instrument

| Instrument | Class | ID No. | Certificate No. | Due Date |
|---|---|---|---|---|
| 1) Standard Weight 1 mg to 1 kg | E2 | LB-WE-83 | 24-001894 | 11 January 2025 |

4. This certification is traceable to the International System of Unit maintained at : -

Asia Medical and Agricultural Laboratory and Research Center Public Company Limited

( Instrument number 1).

5. Condition of Calibration item: Normal

6. Description of Calibrated Item :

| | |
|---|---|
| Type and Nominal Value : | Standard Weight 50 g |
| Shape : | Cylindrical weight with knob |
| Material : | Stainless steel |
| Case : | Wooden Box |
| Comments : | Recalibration |

- End of Report -

COPY



ก-1-05

**STANDARD WEIGHT 100 g**

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025
CALIBRATION 0152

Certificate No. : 24-079772 Page 1 of 3

Sample Code : 24-31841-002

# CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., NongKham,
Sriracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (Calibration Laboratory)

Equipment : Standard Weight 100 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/2

Date of Receipt : 25 June 2024

Date of Calibration : 30 June 2024

Calibrated by Mr. Nawa Sisuwan
Scientist

Approved by ( Mr. Somchai Neampunt )
Signed for Director

Issue date 03 July 2024

COPY

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

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 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 Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).





# REPORT OF CALIBRATION

Equipment : Standard Weight 100 g

Manufacturer : N/A

Class N/A

Serial No. : N/A

ID No. : LABE 10/2

**Result of Calibration :** ◉ Without adjustment ○ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature ($t_{ref}$) of 20°C, the conventional mass is the mass of a reference weight of a density ($\rho_{ref}$) of 8000 kg.m$^{-3}$ which it balances in air of a reference density ($\rho_0$) of 1.2 kg.m$^{-3}$

| Description | Deviation (mg) | Conventional Mass | Expanded Uncertainty (mg) | Maximum Permissible Error ± (mg) | ID No. |
|---|---|---|---|---|---|
| 100 g | -0.173 | 99.999827 g | 0.16 | 0.50 | LABE 10/2 |

The result expanded uncertainty of measurement $U$ is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.0$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

COPY



ก-L-97

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025
CALIBRATION 0152

Certificate No. : 24-079772

Sample Code : 24-31841-002



# REPORT OF CALIBRATION

## Condition of Calibration

1. Ambient Conditions : Temperature 20 °C ± 1.5°C, Relative humidity 50% ± 10% and air density 1.19 kg/m$^3$

2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

3. Reference standard instrument

| Instrument | Class | ID No. | Certificate No. | Due Date |
|---|---|---|---|---|
| 1) Standard Weight 1 mg to 1 kg | E2 | LB-WE-83 | 24-001894 | 11 January 2025 |

4. This certification is traceable to the International System of Unit maintained at : -

Asia Medical and Agricultural Laboratory and Research Center Public Company Limited

( Instrument number 1).

5. Condition of Calibration item: Normal

6. Description of Calibrated Item :

| | |
|---|---|
| Type and Nominal Value : | Standard Weight 100 g |
| Shape : | Cylindrical weight with knob |
| Material : | Stainless steel |
| Case : | Wooden Box |
| Comments : | Recalibration |

- End of Report -

COPY



F-L-98

# STANDARD WEIGHT 50 g

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

ilac-MRA THAILAND
NSC-TISI-TIS17025
CALIBRATION 0152

Certificate No. : 24-079773 Page 1 of 3

Sample Code : 24-31841-003

# CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., NongKham,
Sriracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited
(Calibration Laboratory)

Equipment : Standard Weight 50 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/4

Date of Receipt : 25 June 2024

Date of Calibration : 30 June 2024

Calibrated by Mr. Nawa Sisuwan
Scientist

Approved by ( Mr. Somchai Neampunt )
Signed for Director

Issue date 03 July 2024

COPY

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

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 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 Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).





# REPORT OF CALIBRATION

Equipment : Standard Weight 50 g

Manufacturer : N/A

Class N/A

Serial No. : N/A

ID No. : LABE 10/4

**Result of Calibration :** ◉ Without adjustment ○ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature ($t_{ref}$) of 20°C, the conventional mass is the mass of a reference weight of a density ($\rho_{ref}$) of 8000 $kg.m^{-3}$ which it balances in air of a reference density ($\rho_0$) of 1.2 $kg.m^{-3}$

| Description | Deviation (mg) | Conventional Mass | Expanded Uncertainty (mg) | Maximum Permissible Error ± (mg) | ID No. |
|---|---|---|---|---|---|
| 50 g | -0.176 | 49.999824 g | 0.10 | 0.30 | LABE 10/4 |

The result expanded uncertainty of measurement $U$ is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.0$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

COPY



F-1-100

Certificate No. : 24-079773

Sample Code : 24-31841-003

# REPORT OF CALIBRATION

## Condition of Calibration

1. Ambient Conditions : Temperature 20 °C ± 1.5°C, Relative humidity 50% ± 10% and air density 1.19 kg/m$^3$

2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

3. Reference standard instrument

| Instrument | Class | ID No. | Certificate No. | Due Date |
|---|---|---|---|---|
| 1) Standard Weight 1 mg to 1 kg | E2 | LB-WE-83 | 24-001894 | 11 January 2025 |

4. This certification is traceable to the International System of Unit maintained at : -

Asia Medical and Agricultural Laboratory and Research Center Public Company Limited

( Instrument number 1).

5. Condition of Calibration item: Normal

**6. Description of Calibrated Item :**

| | |
|---|---|
| Type and Nominal Value : | Standard Weight 50 g |
| Shape : | Cylindrical weight with knob |
| Material : | Stainless steel |
| Case : | Wooden Box |
| Comments : | Recalibration |

- End of Report -

COPY

**THERMO-HYGROMETER**

**Model : 608-H1**

**Serial No. : 45106737**

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TI517025
CALIBRATION 0152

# CERTIFICATE OF CALIBRATION



Certificate No. : 25-090091

Sample Code : 25-39161-001

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited
(Calibration laboratory)

Equipment : Digital thermo-hygrometer

Manufacturer : testo | Model : 608-H1

Serial No. : 45106737 | ID No. : LABE 09/7

Date of Receipt : 21 May 2025 | Date of Calibration : 23 May 2025

**Condition of Calibration**

1. Environment
   1.1 Ambient temperature : 23.0 °C ± 3.0 °C
   1.2 Relative humidity : 55.0 % ± 15.0 %
2. Calibration method
   2.1 In-house method: WI-CL-045 By comparison with thermometer standard / chilled mirror hygrometer in controlled chamber.
   2.2 The calibration by comparison unit under calibration (UUC) to the thermometer standard / chilled mirror hygrometer in a chamber at the controlled temperature / relative humidity.
3. Reference standard instrument

| | Instrument | Model | ID No. | Certificate No. | Due Date |
|---|---|---|---|---|---|
| 3.1 | Chilled Mirror | Optidew 401 | LB-DP-03 & LB-DP-03 (DP) | TH-0122-24 | 25 September 2025 |
| 3.2 | Digital Thermometer | Optidew 401 | LB-DP-03 & LB-DP-03 (Temp.) | 24-138856 | 28 October 2025 |
| 3.3 | Digital Thermometer | 34972A | LB-DA-07 with RTD-89 | 24-106857 | 21 August 2025 |

4. This certificate is traceable to the international system of unit (SI Unit).
   4.1 Instrument No. 3.1 through National Institute of Metrology (Thailand).
   4.2 Instrument No. 3.2 and 3.3 through Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.
5. This result of calibration was found accurate as shown on date and place of calibration only.
6. Condition of calibration item : Normal

Calibrated by : Miss Pornsuda Lohabal, Scientist

Approved by : (Mr. Somchai Neampunt), Signed for Director

Issue date : 26 May 2025

COPY

This uncertainties are for a confidence probability of approximately 95%.
The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

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 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 Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC)





AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TI517025
CALIBRATION 0152

# REPORT OF CALIBRATION



Certificate No. : 25-090091

Sample Code : 25-39161-001

**Results of Calibration**

**Temperature measurement**

Resolution : 0.1 °C

Range : 0 °C to 50 °C

| Calibration point | Average of standard reading | | Unit under calibration | | uncertainty |
|---|---|---|---|---|---|
| | Controlled humidity | Temperature | Average reading | Correction value | |
| °C | %RH | °C | °C | °C | °C |
| 20 | 50 | 20.01 | 20.2 | - 0.19 | ± 0.39 |
| 25 | 50 | 25.01 | 25.0 | + 0.01 | ± 0.39 |
| 30 | 50 | 30.01 | 30.0 | + 0.01 | ± 0.39 |

**Humidity measurement**

Resolution : 0.1 %RH

Range : 10 %RH to 95 %RH

| Calibration point | Average of standard reading | | Unit under calibration | | uncertainty |
|---|---|---|---|---|---|
| | Air temperature | Calculated humidity | Average reading | Correction value | |
| %RH | °C | %RH | %RH | %RH | %RH |
| 45 | 25.02 | 45.10 | 50.2 | - 5.10 | ± 1.3 |
| 60 | 25.02 | 60.15 | 65.2 | - 5.05 | ± 1.5 |
| 75 | 25.02 | 75.01 | 82.1 | - 7.09 | ± 1.7 |

**Notes**

- Calibration results without adjustment.

The result expanded uncertainty of measurement *U* is stated as the standard uncertainty of measurement multiplied by the coverage factor *k=2.00*, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

- End of Report -

COPY

**TURBIDITY METER**

**Model : H 188703-02**

**Serial No. : H0083335**

**Hanna Instruments (Thailand) Ltd.**

410/67-68 Soi Ratchadapisek 24, Ratchadapisek Rd., Samsen-nok,

Huaykwang, Bangkok 10310 Tel: 0-2541-4199 Fax: 0-2541-4198

Certificate No. : HIT-2509-0292

Page : 1 of 2

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Equipment :** | Turbidity Meter | | |
| **Meter Model :** | HI88703-02 | **Serial No. :** | H0083335 |
| **Manufacturer :** | Hanna Instruments | | |
| **Made in :** | Romania | | |
| **Condition As-Received :** | Used Product | | |
| **Reference :** | RE250303 | | |
| **Customer name :** | Eastern Thai Consulting 1992 Co., Ltd.<br>683 Moo. 11, Sukhapiban 8 Rd., Nongkham, Sriracha,<br>Chonburi 20230 | | |
| **Received date :** | 20 February 2025 | | |
| **Calibrate date :** | 24 February 2025 | | |
| **Issue date :** | 24 February 2025 | | |
| **Ambient Temperature :** | ( 25 ± 2 )°C | | |
| **Relative Humidity :** | ( 50 ± 15 )% RH | | |
| **Calibrated Location :** | Hanna Instruments (Thailand) Ltd. | | |

**Calibrated by :** ☑ Mr. Pichit Petthong

☐ Mr. Channarong Soinak

☐ Mr. Wasu Kutsai

**Approved by :**

Mr. Anan Suwanchaisakul

Authorized Signatory

HANNA Instruments (Thailand) Limited

This certificate was certified only for the instrument we calibrated.

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

** This certificate may not be reproduced other than in full, except with the prior written **

approval of the head of Hanna Instrument (Thailand)

COPY



**Condition of this result of analysis**

**Turbidity standard calibration set :**

**Product code:** HI98703-11 **Lot No.:** SC0430/24

| Standard Cuvette | Target Value (NTU) | Mean Lot value (NTU) | Lot Number | Best used before |
|---|---|---|---|---|
| HI98703-1 | <0.10 | 0.04 | 8295 | October 2026 |
| HI98703-2 | 15.0 ± 0.3 | 15.0 | 8306 | October 2026 |
| HI98703-3 | 100 ± 2 | 100 | 8309 | October 2026 |
| HI98703-4 | 750 ± 10 | 750 | 8310 | October 2026 |

**Method of Standardization**

This quality product is standardized using Turbidity meter with is calibration ratio nephelometric method (90°), ratio of scatter and transmitted light adaptation of the USEPA Method 108.1 and standard method 2130B as the following details below :

**Result of analysis :**

| Turbidity Standard (NTU) | Reading (NTU) | Error (NTU) |
|---|---|---|
| <0.10 | 0.07 | - |
| 15.0 ± 0.3 | 15.0 | 0.0 |
| 100 ± 2 | 101 | 1 |
| 750 ± 10 | 748 | -2 |

** End of certificate **

COPY

**TURBIDITY METER**

**Model : H 188703-02**

**Serial No. : H0083335**

**Hanna Instruments (Thailand) Ltd.**

410/67-68 Soi Ratchadapisek 24, Ratchadapisek Rd., Samsen-nok, Huaykwang, Bangkok 10310 Tel: 0-2541-4199 Fax: 0-2541-4198

**Certificate No. :** C26020154



# CERTIFICATE OF ANALYSIS

| | | | | |
|---|---|---|---|---|
| **Equipment** | : | Turbidity Meter | | |
| **Meter Model** | : | HI88703-02 | **Serial No.** : | H0083335 |
| **Manufacturer** | : | Hanna Instruments | | |
| **Made in** | : | Romania | | |
| **Condition As-Received** | : | Used Product | | |
| **Reference** | : | RE260329 | | |
| **Customer name** | : | Eastern Thai Consulting 1992 Co., Ltd. | | |
| | | 683 Moo. 11, Sukhapiban 8 Rd., Nongkham, Sriracha, | | |
| | | Chonburi 20230 | | |
| **Received date** | : | 18 February 2026 | | |
| **Callbrate date** | : | 23 February 2026 | | |
| **Issue date** | : | 24 February 2026 | | |
| **Ambient Temperature** | : | ( 25 ± 2 )°C | | |
| **Relative Humidity** | : | ( 50 ± 15 )%RH | | |
| **Calibrated Location** | : | Hanna Instruments (Thailand) Ltd. | | |

**Calibrated by** : Mr. Plchit Petthong **Approved by :**

(Mr. Anan Suwanchaisakul)

Authorized Signatory

Hanna Instruments (Thailand) Limited

COPY

This certificate was certified only for the instrument we calibrated. This result of calibration was found accurate on date and place of calibration only.

This certificate may not be reproduced other than in full, except with the prior written approval of the head of Hanna Instrument (Thailand) Ltd.





**Condition of this result :**

Product name : Turbidity Standard Calibration Set

Product code : HI98703-11 Lot number : SC0430/24

Expiration date : October 2026

| Standard cuvette | Lot number | Target value (NTU) | Mean Lot value (NTU) | Passed |
|---|---|---|---|---|
| HI98703-1 | 8295 | < 0.10 | 0.04 | √ |
| HI98703-2 | 8306 | 15.0 ± 0.3 | 15.0 | √ |
| HI98703-3 | 8309 | 100 ± 2 | 100 | √ |
| HI98703-4 | 8310 | 750 ± 10 | 750 | √ |

Method : Ratio Nephelometric signal (90') scatter light ratio transmitted light.

Adaptation of the USEPA Method 180.1 and Standard Method 2130 B

**Result :**

| Turbidity Standard (NTU) | Reading (NTU) | Error (NTU) |
|---|---|---|
| < 0.10 | 0.07 | - |
| 15.0 ± 0.3 | 15.0 | 0.0 |
| 100 ± 2 | 100 | 0 |
| 750 ± 10 | 750 | 0 |

** End of certificate **

COPY

**UV/VIS SPECTROPHOTOMETER**

**Model : UV-1800**

**Serial No. : A11635101643 CD**

**Bara Scientific Co., Ltd.**
968 U Chu Liang Building Floor7 Rama4 Road
Silom Bangrak Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com

NSC-TISI-TIS 17025

# Certificate of Calibration



| | |
|---|---|
| **Certificate No.** | BSCC-UV-153/25 |
| **Equipment** | UV/Vis Spectrophotometer |
| **Model** | UV-1800 |
| **Manufacturer** | Shimadzu |
| **Serial No.** | A11635101643 CD |
| **ID No.** | LABE 03/2 |
| **Date of receipt** | 21 April 2025 |
| **Date of calibration** | 21 April 2025 |
| **Date of issue** | 25 April 2025 |
| **Customer name** | Eastern Thai Consulting 1992 Co., Ltd. |
| **Address** | 683 Moo 11, Sukkhaphibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230 |
| **Temperature** | (24.7-26.8) °C (On site) |
| **Humidity** | (36.9-46.2) %RH (On site) |
| **Equipment condition** | Good Operation |
| **Calibration Location** | Analysis Department |
| **Calibration Procedure** | In-house method WI-UV-702-01 based on ASTM E275-01 |
| **Traceability** | Wavelength Accuracy is traceable to certificate No. 114485 and 114511<br>Photometric Accuracy is traceable to certificate No. 119612 and 114653<br>Stray Light is traceable to certificate No. 114484<br>The above certificate are traceble to SI unit through Starna Scientific Ltd.<br>(UKAS accredited calibration laboratory NO. 0659) |
| **Calibrated by** | Mr.Phongpak Sonbunchu |

Approved by

Mr. Panhaphong Phanmekakul
Technical Manager

COPY

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced except in full, without written approval of the Bara Scientific Co., Ltd.



F-1-109

**Bara Scientific Co., Ltd.**
968 U Chu Liang Building Floor7 Rama4 Road
Silom Bangrak Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com

NSC-TISI-TIS 17025

# Certificate of Calibration



**Calibration Results:**

**1.Wavelength Accuracy**

| Certified Wavelength (nm) | UUC (nm) | Error (nm) | Uncertainty (±nm) |
|---|---|---|---|
| 287.71 | 287.70 | -0.01 | 0.18 |
| 445.82 | 445.87 | 0.05 | 0.18 |
| 536.52 | 536.52 | 0.00 | 0.18 |
| 741.02 | 741.05 | 0.03 | 0.18 |
| 879.41 | 879.33 | -0.08 | 0.18 |

**2.Photometric Accuracy (UV)**

| Wavelength (nm) | Certified Absorbance (A) | UUC (A) | Error (A) | Uncertainty (±A) |
|---|---|---|---|---|
| 235 | 0.0000 | -0.0001 | -0.0001 | 0.0075 |
| | 0.7404 | 0.7416 | 0.0012 | 0.0075 |
| 257 | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| 313 | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| 350 | 0.0000 | 0.0000 | 0.0000 | 0.0075 |
| | 0.6397 | 0.6398 | 0.0001 | 0.0075 |

*CNR = Customer not request

COPY

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced except in full, without written approval of the Bara Scientific Co., Ltd.

Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor7 Rama4 Road
Silom Bangrak Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com

Bara Scientific

# Certificate of Calibration

**Certificate No.** BSCC-UV-153/25 Number of Page(s) 3 of 3

**Calibration Results:**

**3.Photometric Accuracy (Visible)**

| Wavelength (nm) | Certified Absorbance (A) | UUC (A) | Error (A) | Uncertainty (±A) |
|---|---|---|---|---|
| 420.0 | 0.0000 | 0.0001 | 0.0001 | 0.0042 |
| | 0.5733 | 0.5712 | -0.0021 | 0.0042 |
| | 0.7113 | 0.7097 | -0.0016 | 0.0042 |
| | 1.0164 | 1.0150 | -0.0014 | 0.0042 |
| 440.0 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5581 | 0.5559 | -0.0022 | 0.0042 |
| | 0.6996 | 0.6975 | -0.0021 | 0.0042 |
| | 1.0000 | 0.9984 | -0.0016 | 0.0042 |
| 465.0 | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| 546.1 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5217 | 0.5202 | -0.0015 | 0.0042 |
| | 0.6970 | 0.6947 | -0.0023 | 0.0042 |
| | 0.9982 | 0.9969 | -0.0013 | 0.0042 |
| 590.0 | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| 635.0 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5630 | 0.5620 | -0.0010 | 0.0042 |
| | 0.7615 | 0.7594 | -0.0021 | 0.0042 |
| | 1.0953 | 1.0943 | -0.0010 | 0.0042 |

*CNR = Customer not request

**4.Stray Light***

| Standard | Unit Under Calibration(UUC) | | |
|---|---|---|---|
| cut-off wavelength (nm) | Wavelength (nm) | Transmission (%T) | Absorbance (A) |
| 201.10±0.11nm | 200.85 | 0.9740 | 2.0116 |

The Stray light transmission reference is less than 1.0%T and Stray light absorbance reference is greater than 2.00A
***Stray Light not NSC-ONSC Accredited.**

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

***End of Certificate***

COPY

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced except in full, without written approval of the Bara Scientific Co., Ltd.

**Heat Stress Monitor**

**Model : Ques Temp 34**

**Serial No. : TEU080012**

Jiranatee Associates Co ,Ltd
63/14-15, 67/35-36
Petchkasem 7,7/1, Rd. Watthapra, Bangkokyai,
Bangkok 10600 (Thailand)
Tel: +66808680812
Mobile: +66863999453
E-mail: jnac-calibration@jiranatee.com
Web site: www.jiranatee.com

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

*Temperature measurement laboratory*
*Calibration services department*

NSC – TISI – TIS 17025
CALIBRATION 0367

# CERTIFICATE OF CALIBRATION

**Certificate No.** : CDT-010-69



| | |
|---|---|
| **MEASUREMENT ITEM** | : Heat Stress Monitor |
| **MANUFACTURER** | : TSI QUEST |
| **MODEL/TYPE** | : Ques Temp 34 |
| **SERIAL NUMBER** | : TEU080012 |
| **ID NUMBER** | : NO. 11 |
| **CONDITION AS-RECEIVED** | : Used item |
| **CUSTOMER** | : Eastern thai consulting 1992 Co.,Ltd.<br>683 Moo 11, Sukhapibarn 8 Rd,<br>Nongkham, Sriracha, Chonburi 20230 |
| **RECEIVED DATE** | : 25 Dec 2025 |
| **MEASUREMENT DATE** | : 07 Jan 2026 |
| **ISSUE DATE** | : 08 Jan 2026 |

P-1-112

**ENVIRONMENTAL CONDITIONS:**
Ambient condition in the laboratory are as follow:

| | | |
|---|---|---|
| Temperature | : 23.0 ± 3.0 | °C |
| Relative Humidity | : 55.0 ± 15.0 | %RH |

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

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

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

***Traceability:***
*The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT) Certificate number: TT-1013-25, Certificate number: ER-0061-25.*

***Reference Used During Calibration:***
*1. Standard Temperature Probe*
*Model: STS-100 A500, Serial No.: 667682-09, Due date: 9 Apr 2026*
*2. Digital Temperature Indicator*
*Model: DTI-1000-A MK II, Serial No.: 671407-00591 Due date: 22 Apr 2026*

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

Calibrated by:
☐ Mr. Sorawit Thachalad
☑ Miss Jittraporn Lertsomphol
☐ Miss Ruangrumpai Phoommit

JIRANATEE ASSOCIATES CO.,LTD

Approved signatory: .....
Mr. Parinya Booncharoen
Calibration Department Manager

COPY

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



Result of Calibration: ☑ Without Adjustment ☐ With Adjustment

Calibration Range: 20 °C to 40 °C

Function:

**Table 1: This equipment was connected with wet bulb Temperature probe Model: -, S/N: -. Dimension: Diameter 4.77 mm. Length 70 mm.**

| Immersion Depth (mm) | Standard Reading (°C) | UUC Reading (°C) | Error (°C) | Uncertainty (°C) |
|---|---|---|---|---|
| 65 | 20.055 | 20.4 | 0.3 | 0.099 |
| 65 | 25.041 | 25.3 | 0.3 | 0.099 |
| 65 | 30.034 | 30.3 | 0.3 | 0.099 |
| 65 | 35.019 | 35.3 | 0.3 | 0.14 |
| 65 | 40.005 | 40.2 | 0.2 | 0.099 |

**Table 2: This equipment was connected with Globe Temperature probe Model: -, S/N: -. Dimension: Diameter 4.77 mm. Length 70 mm.**

| Immersion Depth (mm) | Standard Reading (°C) | UUC Reading (°C) | Error (°C) | Uncertainty (°C) |
|---|---|---|---|---|
| 65 | 20.055 | 20.3 | 0.2 | 0.099 |
| 65 | 25.041 | 25.3 | 0.3 | 0.099 |
| 65 | 30.034 | 30.3 | 0.3 | 0.099 |
| 65 | 35.019 | 35.3 | 0.3 | 0.14 |
| 65 | 40.005 | 40.1 | 0.1 | 0.099 |

**Table 3: This equipment was connected with Dry Bulb Temperature probe Model: -, S/N: -. Dimension: Diameter 4.77 mm. Length 70 mm.**

| Immersion Depth (mm) | Standard Reading (°C) | UUC Reading (°C) | Error (°C) | Uncertainty (°C) |
|---|---|---|---|---|
| 65 | 20.055 | 20.4 | 0.3 | 0.099 |
| 65 | 25.041 | 25.3 | 0.3 | 0.099 |
| 65 | 30.034 | 30.3 | 0.3 | 0.099 |
| 65 | 35.019 | 35.3 | 0.3 | 0.14 |
| 65 | 40.005 | 40.2 | 0.2 | 0.099 |

**UUC*:** Unit Under Calibration
**Remark:** The reported uncertainty of measurement is 0.14, based on standard uncertainty multiplied by a coverage factor k=2.14 providing a level of confidence of approximately 95%.

***End of Certificate of Calibration***

JIRANATEE ASSOCIATES CO.,LTD

COPY

**Heat Stress Monitor**

**Model : Ques Temp 34**

**Serial No. : TEU080013**

Jiranatee Associates Co.,Ltd
63/14-15, 67/35-36
Petchkasem 7,7/1, Rd. Watthapra, Bangkokyai,
Bangkok 10600(Thailand)
Tel: +6608680812
Mobile: +66863999453
E-mail: jnac-calibration@jiranatee.com
Web site: www.jiranatee.com

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

*Temperature measurement laboratory*
*Calibration services department.*

NSC – TISI – TIS 17025
CALIBRATION 0367

# CERTIFICATE OF CALIBRATION

**Certificate No.** : CDT-011-69



| | |
|---|---|
| **MEASUREMENT ITEM** | : Heat Stress Monitor |
| **MANUFACTURER** | : TSI QUEST |
| **MODEL/TYPE** | : Ques Temp 34 |
| **SERIAL NUMBER** | : TEU080013 |
| **ID NUMBER** | : NO. 12 |
| **CONDITION AS-RECEIVED** | : Used item |
| **CUSTOMER** | : Eastern thai consulting 1992 Co.,Ltd.<br>683 Moo 11, Sukhapibarn 8 Rd,<br>Nongkham, Sriracha, Chonburi 20230 |
| **RECEIVED DATE** | : 25 Dec 2025 |
| **MEASUREMENT DATE** | : 08 Jan 2026 |
| **ISSUE DATE** | : 08 Jan 2026 |

P-1-114

**ENVIRONMENTAL CONDITIONS:**
Ambient condition in the laboratory are as follow:

| | | |
|---|---|---|
| Temperature | : 23.0 ± 3.0 | °C |
| Relative Humidity | : 55.0 ± 15.0 | %RH |

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

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

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

***Traceability:***
*The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT) Certificate number: TT-1013-25, Certificate number: ER-0061-25.*

***Reference Used During Calibration:***
*1. Standard Temperature Probe*
*Model: STS-100 A500, Serial No.: 667682-09, Due date: 9 Apr 2026*
*2. Digital Temperature Indicator*
*Model: DTI-1000-A MK II, Serial No.: 671407-00591 Due date: 22 Apr 2026*

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

Calibrated by:
☐ Mr. Sorawit Thachalad
☑ Miss Jittraporn Lertsomphol
☐ Miss Ruangrumpai Phoommit

JNAC JIRANATEE ASSOCIATES CO.,LTD.

Approved signatory.
Mr. Parinya Booncharoen
Calibration Department Manager

COPY

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



**Result of Calibration:** ☑ Without Adjustment ☐ With Adjustment

**Calibration Range:** 20 °C to 40 °C

**Function:**

**Table 1: This equipment was connected with wet bulb Temperature probe Model: -, S/N: -.**
**Dimension: Diameter 4.77 mm. Length 70 mm.**

| Immersion Depth (mm) | Standard Reading (°C) | UUC Reading (°C) | Error (°C) | Uncertainty (°C) |
|---|---|---|---|---|
| 65 | 20.024 | 20.5 | 0.5 | 0.099 |
| 65 | 25.041 | 25.3 | 0.3 | 0.099 |
| 65 | 30.029 | 30.3 | 0.3 | 0.14 |
| 65 | 35.020 | 35.2 | 0.2 | 0.14 |
| 65 | 40.009 | 40.2 | 0.2 | 0.099 |

**Table 2: This equipment was connected with Globe Temperature probe Model: -, S/N: -.**
**Dimension: Diameter 4.77 mm. Length 70 mm.**

| Immersion Depth (mm) | Standard Reading (°C) | UUC Reading (°C) | Error (°C) | Uncertainty (°C) |
|---|---|---|---|---|
| 65 | 20.024 | 20.4 | 0.4 | 0.099 |
| 65 | 25.041 | 25.4 | 0.4 | 0.099 |
| 65 | 30.029 | 30.4 | 0.4 | 0.099 |
| 65 | 35.020 | 35.4 | 0.4 | 0.099 |
| 65 | 40.009 | 40.3 | 0.3 | 0.099 |

**Table 3: This equipment was connected with Dry Bulb Temperature probe Model: -, S/N: -.**
**Dimension: Diameter 4.77 mm. Length 70 mm.**

| Immersion Depth (mm) | Standard Reading (°C) | UUC Reading (°C) | Error (°C) | Uncertainty (°C) |
|---|---|---|---|---|
| 65 | 20.024 | 20.4 | 0.4 | 0.099 |
| 65 | 25.041 | 25.3 | 0.3 | 0.099 |
| 65 | 30.029 | 30.2 | 0.2 | 0.14 |
| 65 | 35.020 | 35.1 | 0.1 | 0.14 |
| 65 | 40.009 | 39.9 | -0.1 | 0.099 |

**UUC*:** Unit Under Calibration
**Remark:** The reported uncertainty of measurement is 0.14, based on standard uncertainty multiplied by a coverage factor k=2.14 providing a level of confidence of approximately 95%.

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

JNAC JIRANATEE ASSOCIATES CO.,LTD.

COPY

# *ภาคผนวก ค-2 : เอกสารสอบเทียบความถูกต้องของเครื่องมือเก็บตัวอย่าง บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด*

# 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 | Analytical Balance | FAT OIL AND GREASE | Mettler Toledo | AB204-S/FACT / 1129361010 | United Analyst and Engineering Consultant Co., Ltd. | 260318-1-BL007-26 | 3/4/2026 | 2/4/2027 |
| 2 | Analytical Balance | TOTAL DISSOLVED SOLIDS | Mettler Toledo | XSR205DU / C210685394 | United Analyst and Engineering Consultant.Co.,Ltd (UAE) | 260311-2-BL001-26 | 12/3/2026 | 11/3/2027 |
| 3 | Analytical Balance | TOTAL SUSPENDED SOLIDS | Mettler Toledo | XSR205DU / C009071872 | United Analyst and Engineering Consultant. Co., Ltd. (UAE) | 260311-2-BL002-26 | 12/3/2026 | 11/3/2027 |
| 4 | BOD Incubator | BIOCHEMICAL OXYGEN DEMAND | ARCO | UC4-1320 / 1021 | Technology Promotion Association (Thailand-Japan) | 25TM1001 | 7/7/2025 | 6/7/2026 |
| 5 | DO Meter | BIOCHEMICAL OXYGEN DEMAND | YSI | 5100 / 11B 101863 | Technology Promotion Association (Thailand-Japan) | 26TW50 | 2/3/2026 | 1/3/2027 |
| 6 | pH Meter | pH | Horiba | LAQUA-PH210 / HA0A0005 | technology promotion association (thailand-japan | 25CH1433 | 11/12/2025 | 10/12/2026 |
| 7 | UV/VIS Spectrophotometer | CHEMICAL OXYGEN DEMAND | Hitachi High-Tech Science Corporation Tokyo Japan | U-5100 / 23A4-008 | DQE Services Co.,Ltd. | SP26-014 | 18/5/2026 | 17/5/2027 |

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

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484

# Certificate of Calibration

Cert. No.: 25TM1001
Page : 1 of 3

**Equipment :** BOD Incubator
**Manufacturer :** ARCO
**Model :** UC4-1320
**Serial No. :** -
**ID No. :** UAE.WAO.018/2559
**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 :** 07 July 2025
**Calibration Date :** 07 July 2025
**Ambient Temperature :** ( 26 ± 10 ) °C
**Relative Humidity :** ( 50 ± 30 ) %
**AC Line Voltage :** ( 220 ± 22 ) V

**Calibrated by :** Man Pattanapongpaiboon

**Approved by :** Kunchit
Approved Signatory

( ) Chakrit Waewwanjua
( ) Suwit Imjai
(✓) Kunchit Promprat

**Issue Date :** 17 July 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.

เอกสารไม่ควบคุม

**Equipment :** BOD Incubator
**Condition As-Received :** Used Item
**Reference :** 2507-0146OC-2
**Procedure Used :-**

Cert. No.: 25TM1001
Page : 2 of 3

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector ( RTD ).
The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

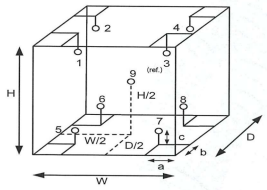
| Instrument | Serial No. | Cert. No. | Traceable | Due Date |
|---|---|---|---|---|
| 1 ) Data Acquisition | MY59003411 | 24LM192 | TPA | 24 Dec 2025 |

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This measurement result is traceable to the International System of Unit maintained through :

**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 ) | 28 | 28 |
| REL.Humid. ( % ) | 54 | 57 |
| AC Supply ( Volt ) | 224 | 226 |




| Position : | Ref. Std. ID No.: |
|---|---|
| 1 | 25-20RTD-2/1 |
| 2 | 25-20RTD-2/2 |
| 3 | 25-20RTD-2/3 |
| 4 | 20RTD-2/4 |
| 5 | 20RTD-2/5 |
| 6 | 20RTD-2/6 |
| 7 | 20RTD-2/7 |
| 8 | 20RTD-2/8 |
| 9 (ref.) | 20RTD-2/9 |

**Probe Installation Details :**

| | | |
|---|---|---|
| a = | 10 | cm |
| b = | 10 | cm |
| c = | 10 | cm |

**Dimension of Chamber :**

| | | |
|---|---|---|
| D = | 0.62 | m |
| W = | 1.2 | m |
| H = | 1.2 | m |
| Capacity = | 0.89 | m³ |

เอกสารไม่ควบคุม

**Equipment :** BOD Incubator
**Condition As-Received :** Used Item
**Reference :** 2507-0146OC-2
**Result of Calibration :-** ( * ) Without Adjustment
**Function of UUC* :** Temperature Source
**Fresh air setting :** Not Available

Cert. No.: 25TM1001
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 | 19.9 | 0.18 | 0.60 | 0.83 | 2 |

| Calibration Point | Measured Temperature ( °C ) | | | | | | | | | Uncertainty |
|---|---|---|---|---|---|---|---|---|---|---|
| | Position | | | | | | | | | |
| ( °C ) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 (ref.) | ( ±°C ) |
| 20.0 | 20.202 | 19.900 | 20.390 | 20.077 | 20.111 | 20.044 | 20.275 | 20.173 | 19.835 | 0.38 |

**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 %.

-o0o-

เอกสารไม่ควบคุม

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484

# Certificate of Calibration

Cert.No.: 25CH1433
Page.: 1 of 3

**Equipment :** pH Meter
**Manufacturer :** Horiba
**Model :** LAQUA-PH210
**Serial No. :** HA0A0005
**ID No. :** UAE.EFM.004/2563(EFM.pH.04/63)
**Condition As-Received:** Used Item
**Received Date :** 09 December 2025
**Calibration Date :** 11 December 2025
**Reference :** 2512-0243WSC-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 Lerngagtrakul

**Approved by :**
Approved Signatory

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

**Issue Date :** 12 December 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.

เอกสารไม่ควบคุม

**Condition of this calibration result**

1. Reference Standard Instrument

| Instrument | Serial No. | ID No. | Cert. No. | Due Date |
|---|---|---|---|---|
| 1) Document Process Calibrator | 54030049 | 130RC116 | 25E2743 | 25 Aug 2026 |
| 2) Ref. Standard Thermometer | 4982054 | 110RC044 | 25I708 | 03 July 2026 |

- This measurement result is traceable to SI throught 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 | 1114384 | 12 June 2027 |
| pH 6.999 | Hach Lenge GmbH | C03273 | 13 May 2027 |
| pH 10.010 | CPA chem | 1114385 | 08 June 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 | Coverage factor |
|---|---|---|---|---|---|---|
| | pH | mV | mV | pH | ( ±mV ) | *k* |
| pH Meter | 4.00 | 177.48 | 177.4 | 4.01 | 0.058 | 2.00 |
| S/N.: HA0A0005 | 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 | -177.2 | 10.01 | 0.058 | 2.00 |

เอกสารไม่ควบคุม



**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 | 4.007 | 4.01 | 175.4 | 0.0085 | 2.05 |
| S/N.: - | 6.999 | 7.00 | -0.3 | 0.0095 | 2.00 |
| | 6.999 | 7.01 | -0.5 | 0.0096 | 2.00 |
| | 10.010 | 10.01 | -170.6 | 0.0092 | 2.00 |

**Function : Temperature Measurement**

**( * ) Without adjustment**

This equipment was connected with Temperature Probe;

- Model : -
- Serial No. : -

Dimension of probe

- Length : 112 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 | 15.002 | 15.0 | -0.002 | 0.13 | 2.00 |
| 30.0 | 30.002 | 30.0 | -0.002 | 0.13 | 2.00 |
| 45.0 | 45.003 | 45.0 | -0.003 | 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-

เอกสารไม่ควบคุม

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



| | |
|---|---|
| **Equipment :** | DO Meter |
| **Manufacturer :** | YSI |
| **Model :** | 5100 |
| **Serial No. :** | 11B 101863 |
| **ID No. :** | UAE.WAO.004/2554 |
| **Received Date :** | 27 February 2026 |
| **Test Date :** | 02 March 2026 |
| **Reference :** | 2602-0915DSC-1 |
| **Submitted by :** | United Analyst and Engineering Consultant Co.,Ltd. 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260 |
| **Laboratory Condition :** | Temperature ( 25 ± 5 ) °C<br>Humidity ( 50 ± 20 ) % |
| **Test Procedure :** | In - house method : CP-CH9 by Comparison Technique with Azide Modification Method |
| **Tested by :** | Walalak Sirithean |
| **Approved by :** | Saithip<br>Approved Signatory |

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

**Issue Date :** 03 March 2026

เอกสารไม่ควบคุม





**Condition of this result of calibration**

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

| Instruments | ID No. | Certificate No. | Due Date |
|---|---|---|---|
| 1. Burette | 130BU10 | 25CG1126 | 18 Mar 2027 |
| 2. Balance | 110RC001 | 25MM316 | 02 July 2026 |

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) |
|---|---|---|
| 8.20 | 8.20 | 0.0084 |

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

United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Tel.0 2763 2828 Fax 0 2763 2800 www.uaeconsultant.com E-mail: uae@uaeconsultant.com

NSC-TISI-TIS 17025 CALIBRATION 0416

# Certificate of Calibration

Certificate No.: 260311-2-BL002-26
Code No.: BL002-26


Customer Name: United Analyst and Engineering Consultant Co., Ltd.
Address: 3 Soi Udom suk 41, Sukhumvit Rd., Bang Chak, Phar Khanong, Bangkok 10260

Equipment: Electronic Balance
Manufacturer: Mettler Toledo
Model: XSR205DU
Serial No.: C009071872
Asset No. : UAE.WAO.012/2563
Building : UAE number 3 Floor : 2 Room : 208

Received Date: March 11, 2026
Date of Calibation : March 12, 2026
Calibration Conditions: Temperature 23.8 °C to 24.1 °C
Humidity 50.0 % to 59.0 %
Pressure 755.5 mmHg to 755.6 mmHg

Calibrated by: Thanachat Chatpahol
Approved by: Suwit Chotnok Signature:

Issued Date: March 16, 2026

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

United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Tel.0 2763 2828 Fax 0 2763 2800 www.uaeconsultant.com E-mail: uae@uaeconsultant.com



Equipment: Electronic Balance
Model: XSR205DU
Serial No.: C009071872
Max. Capacity: 81 g / 220 g
Calibration Date: March 12, 2026
Condition As-Received: In Condition
Manufacturer: Mettler Toledo
Readability: 0 to 81 (g): 0.01 mg > 80 to 200 (g) : 01 mg
ID No.: UAE.WAO.012/2563

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 Standrads:

| Reference Standard: | Model | Serial No. | Calibrated By | Certificate No. | Traceability | Due Date |
|---|---|---|---|---|---|---|
| Standard Weight Class E2 (OIML) | 1 mg to 1 kg | C510641605 | METTLER TOLEDO GmbH | C510641605 | Mettler-Toledo GmbH | 3-Mar-27 |
| Standard Weight Class E2 (OIML) | 1 mg to 1 kg | B749109122 | AMARC | 25-009359 | Mettler-Toledo | 21-Jan-27 |

| Instrument | Model | Serial No. | Calibrated By | Certificate No. | Traceability | Due Date |
|---|---|---|---|---|---|---|
| Thermo-Hygro-Baro Meter | MHB-382SD | AK.46457 | SUCCESS | SG-H-00992/68 | Success Gateway | 26-Nov-26 |
| Thermo-Hygro-Baro Meter | MHB-382SD | AK.46457 | TPA | 25P4464 | TPA | 18-Dec-26 |

3. This certification is traceable to SI Unit
4. This certification was certified only for the indtrument we calibrated
5. This result of calibration wae found accurate as show on date and place of calibration only.
6. Through the reference standard laboratory of Mettler-Toledo GmbH CS10641605, SAS accreditation number SCS 0032
7. Through the reference standard laboratory of AMARC 25-009359, TISI accreditation number 0152

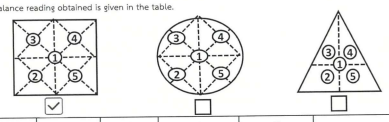
Calibraton Result:

1. Repeatability of Reading:

| Nominal Value (g) | Standard Deviation of Reading (g) |
|---|---|
| 80 | 0.000008 |
| 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 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 0.0000 |

เอกสารไม่ควบคุม

United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Tel.0 2763 2828 Fax 0 2763 2800 www.uaeconsultant.com E-mail: uae@uaeconsultant.com



Equipment: Electronic Balance
Model: XSR205DU
Serial No.: C009071872
Max. Capacity: 81 g / 220 g
Calibration Date: March 12, 2026
Manufacturer: Mettler Toledo
Readability: 0 to 81 (g): 0.01 mg > 80 to 200 (g) : 01 mg
ID No.: UAE.WAO.012/2563

Calibraton Result: (Continued)
Calibraton Range: 0 to 80 (g)
Calibraton Adjustment: Internal Calibration

3. Error of indication from nominal or conventional mass value: (Range: 0 to 81 (g) ; Resolution: 0.00001 g )

| Nominal Value (g) | Reference Value (g) | Indication (g) | Correction (g) | Uncertainty (± mg) | Coverage Factor k |
|---|---|---|---|---|---|
| Unload | 0.0000000 | 0.0000 | 0.0000 | 0.015 | 2.25 |
| 0.001 | 0.0010020 | 0.0010 | 0.00000 | 0.015 | 2.23 |
| 0.005 | 0.0050025 | 0.0050 | -0.00002 | 0.015 | 2.23 |
| 0.01 | 0.0100005 | 0.0100 | -0.00002 | 0.015 | 2.23 |
| 0.05 | 0.0500003 | 0.0500 | -0.00001 | 0.015 | 2.21 |
| 0.10 | 0.1000083 | 0.1000 | -0.00001 | 0.015 | 2.20 |
| 0.50 | 0.5000121 | 0.5000 | -0.00002 | 0.016 | 2.15 |
| 1 | 1.0000119 | 1.0000 | 0.00000 | 0.016 | 2.12 |
| 2 | 2.0000125 | 2.0000 | -0.00001 | 0.017 | 2.09 |
| 5 | 5.0000146 | 5.0000 | -0.00002 | 0.020 | 2.05 |
| 10 | 10.0000330 | 10.0001 | -0.00002 | 0.023 | 2.00 |
| 20 | 20.000028 | 20.0001 | -0.00005 | 0.033 | 2.00 |
| 30 | 30.000061 | 30.0001 | -0.00004 | 0.051 | 2.00 |
| 40 | 40.000054 | 40.0001 | -0.00004 | 0.063 | 2.00 |
| 50 | 50.000037 | 50.0001 | -0.00005 | 0.064 | 2.00 |
| 60 | 60.000070 | 60.0001 | -0.00004 | 0.081 | 2.00 |
| 80 | 80.000098 | 80.0001 | -0.00001 | 0.11 | 2.00 |

เอกสารไม่ควบคุม

United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Tel.0 2763 2828 Fax 0 2763 2800 www.uaeconsultant.com E-mail: uae@uaeconsultant.com



Equipment: Electronic Balance
Model: XSR205DU
Serial No.: C009071872
Max. Capacity: 81 g / 220 g
Calibration Date: March 12, 2026
Manufacturer: Mettler Toledo
Readability: 0 to 81 (g): 0.01 mg > 80 to 200 (g) : 01 mg
ID No.: UAE.WAO.012/2563

Calibraton Result: (Continued)
Calibraton Range: > 80 to 200 (g)
Calibraton Adjustment: Internal Calibration

3. Error of indication from nominal or conventional mass value: (Range: > 80 to 200 (g) ; Resolution: 0.0001 g )

| Nominal Value (g) | Reference Value (g) | Indication (g) | Correction (g) | Uncertainty (± mg) | Coverage Factor k |
|---|---|---|---|---|---|
| Unload | 0.0000000 | 0.0000 | 0.0000 | 0.02 | 2.25 |
| 90 | 90.0000910 | 90.0000 | 0.0000 | 0.16 | 2.00 |
| 100 | 100.0000420 | 100.0000 | 0.0000 | 0.16 | 2.00 |
| 110 | 110.0000750 | 110.0000 | 0.0000 | 0.17 | 2.00 |
| 120 | 120.0000680 | 120.0000 | 0.0001 | 0.18 | 2.00 |
| 130 | 130.0001010 | 130.0000 | 0.0000 | 0.20 | 2.00 |
| 140 | 140.0000960 | 140.0003 | 0.0001 | 0.21 | 2.00 |
| 150 | 150.0000790 | 150.0003 | 0.0001 | 0.21 | 2.00 |
| 160 | 160.0001120 | 160.0003 | 0.0001 | 0.23 | 2.00 |
| 170 | 170.0001050 | 170.0003 | -0.0002 | 0.24 | 2.00 |
| 200 | 200.0001460 | 200.0004 | -0.0002 | 0.26 | 2.00 |

4. Effect of Tare test:

| Tare Load (g) | Test Load (g) | Indication (g) | Correction (g) |
|---|---|---|---|
| 100 | 20.000028 | 20.0000 | 0.0000 |
| | 40.000054 | 40.0002 | -0.0001 |
| | 60.000070 | 60.0002 | -0.0001 |
| | 80.000098 | 80.0002 | -0.0001 |
| | 100.000042 | 100.0003 | -0.0002 |

Remark:
The report uncertainty of measurment was based on standard uncertainty multiplied by coverage factor k, providing a level of confidence of approximetely 95%

o---o-End-o---o

เอกสารไม่ควบคุม

United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Tel.0 2763 2828 Fax 0 2763 2800 www.uaeconsultant.com E-mail: uae@uaeconsultant.com

NSC -TISI -TIS 17025 CALIBRATION 0416

# Certificate of Calibration

Certificate No.: 260311-2-BL001-26
Code No.: BL001-26
Page: 1 of 4

| | |
|---|---|
| Customer Name: | United Analyst and Engineering Consultant Co., Ltd. |
| Address: | 3 Soi Udom suk 41, Sukhumvit Rd., Bang Chak, Phar Khanong, Bangkok 10260 |
| Equipment: | Electronic Balance |
| Manufacturer: | Mettler Toledo |
| Model: | XSR205DU |
| Serial No.: | C210685394 |
| Asset No. : | UAE.WAO.010/2565 |
| Building : | UAE number 3 Floor : 2 Room : 208 |
| Received Date: | March 11, 2026 |
| Date of Calibation : | March 12, 2026 |
| Calibration Conditions: | Temperature 23.0 °C to 23.6 °C |
| | Humidity 51.5 % to 54.4 % |
| | Pressure 755.7 mmHg to 757.9 mmHg |
| Calibrated by: | Thanachat Chatpahol |
| Approved by: | Suwit Chotnok Signature: |
| Issued Date: | March 16, 2026 |

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

United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Tel.0 2763 2828 Fax 0 2763 2800 www.uaeconsultant.com E-mail: uae@uaeconsultant.com



Equipment: Electronic Balance
Model: XSR205DU
Serial No.: C210685394
Max. Capacity: 81 g / 220 g
Calibration Date: March 12, 2026
Condition As-Received: In Condition
Manufacturer: Mettler Toledo
Readability: 0 to 81 (g): 0.01 mg , > 80 to 200 (g) : 0.1 mg
ID No.: UAE.WAO.010/2565

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 Standrads:

| Reference Standard: | Model | Serial No. | Calibrated By | Certificate No. | Traceability | Due Date |
|---|---|---|---|---|---|---|
| Standard Weight Class E2 (OIML) | 1 mg to 1 kg | C510641605 | METTLER TOLEDO GmbH | C510641605 | METTLER TOLEDO GmbH | 3-Mar-27 |
| Standard Weight Class E2 (OIML) | 1 mg to 1 kg | B749109122 | AMARC | 25-009359 | AMARC | 21-Jan-27 |

| Instrument | Model | Serial No. | Calibrated By | Certificate No. | Traceability | Due Date |
|---|---|---|---|---|---|---|
| Thermo-Hygro-Baro Meter | MHB-382SD | AK.46457 | SUCCESS | SG-H-00992/68 | Success Gateway | 26-Nov-26 |
| Thermo-Hygro-Baro Meter | MHB-382SD | AK.46457 | TPA | 25P4464 | TPA | 18-Dec-26 |

3. This certification is traceable to SI Unit
4. This certification was certified only for the indtrument we calibrated
5. This result of calibration wae found accurate as show on date and place of calibration only.
6. Through the reference standard laboratory of Mettler-Toledo GmbH C510641605, SAS accreditation number SCS 0032
7. Through the reference standard laboratory of AMARC 25-009359, TISI accreditation number 0152

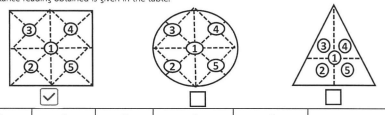
Calibraton Result:

1. Repeatability of Reading:

| Nominal Value (g) | Standard Deviation of Reading (g) |
|---|---|
| 80 | 0.000019 |
| 200* | 0.000055 |

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) |
|---|---|---|---|---|---|
| 100.0002 | 100.0002 | 100.0003 | 100.0004 | 100.0003 | 0.0001 |

เอกสารไม่ควบคุม

United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Tel.0 2763 2828 Fax 0 2763 2800 www.uaeconsultant.com E-mail: uae@uaeconsultant.com



Equipment: Electronic Balance
Model: XSR205DU
Serial No.: C210685394
Max. Capacity: 81 g / 220 g
Calibration Date: March 12, 2026
Manufacturer: Mettler Toledo
Readability: 0 to 81 (g): 0.01 mg , > 80 to 200 (g) : 0.1 mg
ID No.: UAE.WAO.010/2565

Calibraton Result: (Continued)
Calibraton Range: 0 to 80 (g)
Calibraton Adjustment: Internal Calibration

3. Error of indication from nominal or conventional mass value: (Range: 0 to 81 (g) ; Resolution: 0.00001 g )

| Nominal Value (g) | Reference Value (g) | Indication (g) | Correction (g) | Uncertainty ( ± mg) | Coverage Factor k |
|---|---|---|---|---|---|
| Unload | 0.0000000 | 0.00000 | 0.00000 | 0.032 | 2.65 |
| 0.001 | 0.0010020 | 0.00101 | 0.00000 | 0.032 | 2.65 |
| 0.005 | 0.0050025 | 0.00501 | -0.00001 | 0.032 | 2.65 |
| 0.01 | 0.0100005 | 0.01001 | -0.00001 | 0.032 | 2.65 |
| 0.05 | 0.0500003 | 0.05001 | -0.00001 | 0.032 | 2.65 |
| 0.10 | 0.1000083 | 0.10000 | 0.00001 | 0.033 | 2.65 |
| 0.50 | 0.5000121 | 0.50001 | 0.00000 | 0.033 | 2.65 |
| 1 | 1.0000119 | 1.00003 | -0.00002 | 0.032 | 2.52 |
| 2 | 2.0000125 | 2.00003 | -0.00002 | 0.033 | 2.52 |
| 5 | 5.0000146 | 5.00003 | -0.00002 | 0.033 | 2.32 |
| 10 | 10.0000330 | 10.00006 | -0.00003 | 0.034 | 2.21 |
| 20 | 20.000028 | 20.00006 | -0.00003 | 0.041 | 2.07 |
| 30 | 30.000061 | 30.00017 | -0.00011 | 0.055 | 2.00 |
| 40 | 40.000054 | 40.00021 | -0.00016 | 0.066 | 2.00 |
| 50 | 50.000037 | 50.00023 | -0.00019 | 0.068 | 2.00 |
| 60 | 60.000070 | 60.00029 | -0.00022 | 0.084 | 2.00 |
| 80 | 80.000098 | 80.00039 | -0.00030 | 0.12 | 2.00 |

เอกสารไม่ควบคุม

United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Tel.0 2763 2828 Fax 0 2763 2800 www.uaeconsultant.com E-mail: uae@uaeconsultant.com



Equipment: Electronic Balance
Model: XSR205DU
Serial No.: C210685394
Max. Capacity: 81 g / 220 g
Calibration Date: March 12, 2026
Manufacturer: Mettler Toledo
Readability: 0 to 81 (g): 0.01 mg , > 80 to 200 (g) : 0.1 mg
ID No.: UAE.WAO.010/2565

Calibraton Result: (Continued)
Calibraton Range: > 81 to 200 (g)
Calibraton Adjustment: Internal Calibration

3. Error of indication from nominal or conventional mass value: (Range: > 81 - 220 (g) ; Resolution: 0.0001 g )

| Nominal Value (g) | Reference Value (g) | Indication (g) | Correction (g) | Uncertainty ( ± mg) | Coverage Factor k |
|---|---|---|---|---|---|
| Unload | 0.0000000 | 0.0000 | 0.0000 | 0.032 | 2.65 |
| 90 | 90.0000910 | 90.0004 | -0.0003 | 0.16 | 2.00 |
| 100 | 100.0000420 | 100.0003 | -0.0003 | 0.16 | 2.00 |
| 110 | 110.0000750 | 110.0004 | -0.0003 | 0.18 | 2.00 |
| 120 | 120.0000680 | 120.0004 | -0.0003 | 0.19 | 2.00 |
| 130 | 130.0001010 | 130.0005 | -0.0004 | 0.20 | 2.00 |
| 140 | 140.0000960 | 140.0004 | -0.0003 | 0.21 | 2.00 |
| 150 | 150.0000790 | 150.0005 | -0.0004 | 0.22 | 2.00 |
| 160 | 160.0001120 | 160.0004 | -0.0003 | 0.23 | 2.00 |
| 170 | 170.0001050 | 170.0003 | -0.0002 | 0.24 | 2.00 |
| 200 | 200.0001460 | 200.0001 | 0.0000 | 0.26 | 2.00 |

4. Effect of Tare test:

| Tare Load (g) | Test Load (g) | Indication (g) | Correction (g) |
|---|---|---|---|
| 100 | 20.000028 | 20.0001 | 0.0000 |
| | 40.000054 | 40.0001 | 0.0000 |
| | 60.000070 | 60.0000 | 0.0001 |
| | 80.000098 | 80.0000 | 0.0001 |
| | 100.000109 | 100.0000 | 0.0001 |

Remark: -
The report uncertainty of measurment was based on standard uncertainty multiplied by coverage factor k, providing a level of confidence of approximetely 95%

o---o-End-o---o

เอกสารไม่ควบคุม

United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Tel.0 2763 2828 Fax 0 2763 2800 www.uaeconsultant.com E-mail: uae@uaeconsultant.com

NSC-TISI-TIS 17025 CALIBRATION 0416

# Certificate of Calibration

Certificate No.: 260318-1-BL007-26
Code No.: BL007-26
Page: 1 of 3

Customer Name: United Analyst and Engineering Consultant Co., Ltd.
Address: 3 Soi Udom suk 41, Sukhumvit Rd., Bang Chak, Phar Khanong, Bangkok 10260

Equipment: Electronic Balance
Manufacturer: Mettler Toledo
Model: AB204-S/FACT
Serial No.: 1129361010
Asset No. : UAE.WAS.002/2552
Building : UAE No.3 Floor : 1 Room : 107

Received Date: April 2, 2026
Date of Calibation : April 3, 2026
Calibration Conditions:

| | | | | |
|---|---|---|---|---|
| Temperature | start | 21.9 °C | end | 22.1 °C |
| Humidity | start | 60.6 % | end | 60.1 % |
| Pressure | start | 756.6 mmHg | end | 755.1 mmHg |

Calibrated by: Thanachat Chatpahol

Approved by: Suwit Chotnok Signature:

Issued Date: April 7, 2026

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

United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Tel.0 2763 2828 Fax 0 2763 2800 www.uaeconsultant.com E-mail: uae@uaeconsultant.com

NSC-TISI-TIS 17025 CALIBRATION 0416

Certificate No.: 260318-1-BL007-26
Code No.: BL007-26
Page: 2 of 3

Equipment: Electronic Balance
Manufacturer: Mettler Toledo
Model: AB204-S/FACT
Readability: 0.0001 g
Serial No.: 1129361010
ID No.: UAE.WAS.002/2552
Max. Capacity: 220 g
Calibration Date: April 3, 2026
Condition As-Received: In Condition

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 Standrads:

| Reference Standard: | Model | Serial No. | Calibrated By | Certificate No. | Traceability | Due Date |
|---|---|---|---|---|---|---|
| Standard Weight Class E2 (OIML) | 1 mg to 1 kg | C510641605 | METTLER TOLEDO GmbH | C510641605 | Mettler-Toledo | 3-Mar-27 |

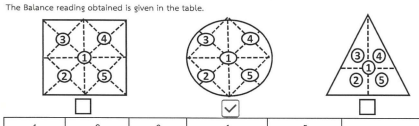
| Instrument | Model | Serial No. | Calibrated By | Certificate No. | Traceability | Due Date |
|---|---|---|---|---|---|---|
| Thermo-Hygro-Baro Meter | MHB-382SD | AK.46457 | SUCCESS | SG-H-00992/68 | Success Gateway | 26-Nov-26 |
| Thermo-Hygro-Baro Meter | MHB-382SD | AK.46457 | TPA | 25P4464 | TPA | 18-Dec-26 |

3. This certification is traceable to SI Unit
4. This certification was certified only for the indtrument we calibrated
5. This result of calibration wae found accurate as show on date and place of calibration only.
6. Through the reference standard laboratory of Mettler-Toledo GmbH C510641605, SAS accreditation number SCS 0032

Calibraton Result:
1. Repeatability of Reading:

| Nominal Value (g) | Standard Deviation of Reading (g) |
|---|---|
| 200* | 0.00010 |

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) |
|---|---|---|---|---|---|
| 100.0025 | 100.0022 | 100.0022 | 100.0029 | 100.0030 | 0.0005 |

เอกสารไม่ควบคุม

United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Tel.0 2763 2828 Fax 0 2763 2800 www.uaeconsultant.com E-mail: uae@uaeconsultant.com

NSC-TISI-TIS 17025 CALIBRATION 0416

Certificate No.: 260318-1-BL007-26
Code No.: BL007-26
Page: 3 of 3

Equipment: Electronic Balance
Manufacturer: Mettler Toledo
Model: AB204-S/FACT
Readability: 0.0001 g
Serial No.: 1129361010
ID No.: UAE.WAS.002/2552
Max. Capacity: 220 g
Calibration Date: April 3, 2026

Calibraton Result: (Continued)
Calibraton Range: 0 - 200 g
Calibraton Adjustment: Internal Calibration

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

| Nominal Value (g) | Reference Value (g) | Indication (g) | Correction (g) | Uncertainty (± mg) | Coverage Factor k |
|---|---|---|---|---|---|
| Unload | 0.0000000 | 0.0000 | 0.0000 | 0.17 | 2.37 |
| 0.01 | 0.0100005 | 0.0099 | 0.0001 | 0.17 | 2.32 |
| 0.05 | 0.0500003 | 0.0499 | 0.0001 | 0.17 | 2.32 |
| 0.1 | 0.1000083 | 0.0999 | 0.0001 | 0.17 | 2.32 |
| 0.5 | 0.5000121 | 0.5000 | 0.0000 | 0.17 | 2.32 |
| 1.0 | 1.0000119 | 1.0000 | 0.0000 | 0.17 | 2.32 |
| 10.0 | 10.000033 | 10.0003 | -0.0003 | 0.17 | 2.32 |
| 40.0 | 40.000054 | 40.0010 | -0.0010 | 0.18 | 2.23 |
| 50.0 | 50.000037 | 50.0013 | -0.0012 | 0.18 | 2.23 |
| 80.0 | 80.000098 | 80.0020 | -0.0019 | 0.19 | 2.11 |
| 100.0 | 100.000042 | 100.0025 | -0.0024 | 0.20 | 2.10 |
| 120.0 | 120.000068 | 120.0028 | -0.0027 | 0.22 | 2.06 |
| 150.0 | 150.000079 | 150.0035 | -0.0035 | 0.24 | 2.04 |
| 160.0 | 160.000112 | 160.0036 | -0.0035 | 0.25 | 2.03 |
| 200.0 | 200.000146 | 200.0049 | -0.0047 | 0.28 | 2.00 |

4. Effect of Tare test:

| Tare Load (g) | Test Load (g) | Indication (g) | Correction (g) |
|---|---|---|---|
| 100 | 20.000028 | 20.0004 | -0.0003 |
| | 40.000054 | 40.0009 | -0.0008 |
| | 60.000070 | 60.0013 | -0.0012 |
| | 80.000098 | 80.0017 | -0.0016 |
| | 100.000042 | 100.0021 | -0.0021 |

Remark: -
The report uncertainty of measurment was based on standard uncertainty multiplied by coverage factor k, providing a level of confidence of approximetely 95%

o---o-End-o---o

เอกสารไม่ควบคุม



DQE Services Co.,Ltd.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

NSC-TISI-TIS 17025 CALIBRATION 0404

# CERTIFICATE OF CALIBRATION

**Certificate No. :** SP26-014 Page 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 :** HITACHI

**Model :** U-5100

**Serial No. :** 23A4-008

**ID No. :** UAE.WAS.010/2567

**Received Date :** 18 May 2026

**Calibration Date :** 18 May 2026

**Issue Date :** 21 May 2026

**Condition Instrument :** Good

**Calibrated by :** ( Mr.Pacit Mathavorn )
Calibration Engineer

**Approved by :** ( Ms.Chonticha Sangngern )
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.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

NSC-TISI-TIS 17025 CALIBRATION 0404

# REPORT OF CALIBRATION

**Certificate No. :** SP26-014 

**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 |
|---|---|---|---|
| Absobance Standard set | 25760 | 136858 | 5 November 2027 |
| Absobance Standard set | 25757 | 136848 | 5 November 2027 |
| Wavelength Standard set | 25806 | 136824 | 5 November 2027 |
| Wavelength Standard set | 25758 | 136827 | 5 November 2027 |

**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.

เอกสารไม่ควบคุม



DQE Services Co.,Ltd.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

NSC-TISI-TIS 17025 CALIBRATION 0404

# REPORT OF CALIBRATION

**Certificate No. :** SP26-014 

**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 |
| | 0.5772 | 0.574 | 0.0032 | 0.0031 | 2.00 |
| | 1.0478 | 1.043 | 0.0048 | 0.0029 | 2.00 |
| | 2.1879 | 2.182 | 0.0059 | 0.0082 | 2.00 |
| 440 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5581 | 0.556 | 0.0021 | 0.0034 | 2.00 |
| | 1.0224 | 1.020 | 0.0024 | 0.0035 | 2.00 |
| | 2.1227 | 2.121 | 0.0017 | 0.0079 | 2.00 |
| 465 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5225 | 0.518 | 0.0045 | 0.0029 | 2.00 |
| | 0.9628 | 0.961 | 0.0018 | 0.0028 | 2.00 |
| | 1.9744 | 1.974 | 0.0004 | 0.0070 | 2.00 |
| 546.1 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5174 | 0.514 | 0.0034 | 0.0031 | 2.00 |
| | 0.9990 | 0.996 | 0.0030 | 0.0033 | 2.00 |
| | 1.9953 | 1.995 | 0.0003 | 0.0087 | 2.00 |
| 590 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5508 | 0.549 | 0.0018 | 0.0030 | 2.00 |
| | 1.0801 | 1.078 | 0.0021 | 0.0029 | 2.00 |
| | 2.0356 | 2.028 | 0.0076 | 0.0079 | 2.00 |
| 635 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5579 | 0.558 | -0.0001 | 0.0031 | 2.00 |
| | 1.0512 | 1.050 | 0.0012 | 0.0029 | 2.00 |
| | 1.9257 | 1.923 | 0.0027 | 0.0083 | 2.00 |

เอกสารไม่ควบคุม



DQE Services Co.,Ltd.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

NSC-TISI-TIS 17025 CALIBRATION 0404

# REPORT OF CALIBRATION

**Certificate No. :** SP26-014 

**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 |
| | 0.7455 | 0.744 | 0.0015 | 0.0056 | 2.00 |
| 257 | 0.0000 | 0.000 | 0.0000 | 0.0050 | 2.00 |
| | 0.8656 | 0.863 | 0.0026 | 0.0059 | 2.00 |
| 313 | 0.0000 | 0.000 | 0.0000 | 0.0050 | 2.00 |
| | 0.2910 | 0.290 | 0.0010 | 0.0051 | 2.00 |
| 350 | 0.0000 | 0.000 | 0.0000 | 0.0050 | 2.00 |
| | 0.6414 | 0.640 | 0.0014 | 0.0055 | 2.00 |

DQE Services Co.,Ltd.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

NSC-TISI-TIS 17025 CALIBRATION 0404

# REPORT OF CALIBRATION

**Certificate No. :** SP26-014 

**Wavelength Accuracy :**

| CRMs Values (nm.) | UUC Reading (nm.) | Correction (nm.) | Uncertainty (nm.) | Coverage factor *k* |
|---|---|---|---|---|
| 241.00 | 240.3 | 0.70 | 0.18 | 2.00 |
| 279.30 | 278.9 | 0.40 | 0.18 | 2.00 |
| 288.90 | 288.2 | 0.70 | 0.18 | 2.00 |
| 334.50 | 333.8 | 0.70 | 0.18 | 2.00 |
| 361.40 | 360.7 | 0.70 | 0.18 | 2.00 |
| 418.40 | 417.9 | 0.50 | 0.18 | 2.00 |
| 447.20 | 446.6 | 0.60 | 0.18 | 2.00 |
| 459.30 | 459.4 | -0.10 | 0.18 | 2.00 |
| 537.00 | 536.5 | 0.50 | 0.18 | 2.00 |
| 638.00 | 637.3 | 0.70 | 0.18 | 2.00 |
| 441.29 | 440.6 | 0.69 | 0.18 | 2.00 |
| 479.88 | 479.2 | 0.68 | 0.18 | 2.00 |
| 513.75 | 513.0 | 0.75 | 0.18 | 2.00 |
| 528.59 | 528.1 | 0.49 | 0.18 | 2.00 |
| 575.10 | 574.5 | 0.60 | 0.18 | 2.00 |
| 585.56 | 585.0 | 0.56 | 0.20 | 2.00 |
| 684.70 | 684.2 | 0.50 | 0.18 | 2.00 |
| 740.51 | 739.9 | 0.61 | 0.20 | 2.00 |
| 747.61 | 747.0 | 0.61 | 0.18 | 2.00 |
| 807.04 | 806.5 | 0.54 | 0.18 | 2.00 |
| 879.68 | 879.0 | 0.68 | 0.18 | 2.00 |

Remark : - UUC = Unit Under Calinration

- N/A = Not Avaiable
- 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%
- * Indicates non TISI accredited

- End of Certificate -

เอกสารไม่ควบคุม





เอกสารไม่ควบคุม

# *ภาคผนวก ง : หนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน*

ที่ อก ๐๓๒๐/๑๑๓๔๒

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๗ กรกฎาคม ๒๕๖๖

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด

อ้างถึง คำขอต่ออายุของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๗ มิถุนายน ๒๕๖๖

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒๕ ราย
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๙๒ รายการ จำนวน ๑๙ แผ่น

ตามหนังสือที่อ้างถึง บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๐๓ สถานที่ตั้งเลขที่ ๖๘๓ หมู่ที่ ๑๑ ถนนสุขาภิบาล ๘ ตำบลหนองขาม อำเภอศรีราชา จังหวัดชลบุรี ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒๕ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๔๗ รายการ อากาศเสีย (ปล่องระบาย) จำนวน ๒๑ รายการ น้ำใต้ดิน จำนวน ๑๑๑ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน ๑๘ รายการ และดิน จำนวน ๙๕ รายการ รวมทั้งสิ้นจำนวน ๒๙๒ รายการ ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๕ กรกฎาคม ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายทวี อำพาพันธ์)
ผู้อำนวยการศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
โทร. ๐ ๓๓๑๓ ๖๑๕๙ ต่อ ๕๐๐๑-๒
ไปรษณีย์อิเล็กทรอนิกส์ eirw@diw.mail.go.th

"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"

COPY

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด เลขทะเบียน ว-๐๐๓
ที่ อก ๐๓๒๐/๑๑๓๔๒ ลงวันที่ ๒๗ กรกฎาคม ๒๕๖๖

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย

๑) นางสาวมาลิเกษ เลขะวัจกุล ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๐๑
๒) นายวัฒนา โคตรหล้า ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๐๒
๓) นางวรรณเพ็ญ เหลาจินดาวัฒน์ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๐๓
๔) นายกะวีร์ สุธาทรัพย์ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๐๔
๕) นางสาวนันท์ณภัส แบขุนทด ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๐๕
๖) นางสาวพรนภา หลงคำหงษ์ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๐๖
๗) นางสาวอภิรดี ขื่นอารมย์ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๐๗
๘) นางสาวอัจฉรี จิตตะยโศธร ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๐๘
๙) นางสาวจิรพร ป่านคง ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๐๙
๑๐) นายสุทธา สองธนินัย ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๑๐
๑๑) นางสาวนันประภา อุยสูงเนิน ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๑๑
๑๒) นายธงไชย บุญศักดิ์ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๑๒
๑๓) นางสาวธนัชพร กลิ่นโสภณ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๑๓
๑๔) นายธีระพงษ์ นวลอินทร์ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๑๔
๑๕) นางสาวแพรว พลเสน ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๑๕
๑๖) นายทรงพล ผิวอ้วน ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๑๖
๑๗) นายภาคภูมิ บัวสวัสดิ์ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๑๗
๑๘) นางสาวจันทนี สายพันธ์ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๑๘
๑๙) นายภาณุพงศ์ บำรุงรส ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๑๙
๒๐) นางสาวปภาณิน จันติะสอน ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๒๐
๒๑) นายวรากร ไวทยะเสวี ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๒๑
๒๒) นางสาววรรณภา ไชยศิริ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๒๒
๒๓) นางสาวพรพิมล ภูมิคอนสาร ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๒๓
๒๔) นางสาวธมลวรรณ ผลอ้อ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๒๔
๒๕) นางสาวบุญเรือง บุญถม ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๒๕
๒๖) นางสาวภัสนันท์ ป้อมน้อย ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๒๖
๒๗) นายชานุวัฒน์ โชตะวงค์ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๒๗
๒๘) นางสาวพจนีย์ งามวิลัย ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๒๘
๒๙) นายวิชญ์ชวัล สิงห์โต ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๒๙
๓๐) นางสาวนุกูล อาภรศรี ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๓๐
๓๑) นายศุภฤกษ์ พาดกลาง ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๓๑
๓๒) นายณิพล ทองหล่อ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๓๒
๓๓) นายธรรมรัตน์ โพธิ์ต้นคำ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๓๓
๓๔) นายโอชา ขวัญศิริมงคล ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๓๔
๓๕) นายเมธี สุขประเสริฐ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๓๕

COPY

๓๖) นางสาวพรพินันท์...



๓๖) นางสาวพรพินันท์ วิริยกุศลกุล ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๓๖
๓๗) นางสาวอาภาภรณ์ เสริมสนธิ ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๓๗
๓๘) นางสาวนภัทร์ธมณฑ์ ประดิษฐ์นุช ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๓๘
๓๙) นางสาวสุนิษา เฮ็งเส็ง ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๓๙
๔๐) นางสาวระพิน อันชัน ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๔๐

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒๕ ราย

๑) นางสาวดวงกมล เนื้อทอง ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๐๑
๒) นางสาววัชราภรณ์ อินทสุข ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๐๒
๓) นางสาวกัญจน์ถวิกา จันทร์ขอดแก้ว ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๐๓
๔) นางสาวฉัตรสุดา มงคลโภชน์ ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๐๔
๕) นางสาวณัฐวดี อำมาตทัศน์ ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๐๕
๖) นางสาวนิอรอุมา ปาระ ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๐๖
๗) นางสาวธัญลักษณ์ ขันโต ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๐๗
๘) นางสาวสุทธิดา สร้างแก้ว ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๐๘
๙) นายอุดมทรัพย์ เจนจบจริง ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๐๙
๑๐) นายนราธิป สงวนศิลป์ ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๑๐
๑๑) นายวีระชัย พอใจ ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๑๑
๑๒) นายอัญชลี ทะพงษ์ ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๑๒
๑๓) นางสาวสุมิลดรา มีแก่น ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๑๓
๑๔) นางสาวสวรรยา เพชรประไพ ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๑๔
๑๕) นางสาวจุฑามาศ เจริญพรหม ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๑๕
๑๖) นางสาวนิภาพร คำชมภู ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๑๖
๑๗) นางสาวอรชา พันธ์เมือง ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๑๗
๑๘) นายกิตติ ไพโรจน์ ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๑๘
๑๙) นายชาญณรงค์ ตั้งธรรมรักษ์ ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๑๙
๒๐) นางสาวปวรีศา เอสันเทียะ ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๒๐
๒๑) นางสาวจุฑาทิพย์ กิจดี ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๒๑
๒๒) นางสาวสุภาวดี ศรีละออง ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๒๒
๒๓) นางสาวณัฐชยา บรรพบุตร ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๒๓
๒๔) นางสาวณัฏฐนิช นนตานอก ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๒๔
๒๕) นางสาวดวงสุดา แสนวันดี ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๒๕

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด เลขทะเบียน ว-๐๐๓
ที่ อก ๐๓๒๐/๑๑๓๔๒ ลงวันที่ ๒๗ กรกฎาคม ๒๕๖๖

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๙๒ รายการ

น้ำเสีย จำนวน 47 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Aldrin | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 2 | Arsenic | 1) Continuous Hydride Generation/Atomic Absorption Spectrometric Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 3 | Barium | Digestion, Inductively Coupled Plasma Method[4] |
| 4 | α-BHC | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 5 | β-BHC | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 6 | δ-BHC | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 7 | γ-BHC | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 8 | Biochemical Oxygen Demand | 1) 5-Day BOD Test, Membrane Electrode Method[4]<br>2) 5-Day BOD Test, Azide Modification Method[4] |
| 9 | Cadmium | Digestion, Inductively Coupled Plasma Method[4] |
| 10 | Chemical Oxygen Demand | Closed Reflux, Titrimetric Method[4] |
| 11 | cis-Chlordane | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 12 | trans-Chlordane | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 13 | Chromium | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |

COPY



COPY 14 Color...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 14 | Color | ADMI Weighted-Ordinate Spectrophotometric Method[4] |
| 15 | Copper | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 16 | Cyanide | Distillation, Colorimetric Method[4] |
| 17 | 4,4′-DDD | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 18 | 4,4′-DDE | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 19 | DDT | Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 20 | Dieldrin | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 21 | Endosulfan I | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 22 | Endosulfan II | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 23 | Endosulfan sulfate | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 24 | Endrin | Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 25 | Endrin aldehyde | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 26 | Endrin ketone | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 27 | Formaldehyde | Distillation, Colorimetric Method[3] |
| 28 | Free Chlorine | 1) Iodometric Method[4]<br>2) Colorimetric Method[4] |

COPY

29 Heptachlor...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 29 | Heptachlor | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 30 | Heptachlor Epoxide | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 31 | Hexavalent Chromium | Filtration, Colorimetric Method[4] |
| 32 | Lead | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 33 | Manganese | Digestion, Inductively Coupled Plasma Method[4] |
| 34 | Mercury | Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[4] |
| 35 | Methoxychlor | Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4] |
| 36 | Nickel | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 37 | Oil and Grease | Liquid-Liquid, Partition-Gravimetric Method[4] |
| 38 | pH | Electrometric Method[4] |
| 39 | Phenols | Distillation, Direct Photometric Method[4] |
| 40 | Selenium | Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4] |
| 41 | Sulfide | ZnS Precipitation, Iodometric Method[4] |
| 42 | Temperature | Field Method[4] |
| 43 | Trivalent Chromium | 1) Digestion, Direct Air-Acetylene Flame Method; Filtration, Colorimetric Method; Calculation[4]<br>2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[4] |
| 44 | Total Dissolved Solids | Dried at 180 °C [4] |
| 45 | Total Kjeldahl Nitrogen | Macro Kjeldahl Method[4] |
| 46 | Total Suspended Solids | Dried at 103-105 °C [4] |
| 47 | Zinc | Digestion, Inductively Coupled Plasma Method[4] |

COPY

อากาศเสีย...



อากาศเสีย (ปล่องระบาย) จำนวน 21 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Antimony | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 2 | Arsenic | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 3 | Cadmium | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 4 | Carbon Monoxide | 1) Bag, Non-Dispersive Infrared Method[5]<br>2) Instrumental Analyzer Method[5] |
| 5 | Chromium | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 6 | Cobalt | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 7 | Copper | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 8 | Hydrogen Sulfide | Absorption Sampling, Iodometric Method[5] |
| 9 | Lead | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 10 | Manganese | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 11 | Mercury | Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[5] |
| 12 | Nickel | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 13 | Opacity | Ringelmann's Method[1,5] |
| 14 | Oxides of Nitrogen | 1) Absorption Sampling, Phenoldisulfonic Acid Method[8]<br>2) Instrumental Analyzer Method[7] |
| 15 | Selenium | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 16 | Sulfur Dioxide | 1) Absorption Sampling , Barium-Thorin Titrimetric Method[5]<br>2) Instrumental Analyzer Method[5] |
| 17 | Sulfuric Acid | Isokinetic Sampling, Barium-Thorin Titrimetric Method[6] |
| 18 | Tin | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |

COPY

19 Total Suspended Particulate...





| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 19 | Total Suspended Particulate | Isokinetic Sampling, Gravimetric Method[6] |
| 20 | Vanadium | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 21 | Xylene | Adsorption Sampling, Gas Chromatographic Method[6] |

น้ำใต้ดิน จำนวน 111 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Acenaphthene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 2 | Acetone | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 3 | Aldrin | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 4 | Anthracene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 5 | Antimony | Digestion, Inductively Coupled Plasma Method[4] |
| 6 | Arsenic | 1) Continuous Hydride Generation/Atomic Absorption Spectrometric Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 7 | Barium | Digestion, Inductively Coupled Plasma Method[4] |
| 8 | Benz(a)anthracene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 9 | Benzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 10 | Benzo(b)fluoranthene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 11 | Benzo(k)fluoranthene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 12 | Benzo(a)pyrene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 13 | Benzo[g,h,i]perylene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 14 | Beryllium | Digestion, Inductively Coupled Plasma Method[4] |

COPY

15 Bis(2-chloroethyl)ether...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 15 | Bis(2-chloroethyl)ether | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 16 | Bis(2-ethylhexyl)phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 17 | Bromodichloromethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 18 | Bromoform | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 19 | Butanol | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 20 | Butyl benzyl phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 21 | Cadmium | Digestion, Inductively Coupled Plasma Method[4] |
| 22 | Carbazole | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 23 | Carbon disulfide | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 24 | Carbon tetrachloride | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 25 | Chlordane | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 26 | p-Chloroaniline | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 27 | Chlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 28 | Chlorodibromomethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 29 | Chloroform | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 30 | 2-Chlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 31 | Chromium | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 32 | Chromium (III) | 1) Digestion, Direct Air-Acetylene Flame Method; Filtration, Colorimetric Method; Calculation[4]<br>2) Digestion, Inductively Coupled Plasma Method; Filtration, Colorimetric Method; Calculation[4] |

COPY 31 Chromium (VI)



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 33 | Chromium (VI) | Filtration, Colorimetric Method[4] |
| 34 | Chrysene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 35 | Cyanide | Distillation, Colorimetric Method[4] |
| 36 | DDD | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 37 | DDE | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 38 | DDT | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 39 | Dibenz(a,h)anthracene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 40 | Di-n-butyl phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 41 | 1,2-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 42 | 1,3-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 43 | 1,4-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 44 | 1,1-Dichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 45 | 1,2-Dichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 46 | 1,1-Dichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 47 | cis-1,2-Dichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 48 | trans-1,2-Dichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 49 | 2,4-Dichlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 50 | 1,2-Dichloropropane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 51 | 1,3-Dichloropropane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |

COPY 52 Dieldrin...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 52 | Dieldrin | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 53 | Diethyl phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 54 | 2,4-Dimethylphenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 55 | 2,4-Dinitrotoluene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 56 | 2,6-Dinitrotoluene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 57 | Di-n-octyl phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 58 | Endosulfan | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 59 | Endrin | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 60 | Ethylbenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 61 | Fluoranthene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 62 | Fluorene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 63 | Heptachlor | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 64 | Heptachlor epoxide | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 65 | Hexachlorobenzene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 66 | Hexachloro-1,3-butadiene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 67 | n-Hexane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 68 | $\alpha$-HCH | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 69 | $\beta$-HCH | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |

COPY 70 $\gamma$-HCH...





| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 70 | $\gamma$-HCH | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 71 | Hexachlorocyclopentadiene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 72 | Hexachloroethane | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 73 | Indeno(1,2,3-cd)pyrene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 74 | Isophorone | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 75 | Lead | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 76 | Manganese | Digestion, Inductively Coupled Plasma Method[4] |
| 77 | Mercury | Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[4] |
| 78 | Methoxychlor | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 79 | Methylene chloride | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 80 | 2-Methylphenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 81 | 2-Methylnaphthalene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 82 | Methyl tert-butyl ether | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 83 | Naphthalene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 84 | Nickel | Digestion, Inductively Coupled Plasma Method[4] |
| 85 | Nitrobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 86 | N-Nitrosodi-n-propylamine | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 87 | pH | Electrometric Method[4] |
| 88 | Phenanthrene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |

COPY 82 Phenol...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 89 | Phenol | 1) Distillation, Direct Photometric Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 90 | Pyrene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 91 | Selenium | Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4] |
| 92 | Silver | Digestion, Inductively Coupled Plasma Method[4] |
| 93 | Styrene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 94 | 1,1,2,2-Tetrachloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 95 | Trichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 96 | 1,2,4-Trichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 97 | 1,1,1-Trichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 98 | 1,1,2-Trichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 99 | Tetrachloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 100 | Toluene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 101 | 2,4,5-Trichlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 102 | 2,4,6-Trichlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 103 | 1,3,5-Trimethylbenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 104 | Vanadium | Digestion, Inductively Coupled Plasma Method[4] |
| 105 | Vinyl acetate | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 106 | Vinyl chloride | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |

COPY

107 m-Xylene...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 107 | m-Xylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 108 | o-Xylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 109 | p-Xylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 110 | Xylene (Total) | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 111 | Zinc | Digestion, Inductively Coupled Plasma Method[4] |

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 18 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Antimony | Digestion, Inductively Coupled Plasma Method[9,10] |
| 2 | Arsenic | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |
| 3 | Barium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |
| 4 | Beryllium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |
| 5 | Cadmium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |
| 6 | Chromium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |
| 7 | Chromium (VI) | 1) Waste Extraction, Digestion, Colorimetric Method[2,13]<br>2) Alkaline Digestion, Colorimetric Method[9,13] |
| 8 | Cobalt | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |
| 9 | Copper | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |

COPY

10 Lead...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 10 | Lead | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |
| 11 | Mercury | 1) Waste Extraction, Digestion, Cold Vapor Atomic Absorption Spectrometric Method[2,11]<br>2) Digestion, Cold vapor Atomic Absorption Spectrometric Method[9,11] |
| 12 | Nickel | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |
| 13 | Molybdenum | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |
| 14 | Selenium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |
| 15 | Silver | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |
| 16 | Thallium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |
| 17 | Vanadium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |
| 18 | Zinc | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10]<br>2) Digestion, Inductively Coupled Plasma Method[9,10] |

COPY

ดิน...



ดิน จำนวน 95 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Acenaphthene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 2 | Acetone | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 3 | Anthracene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 4 | Antimony | Digestion, Inductively Coupled Plasma Method[9,10] |
| 5 | Arsenic | Digestion, Inductively Coupled Plasma Method[9,10] |
| 6 | Barium | Digestion, Inductively Coupled Plasma Method[9,10] |
| 7 | Benz(a)anthracene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 8 | Benzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 9 | Benzo(b)fluoranthene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 10 | Benzo(k)fluoranthene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 11 | Benzo(a)pyrene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 12 | Benzo[g,h,i]perylene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 13 | Beryllium | Digestion, Inductively Coupled Plasma Method[9,10] |
| 14 | Bis(2-chloroethyl)ether | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 15 | Bis(2-ethylhexyl)phthalate | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 16 | Bromodichloromethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 17 | Bromoform | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 18 | Butanol | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |

COPY

19 Butyl benzyl phthalate...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 19 | Butyl benzyl phthalate | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 20 | Cadmium | Digestion, Inductively Coupled Plasma Method[9,10] |
| 21 | Carbazole | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 22 | Carbon disulfide | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 23 | Carbon tetrachloride | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 24 | p-Chloroaniline | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 25 | Chlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 26 | Chlorodibromomethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 27 | Chloroform | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 28 | 2-Chlorophenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 29 | Chromium | Digestion, Inductively Coupled Plasma Method[9,10] |
| 30 | Chromium (III) | Digestion, Inductively Coupled Plasma Method; Filtration, Colorimetric Method; Calculation[9,10] |
| 31 | Chromium (VI) | Alkaline Digestion, Colorimetric Method[12,13] |
| 32 | Chrysene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 33 | Dibenz(a,h)anthracene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 34 | Di-n-butyl phthalate | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 35 | 1,2-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 36 | 1,3-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 37 | 1,4-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |

38 1,1-Dichloroethane...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 38 | 1,1-Dichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 39 | 1,2-Dichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 40 | 1,1-Dichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 41 | cis-1,2-Dichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 42 | trans-1,2-Dichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 43 | 2,4-Dichlorophenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 44 | 1,2-Dichloropropane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 45 | 1,3-Dichloropropane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 46 | Diethyl phthalate | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 47 | 2,4-Dimethylphenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 48 | 2,4-Dinitrotoluene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 49 | 2,6-Dinitrotoluene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 50 | Di-n-octyl phthalate | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 51 | Ethylbenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 52 | Fluoranthene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 53 | Fluorene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 54 | Hexachlorobenzene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 55 | Hexachloro-1,3-butadiene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |

56 n-Hexane...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 56 | n-Hexane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 57 | Hexachlorocyclopentadiene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 58 | Hexachloroethane | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 59 | Indeno(1,2,3-cd)pyrene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 60 | Isophorone | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 61 | Lead | Digestion, Inductively Coupled Plasma Method[9,10] |
| 62 | Manganese | Digestion, Inductively Coupled Plasma Method[9,10] |
| 63 | Mercury | Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[9,11] |
| 64 | Methylene chloride | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 65 | 2-Methylphenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 66 | 2-Methylnaphthalene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 67 | Methyl tert-butyl ether | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 68 | Naphthalene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 69 | Nickel | Digestion, Inductively Coupled Plasma Method[9,10] |
| 70 | Nitrobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 71 | N-Nitrosodi-n-propylamine | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 72 | Phenanthrene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 73 | Phenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 74 | Pyrene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |

75 Selenium...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 75 | Selenium | Digestion, Inductively Coupled Plasma Method[9,10] |
| 76 | Silver | Digestion, Inductively Coupled Plasma Method[9,10] |
| 77 | Styrene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 78 | 1,1,2,2-Tetrachloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 79 | Tetrachloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 80 | Toluene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 81 | 1,2,4-Trichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 82 | 1,1,1-Trichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 83 | 1,1,2-Trichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 84 | Trichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 85 | 2,4,5-Trichlorophenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 86 | 2,4,6-Trichlorophenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17] |
| 87 | 1,3,5-Trimethylbenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 88 | Vanadium | Digestion, Inductively Coupled Plasma Method[9,10] |
| 89 | Vinyl acetate | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 90 | Vinyl chloride | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 91 | m-Xylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 92 | o-Xylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 93 | p-Xylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |

94 Xylene (Total)...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 94 | Xylene (Total) | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16] |
| 95 | Zinc | Digestion, Inductively Coupled Plasma Method[9,10] |


**เอกสารอ้างอิง**

1. กระทรวงอุตสาหกรรม. **ประกาศกระทรวงอุตสาหกรรม พ.ศ.2549** เรื่องกำหนดค่าปริมาณเขม่าควันที่เจือปนในอากาศที่ระบายออกจากปล่องของหม้อน้ำโรงสีข้าวที่ใช้แกลบเป็นเชื้อเพลิง. ราชกิจจานุเบกษา. 4 ธันวาคม 2549. เล่มที่ 123 ตอนพิเศษ 125 ง.

2. กระทรวงอุตสาหกรรม. **ประกาศกระทรวงอุตสาหกรรม พ.ศ.2548** เรื่อง การกำจัดสิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว. ราชกิจจานุเบกษา. 25 มกราคม 2549. เล่มที่ 123 ตอนพิเศษ 11ง.

3. สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4. กรุงเทพฯ: เรือนแก้วการพิมพ์, 2547.

4. APHA, AWWA, WEF. **Standard Methods for the Examination of Water and Wastewater.** 23rd ed. Washington, DC : APHA, 2017

5. United States Environmental Protection Agency. **Standard of Performance for New Stationary Sources.** 40 CFR Part 60. Appendix A, 2017.

6. United States Environmental Protection Agency. **Standard of Performance for New Stationary Sources.** 40 CFR Part 60. Appendix A, 2019.

7. United States Environmental Protection Agency. **Standard of Performance for New Stationary Sources.** 40 CFR Part 60. Appendix A, 2020.

8. United States Environmental Protection Agency. **Standard of Performance for New Stationary Sources.** 40 CFR Part 60. Appendix A, 2023.

9. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Acid Digestion of Sediments Sludge and Soils. SW-846 Method 3050B,** 1996.

10. United States Environment Protection Agency. Test Methods for Evaluation Solid Watste Physical/Chemical Methods. **Inductively Coupled Plasma-Atomic Emission spectrometry. SW-846 Method 6010C,** 2007.

11. United States Environment 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,** 2007.

12. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Alkaline digestion for Hexavalent Chromium. SW-846 Method 3060A,** 1996.


COPY

13 United...




13. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Chromium. Hexavalent (Colorimetric). SW-846 Method 7196A,** 1992

14. United States Environment 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 Samples. SW-846 Method 5035A,** 2002

15. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Ultrasonic Extraction. SW-846 Method 3550C,** 2007

16. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS). SW-846 Method 8260D,** 2018

17. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry. SW-846 Method 8270E,** 2018


COPY

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก กรมโรงงานอุตสาหกรรม โทร. ๐ ๓๓๑๓ ๖๐๕๙ ต่อ ๕๐๐๑-๒

COPY

ที่ อก ๐๓๒๐/ ๕๖๐๕ ๑

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๔ พฤษภาคม ๒๕๖๗

เรื่อง เปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษ เปลี่ยนแปลงสารมลพิษในดิน และเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๔ มีนาคม ๒๕๖๗

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษ และเปลี่ยนแปลงสารมลพิษบริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด จำนวน ๑๒ แผ่น

ตามคำขอฯ ที่อ้างถึง บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๐๓ สถานที่ตั้งเลขที่ ๖๘๓ หมู่ที่ ๑๑ ถนนสุขาภิบาล ๘ ตำบลหนองขาม อำเภอศรีราชา จังหวัดชลบุรี แจ้งขอเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษในน้ำเสีย น้ำใต้ดิน เปลี่ยนแปลงสารมลพิษในดิน และเปลี่ยนแปลงบุคลากร นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ ราย
นายวัฒนา โคตรหล้า ทะเบียนเลขที่ ว-๐๐๓-ค-๐๐๐๒

๒. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓ ราย
๑) นางสาวอัญชลี ทะพงษ์ ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๑๒
๒) นางสาวจุฑามาศ เจริญพรหม ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๑๕
๓) นางสาวณัฐฐนิช นนตานอก ทะเบียนเลขที่ ว-๐๐๓-จ-๐๐๒๔

๓ ให้ยกเลิกขอบข่ายรายการสารมลพิษในน้ำเสีย และน้ำใต้ดินตามรายการเอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชนที่ อก ๐๓๒๐/๑๑๓๔๒ ลงวันที่ ๒๗ กรกฎาคม ๒๕๖๖

๔. ให้วิเคราะห์สารมลพิษตามขอบข่ายที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๔๗ รายการ และน้ำใต้ดิน จำนวน ๑๑๑ รายการ รวมทั้งสิ้นจำนวน ๑๕๘ รายการ ตามเอกสารแนบท้ายหนังสือเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษ เปลี่ยนแปลงสารมลพิษในดิน และเปลี่ยนแปลงบุคลากร ดังสิ่งที่ส่งมาด้วย

๕. ให้วิเคราะห์สารมลพิษตามขอบข่ายที่ได้รับขึ้นทะเบียนให้วิเคราะห์เพิ่มเติมในดิน จำนวน ๑๒ รายการ ตามเอกสารแนบท้ายหนังสือเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษเปลี่ยนแปลงสารมลพิษในดิน และเปลี่ยนแปลงบุคลากร ดังสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือ ....

COPY





อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชนในวันที่ ๕ กรกฎาคม ๒๕๖๙

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายพรยศ กลั่นกรอง)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
โทร. ๐ ๓๓๑๓ ๖๐๕๙ ต่อ ๕๐๐๑-๒
ไปรษณีย์อิเล็กทรอนิกส์ eirw@diw.mail.go.th

COPY

เอกสารแนบท้ายหนังสือเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษ
บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด เลขทะเบียน ว-๐๐๓
ที่ อก ๐๓๒๐/ ลงวันที่

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๗๐ รายการ

น้ำเสีย จำนวน 47 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Aldrin | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 2 | Arsenic | 1) Continuous Hydride Generation/Atomic Absorption Spectrometric Method[1]<br>2) Digestion, Inductively Coupled Plasma Method[1] |
| 3 | Barium | Digestion, Inductively Coupled Plasma Method[1] |
| 4 | α-BHC | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 5 | β-BHC | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 6 | δ-BHC | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 7 | γ-BHC | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 8 | Biochemical Oxygen Demand | 1) 5-Day BOD Test, Membrane Electrode Method[1]<br>2) 5-Day BOD Test, Azide Modification Method[1] |
| 9 | Cadmium | Digestion, Inductively Coupled Plasma Method[1] |
| 10 | Chemical Oxygen Demand | Closed Reflux, Titrimetric Method[1] |
| 11 | cis-Chlordane | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |

COPY
trans-Chlordane ...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 12 | trans-Chlordane | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 13 | Chromium | 1) Digestion, Direct Air-Acetylene Flame Method[1]<br>2) Digestion, Inductively Coupled Plasma Method[1] |
| 14 | Color | ADMI Weighted-Ordinate Spectrophotometric Method[1] |
| 15 | Copper | 1) Digestion, Direct Air-Acetylene Flame Method[1]<br>2) Digestion, Inductively Coupled Plasma Method[1] |
| 16 | Cyanide | Distillation, Colorimetric Method[1] |
| 17 | 4,4′-DDD | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 18 | 4,4′-DDE | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 19 | DDT | Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 20 | Dieldrin | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 21 | Endosulfan I | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 22 | Endosulfan II | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 23 | Endosulfan sulfate | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 24 | Endrin | Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |

COPY
25 Endrin aldehyde ...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 25 | Endrin aldehyde | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 26 | Endrin ketone | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 27 | Formaldehyde | Distillation, Colorimetric Method[6] |
| 28 | Free Chlorine | 1) Iodometric Method[1]<br>2) Colorimetric Method[1] |
| 29 | Heptachlor | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 30 | Heptachlor Epoxide | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[1]<br>2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 31 | Hexavalent Chromium | Filtration, Colorimetric Method[1] |
| 32 | Lead | 1) Digestion, Direct Air-Acetylene Flame Method[1]<br>2) Digestion, Inductively Coupled Plasma Method[1] |
| 33 | Manganese | Digestion, Inductively Coupled Plasma Method[1] |
| 34 | Mercury | Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[1] |
| 35 | Methoxychlor | Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1] |
| 36 | Nickel | 1) Digestion, Direct Air-Acetylene Flame Method[1]<br>2) Digestion, Inductively Coupled Plasma Method[1] |
| 37 | Oil and Grease | Liquid-Liquid, Partition-Gravimetric Method[1] |
| 38 | pH | Electrometric Method[1] |
| 39 | Phenols | Distillation, Direct Photometric Method[1] |
| 40 | Selenium | Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[1] |

COPY
41 Sulfide ...





| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 41 | Sulfide | ZnS Precipitation, Iodometric Method[1] |
| 42 | Temperature | Field Method[1] |
| 43 | Trivalent Chromium | 1) Digestion, Direct Air-Acetylene Flame Method; Filtration, Colorimetric Method; Calculation[1]<br>2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[1] |
| 44 | Total Dissolved Solids | Dried at 180 °C [1] |
| 45 | Total Kjeldahl Nitrogen | Macro Kjeldahl Method[1] |
| 46 | Total Suspended Solids | Dried at 103-105 °C [1] |
| 47 | Zinc | Digestion, Inductively Coupled Plasma Method[1] |

น้ำใต้ดิน จำนวน 111 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Acenaphthene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 2 | Acetone | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 3 | Aldrin | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 4 | Anthracene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 5 | Antimony | Digestion, Inductively Coupled Plasma Method[1] |
| 6 | Arsenic | 1) Continuous Hydride Generation/Atomic Absorption Spectrometric Method[1]<br>2) Digestion, Inductively Coupled Plasma Method[1] |
| 7 | Barium | Digestion, Inductively Coupled Plasma Method[1] |
| 8 | Benz(a)anthracene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |

COPY
9 Benzene ...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 9 | Benzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 10 | Benzo(b)fluoranthene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 11 | Benzo(k)fluoranthene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 12 | Benzo(a)pyrene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 13 | Benzo[g,h,i]perylene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 14 | Beryllium | Digestion, Inductively Coupled Plasma Method[1] |
| 15 | Bis(2-chloroethyl)ether | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 16 | Bis(2-ethylhexyl)phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 17 | Bromodichloromethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 18 | Bromoform | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 19 | Butanol | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 20 | Butyl benzyl phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 21 | Cadmium | Digestion, Inductively Coupled Plasma Method[1] |
| 22 | Carbazole | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 23 | Carbon disulfide | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 24 | Carbon tetrachloride | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |

25 Chlordane ...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 25 | Chlordane | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 26 | p-Chloroaniline | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 27 | Chlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 28 | Chlorodibromomethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 29 | Chloroform | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 30 | 2-Chlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 31 | Chromium | 1) Digestion, Direct Air-Acetylene Flame Method[1]<br>2) Digestion, Inductively Coupled Plasma Method[1] |
| 32 | Chromium (III) | 1) Digestion, Direct Air-Acetylene Flame Method; Filtration, Colorimetric Method; Calculation[1]<br>2) Digestion, Inductively Coupled Plasma Method; Filtration, Colorimetric Method; Calculation[1] |
| 33 | Chromium (VI) | Filtration, Colorimetric Method[1] |
| 34 | Chrysene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 35 | Cyanide | Distillation, Colorimetric Method[1] |
| 36 | DDD | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 37 | DDE | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 38 | DDT | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 39 | Dibenz(a,h)anthracene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |

40 Di-n-butyl phthalate ...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 40 | Di-n-butyl phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 41 | 1,2-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 42 | 1,3-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 43 | 1,4-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 44 | 1,1-Dichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 45 | 1,2-Dichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 46 | 1,1-Dichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 47 | cis-1,2-Dichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 48 | trans-1,2-Dichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 49 | 2,4-Dichlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 50 | 1,2-Dichloropropane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 51 | 1,3-Dichloropropane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 52 | Dieldrin | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 53 | Diethyl phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 54 | 2,4-Dimethylphenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |

55 2,4-Dinitrotoluene ...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 55 | 2,4-Dinitrotoluene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 56 | 2,6-Dinitrotoluene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 57 | Di-n-octyl phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 58 | Endosulfan | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 59 | Endrin | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 60 | Ethylbenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 61 | Fluoranthene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 62 | Fluorene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 63 | Heptachlor | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 64 | Heptachlor epoxide | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 65 | Hexachlorobenzene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 66 | Hexachloro-1,3-butadiene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 67 | n-Hexane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 68 | α-HCH | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 69 | β-HCH | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |

70 γ-HCH ...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 70 | γ-HCH | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 71 | Hexachlorocyclopentadiene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 72 | Hexachloroethane | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 73 | Indeno(1,2,3-cd)pyrene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 74 | Isophorone | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 75 | Lead | 1) Digestion, Direct Air-Acetylene Flame Method[1]<br>2) Digestion, Inductively Coupled Plasma Method[1] |
| 76 | Manganese | Digestion, Inductively Coupled Plasma Method[1] |
| 77 | Mercury | Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[1] |
| 78 | Methoxychlor | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 79 | Methylene chloride | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 80 | 2-Methylphenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 81 | 2-Methylnaphthalene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 82 | Methyl tert-butyl ether | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 83 | Naphthalene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |
| 84 | Nickel | Digestion, Inductively Coupled Plasma Method[1] |
| 85 | Nitrobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1] |

COPY

86 N-Nitrosodi-n-propylamine ...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 86 | N-Nitrosodi-n-propylamine | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1] |
| 87 | pH | Electrometric Method[4] |
| 88 | Phenanthrene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 89 | Phenol | 1) Distillation, Direct Photometric Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 90 | Pyrene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 91 | Selenium | Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4] |
| 92 | Silver | Digestion, Inductively Coupled Plasma Method[4] |
| 93 | Styrene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 94 | 1,1,2,2-Tetrachloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 95 | Trichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 96 | 1,2,4-Trichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 97 | 1,1,1-Trichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 98 | 1,1,2-Trichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 99 | Tetrachloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 100 | Toluene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 101 | 2,4,5-Trichlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |

COPY

102 2,4,6-Trichlorophenol ...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 102 | 2,4,6-Trichlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 103 | 1,3,5-Trimethylbenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 104 | Vanadium | Digestion, Inductively Coupled Plasma Method[4] |
| 105 | Vinyl acetate | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 106 | Vinyl chloride | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 107 | m-Xylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 108 | o-Xylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 109 | p-Xylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 110 | Xylene (Total) | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4] |
| 111 | Zinc | Digestion, Inductively Coupled Plasma Method[4] |

**ดิน จำนวน 12 รายการ**

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | α-HCH | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3] |
| 2 | β-HCH | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3] |
| 3 | γ-HCH | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3] |
| 4 | Heptachlor | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3] |

COPY

5 Aldrin ...



| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 5 | Aldrin | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3] |
| 6 | Heptachlor epoxide | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3] |
| 7 | Chlordane | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3] |
| 8 | Dieldrin | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3] |
| 9 | Endrin | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3] |
| 10 | DDD | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3] |
| 11 | DDT | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3] |
| 12 | Methoxychlor | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3] |

**เอกสารอ้างอิง**


1. APHA, AWWA, WEF. **Standard Methods for the Examination of Water and Wastewater.** 24th ed. Washington, DC: APHA, 2023.
2. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Ultrasonic Extraction. SW-846 Method 3550C,** 2007
3. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry. SW-846 Method 8270E,** 2018
4. สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4. กรุงเทพฯ: เรือนแก้วการพิมพ์, 2547.


COPY



ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก กรมโรงงานอุตสาหกรรม โทร. ๐ ๓๓๓๓ ๖๐๕๙ ต่อ ๕๐๐๑-๒

ที่ อก ๐๓๑๐(๑)/ ๓๗๗๘

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๐ มิถุนายน ๒๕๖๙

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๙ พฤษภาคม ๒๕๖๙

ตามคำขอที่อ้างถึง บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔ ราย

| | |
|---|---|
| ๑) นายณัฐพงศ์ เมืองชัย | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๔๕ |
| ๒) นายณัฏฐชัย พรหมอารักษ์ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๙๖ |
| ๓) นายคุณานนท์ ฤทธาคุณานนท์ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๒๓ |
| ๔) นางสาวบุณยาพร บุญถนอมศรี | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๖๓ |

๒. ให้เพิ่มเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๒๔ ราย

| | |
|---|---|
| ๑) นายเจษฎา มาศประสิทธิ์ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๑๐ |
| ๒) นางสาวนฤมล ยินดี | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๑๑ |
| ๓) นายสุรชัย บุพศิริ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๑๒ |
| ๔) นางสาวปิยพร วรดี | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๑๓ |
| ๕) นางสาวสิริกันยา สุรจิต | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๑๔ |
| ๖) นางสาววทันยา วิเชียรผลา | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๑๕ |
| ๗) นายธนดล แก้วประสงค์ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๑๖ |
| ๘) นายวิทิต สงแสง | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๑๗ |
| ๙) นางสาวดวงกมล ศรีดา | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๑๘ |
| ๑๐) นายภูฤทธิ์ ลีล้าน | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๑๙ |
| ๑๑) นายคณิน หนองหว้า | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๒๐ |
| ๑๒) นายต้นน้ำ สังข์นคร | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๒๑ |
| ๑๓) นายวัชรพงษ์ วราศรี | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๒๒ |
| ๑๔) นายจักรพงษ์ สัตย์สาร | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๒๓ |
| ๑๕) นายปุระชัย โพธิ์ทอง | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๒๔ |
| ๑๖) นายชนะพันธ์ อภินพหิรัณย์ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๒๕ |

UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED สำเนาถูกต้อง

๑๗) นายกมลไท...



| | |
|---|---|
| ๑๗) นายกมลไท ชัยสิริสมบัติ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๒๖ |
| ๑๘) นายธเนศ ทรัพย์ธำรงค์ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๒๗ |
| ๑๙) นางสาวภัทรสุดา สุธรรมมา | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๒๘ |
| ๒๐) นางสาวสุนันทา สมรูป | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๒๙ |
| ๒๑) นางสาวมนรดา มั่นศาสตร์ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๓๐ |
| ๒๒) นางสาวรัชนีภรณ์ สาระพันธ์ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๓๑ |
| ๒๓) นายรณวิชย์ บุญเอก | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๓๒ |
| ๒๔) นางสาวอาทิตยา เล็กน้อย | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๓๓ |

อนึ่ง หนังสืออนุบัตินี้จะสิ้นอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ในวันที่ ๒ กุมภาพันธ์ ๒๕๗๒

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายศิระ จันทร์เฉิด)
นักวิทยาศาสตร์เชี่ยวชาญ รักษาราชการแทน
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED สำเนาถูกต้อง



ที่ อก ๐๓๑๐(๑)/ ๓๗๓๘

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐๕ มีนาคม ๒๕๖๙

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๑๐ กุมภาพันธ์ ๒๕๖๙

ตามคำขอที่อ้างถึง บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔ ราย

| | |
|---|---|
| ๑) นายพีรณัฐ เจริญผล | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๐๓ |
| ๒) นายเจษฎา ช่วยตรึก | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๒๗ |
| ๓) นายศุภกร สวนศรี | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๓๔ |
| ๔) นางสาวณัฐกฤตา พลนิกรกิจ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๔๐ |

๒. ให้เพิ่มเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๙ ราย

| | |
|---|---|
| ๑) นายเกียรติศักดิ์ ทำทอง | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๐๑ |
| ๒) นางสาวธนภร แฉะกระโทก | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๐๒ |
| ๓) นางสาวรชยา ปรีดี | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๐๓ |
| ๔) นางสาวญาณินดา แช่มเล็ก | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๐๔ |
| ๕) นางสาวมนัสพร การงานดี | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๐๕ |
| ๖) นายธนากร เชื้อมาก | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๐๖ |
| ๗) นางสาวพัชรินทร์ แพรกทอง | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๐๗ |
| ๘) นางสาวนรินทร รินทราช | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๐๘ |
| ๙) นางสาวชญานี เมินกระโทก | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๐๙ |

อนึ่ง หนังสืออนุบัตินี้จะสิ้นอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ในวันที่ ๒ กุมภาพันธ์ ๒๕๗๒

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นางสาวปัทมวรรณ คุณประเสริฐ)
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED สำเนาถูกต้อง



ที่ อก ๐๓๑๐(๑)/ ๘๓๐๒

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐๘ ตุลาคม ๒๕๖๘

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๕ กันยายน ๒๕๖๘

ตามคำขอที่อ้างถึง บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๓ ราย ได้แก่

| | |
|---|---|
| ๑) นางสาวอารียา ทรารมย์ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๖๗ |
| ๒) นางสาวศรีเพชร ทองขาว | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๐๗ |
| ๓) นางสาวปวีณา แดนขนบ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๖๙ |

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นางสาวปัทมวรรณ คุณประเสริฐ)
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED สำเนาถูกต้อง

ที่ อก ๐๓๑๐(๑)/ ๖๙๗๓

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๕ สิงหาคม ๒๕๖๘

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๗ สิงหาคม ๒๕๖๘

ตามคำขอที่อ้างถึง บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๕ ราย ได้แก่

| | |
|---|---|
| ๑) นายคณิติน พงษ์อิศรานุพร | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๐๔ |
| ๒) นายธีรวัฒน์ ธรรมสุวรรณ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๓๘ |
| ๓) นายอาทิตย์ ดาภา | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๖๒ |
| ๔) นางสาวกมลชนก ปุนคำ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๗๒ |
| ๕) นายวีระพงษ์ แสงท่านั่ง | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๘๘ |

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายศิระ จันทร์เฉิด)
นักวิทยาศาสตร์เชี่ยวชาญ รักษาราชการแทน
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

UAE UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED
สำเนาถูกต้อง

Green Industry "อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"

ที่ อก ๐๓๑๐(๑)/ ๕๖๙๑

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐๗ กรกฎาคม ๒๕๖๘

เรื่อง เปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๙ พฤษภาคม ๒๕๖๘

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด จำนวน ๒ แผ่น

ตามหนังสือที่อ้างถึง บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๓ ราย

| | |
|---|---|
| ๑) นายสุขสันต์ พันสิงห์ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๐๑ |
| ๒) นางสาวสุภัสสรา เฉียนเงิน | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๔๙ |
| ๓) นางสาวชามันตา กิมาคม | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๘๖ |

๒. ให้เพิ่มผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑ ราย

| | |
|---|---|
| นายสุขสันต์ พันสิงห์ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๔๗ |

๓. ให้เพิ่มขอบข่ายสารมลพิษที่วิเคราะห์ในน้ำใต้ดิน อากาศเสีย และดิน ตามสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ในวันที่ ๒ กุมภาพันธ์ ๒๕๗๒

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายประสม สำรองพงษ์)
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

UAE UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED
สำเนาถูกต้อง

Green Industry "อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"

**เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์**
**บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด เลขทะเบียน ว-๑๔๕**
**ที่ อก ๐๓๑๐(๑)/ ๕๖๙๑ ลงวันที่ ๐๗ กรกฎาคม ๒๕๖๘**

**ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๑ รายการ**

น้ำใต้ดิน จำนวน 4 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Aluminum | Digestion, Inductively Coupled Plasma Method[1] |
| 2 | Copper | 1) Digestion, Flame Atomic Absorption Spectrometric Method[1]<br>2) Digestion, Inductively Coupled Plasma Method[1] |
| 3 | Iron | 1) Digestion, Flame Atomic Absorption Spectrometric Method[1]<br>2) Digestion, Inductively Coupled Plasma Method[1] |
| 4 | Molybdenum | Digestion, Inductively Coupled Plasma Method[1] |

อากาศเสีย (ปล่องระบาย) จำนวน 1 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Oxides of Nitrogen | Absorption Sampling, Ion Chromatographic Method[2] |

ดิน จำนวน 6 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Aluminum | Digestion, Inductively Coupled Plasma Method[3,5] |
| 2 | Copper | 1) Digestion, Flame Atomic Absorption Spectrometric Method[3,6]<br>2) Digestion, Inductively Coupled Plasma Method[3,5] |
| 3 | Iron | 1) Digestion, Flame Atomic Absorption Spectrometric Method[3,6]<br>2) Digestion, Inductively Coupled Plasma Method[3,5] |
| 4 | Molybdenum | Digestion, Inductively Coupled Plasma Method[3,6] |
| 5 | pH | Electrometric Method[8] |
| 6 | TPH ($C_5$-$C_8$) | Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method[4,7] |

UAE UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED
สำเนาถูกต้อง

เอกสารอ้างอิง


1. APHA, AWWA, WEF. **Standard Methods for the Examination of Water and Wastewater.** 24th ed. Washington, DC: APHA, 2023.

2. United States Environmental Protection Agency. **Standards of Performance for New Stationary Sources.** 40 CFR 60. Appendix A, 2023.


3. United States...




3. 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.

4. 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.

5. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Inductively Coupled Plasma-Optical Emission Spectrometry.** SW-846 Method 6010D, 2018.

6. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Flame Atomic Absorption Spectrophotometry.** SW-846 Method 7000B, 2007.

7. 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.

8. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Soil and Waste pH.** SW-846 Method 9045D, 2004.

ที่ อก ๐๓๑๐(๑)/ ๑๔๙๑

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๔ กุมภาพันธ์ ๒๕๖๘

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๑๘ กุมภาพันธ์ ๒๕๖๘

ตามคำขอที่อ้างถึง บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๓ ราย ได้แก่

| | |
|---|---|
| ๑) นายอภิสิทธิ์ ศรีคงแก้ว | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๕๘ |
| ๒) นางสาวนันธิดา พรมกวยถ้ำ | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๗๐ |
| ๓) นายภูวดล เป็งมา | ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๙๘ |

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

จิงสรางกูร

(นายธีรทัศน์ อิศรางกูร ณ อยุธยา)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED

สำเนาถูกต้อง

"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"

ที่ อก ๐๓๑๐(๑)/ ๑๐๘๙

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐๗ กุมภาพันธ์ ๒๕๖๘

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง 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 ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔๐ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๔๑ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำ/น้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กุมภาพันธ์ ๒๕๗๒ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอกรมโรงงานอุตสาหกรรมภายใน ๖๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

จิงสรางกูร

(นายธีรทัศน์ อิศรางกูร ณ อยุธยา)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED

สำเนาถูกต้อง

"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"

สิ่งที่ส่งมาด้วย ๑

**เอกสารแนบท้ายหนังสืออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน**
**บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด เลขทะเบียน ว-๑๔๕**
**ที่ อก ๐๓๑๐(๑)/ ๑๐๘๙ ลงวันที่ ๐๗ กุมภาพันธ์ ๒๕๖๘**

**ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔๐ ราย**

| | |
|---|---|
| ๑) นางสาวกฤชวรรณ ภัทรธีรกุล | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๐๑ |
| ๒) นายนรงค์ อิมพาลี | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๐๒ |
| ๓) นางสาวนันทิดา บุญไสย | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๐๓ |
| ๔) นางปิยะพัชร์ สุทธมนัสวงษ์ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๐๔ |
| ๕) นางสาวเบญจวรรณ วิริโยทัย | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๐๖ |
| ๖) นายนพรัตน์ วงค์อนุรักษ์ชัย | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๐๗ |
| ๗) นางสาวฉวีวรรณ บุญลา | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๐๘ |
| ๘) นายสุวิทย์ จอดนอก | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๐๙ |
| ๙) นางสาวโชติภา สมบรรณ์ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๑๐ |
| ๑๐) นางสาวบุษกร เลิศภาณุมาศ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๑๑ |
| ๑๑) นางสาววิไลลักษณ์ ศรีสุข | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๑๒ |
| ๑๒) นายศิลา บรรจงใจรักษ์ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๑๔ |
| ๑๓) นายปฏิกรณ์ คณะนา | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๑๕ |
| ๑๔) นายธีรวัฒน์ ชมมิ่ง | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๑๖ |
| ๑๕) นางสาวศิริพร ศรีประดิษฐ์ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๑๗ |
| ๑๖) นางสาวสาวิตรี ริรัง | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๑๘ |
| ๑๗) นางสาวนพวรรณ อุรารักษ์ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๑๙ |
| ๑๘) นายภุชงค์ พานิชย์เลิศอำไพ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๒๐ |
| ๑๙) นายณัฐวัฒน์ แดงสวัสดิ์ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๒๑ |
| ๒๐) นายเอกรัตน์ ปณะคามินทร์ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๒๒ |
| ๒๑) นางสาวนิศารัตน์ ศรีสกุลสิทธิโชค | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๒๓ |
| ๒๒) นางสาวเจตจรินทร์ ทำสะอาด | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๒๔ |
| ๒๓) นางสาวสุวรรณ คงทอง | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๒๕ |
| ๒๔) นางสาววรกร พัดสองชั้น | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๒๖ |
| ๒๕) นายวีรยุทธ โมกแก้ว | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๒๗ |
| ๒๖) นายวัชรพงษ์ เทพดนตรี | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๒๘ |
| ๒๗) นายอนุศาสน์ สวยดี | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๒๙ |
| ๒๘) นายกรวิทย์ เจี่ยศิริสกุล | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๓๐ |
| ๒๙) นายสุทธีระ อรุณจันทร์ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๓๓ |
| ๓๐) นางสาวทัศนีย์ อ่อนคำ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๓๔ |
| ๓๑) นางพริ้มพรรณ กอนสิน | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๓๕ |
| ๓๒) นายศุภณัฐธ์ คุณธนากาญจน์ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๓๖ |
| ๓๓) นางสาวศิริภาพร เหมือนเร่ | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๓๗ |
| ๓๔) นางศิวานัส ขำนิล | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๓๘ |
| ๓๕) นางสาวพรรนิภา ธีระจินดาชล | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๓๙ |

๓๖) นายนาเคนทร์...

UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED
สำเนาถูกต้อง





| | |
|---|---|
| ๓๖) นายนาเคนทร์ พันธุ์วิชาติกุล | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๔๐ |
| ๓๗) นายกานต์พงศ์ บุญพวง | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๔๑ |
| ๓๘) นางสุธรรมา แก้วข้อนอก | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๔๒ |
| ๓๙) นางสาวรสริน ไชยเชษฐ์พิพัฒกุล | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๔๓ |
| ๔๐) นางมานิดา แย้มใย | ทะเบียนเลขที่ ว-๑๔๕-ค-๐๐๔๔ |

UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED
สำเนาถูกต้อง

เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด เลขทะเบียน ว-๑๔๕
ที่ อก ๐๓๑๐(๑)/ ๑ ๐ ๘ ๙ ลงวันที่ ๐๗ กุมภาพันธ์ ๒๕๖๘

ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๔๑ ราย

๑) นายสุขสันต์ พันสิงห์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๐๑
๒) นายพีรณัฐ เจริญผล ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๐๓
๓) นางสาววิไลลักษณ์ เกไธสง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๐๔
๔) นายสมชาติ อุทุมรัตน์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๐๕
๕) นางสาวปรมาภรณ์ ทองแก้ว ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๐๖
๖) นางสาวกัลยา สมพงษ์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๐๗
๗) นางสาววรรณี สายบุญเรือน ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๑๐
๘) นายกฤษณพงษ์ นามทิพย์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๑๑
๙) นางสาวอาภรณ์ อ่อนคง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๑๒
๑๐) นายกิตติศักดิ์ ทรงจำรัส ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๑๓
๑๑) นางสาวอักษรินทร์ บุญคง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๑๔
๑๒) นางสาวพรพิมล แว่นทอง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๑๕
๑๓) นายอภิวิชญ์ ท่วงที ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๑๗
๑๔) นายมานิตย์ ปานโชติ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๑๘
๑๕) นายทศพร ธนะพิรุหก์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๑๙
๑๖) นางสาวกัลยาณี โยธา ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๒๐
๑๗) นางสาวเกวลี สุขรี ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๒๑
๑๘) นางสาวชมธนัญ อภิพัทธ์ปภา ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๒๒
๑๙) นายศิรพัชร จงผดุงเกียรติ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๒๓
๒๐) นางสาวสุภาวดี อินยาศรี ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๒๔
๒๑) นายพงศ์เทพ เหล่าขจร ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๒๕
๒๒) นายขวัญชัย พันทุกข์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๒๖
๒๓) นางสาวพัชจิรา คดีพิศาล ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๒๗
๒๔) นางสาวเมวิกา เสือคำจันทร์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๒๘
๒๕) นายพีระพัฒน์ บัญญัติศิลป์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๓๒
๒๖) นายชัชวาลย์ เลื่อนล่อง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๓๔
๒๗) นายนภสินธุ์ ธนูธรรมรัตน์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๓๖
๒๘) นายกันนิกร ระโส ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๓๗
๒๙) นายปริญญา กลมเกลียว ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๓๙
๓๐) นายธีรวัจน์ มาตรโพธิ์ศรี ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๔๐
๓๑) นายบุญญฤทธิ์ ก้อนสิน ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๔๑
๓๒) นายพรรษวุฒิ โถวสกุล ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๔๓
๓๓) นายอชิตะ แสงจันทร์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๔๔
๓๔) ว่าที่ร้อยตรีณัฐพงศ์ เมืองชัย ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๔๕
๓๕) นายธนัท เลิศประเสริฐ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๔๖

๓๖) นางสาวนิภาพร...



๓๖) นางสาวนิภาพร จันทเขตต์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๔๗
๓๗) นายรณภพ ภู่ตระกูลพัฒนา ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๔๙
๓๘) นายสมพงศ์ สกุลไทย ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๕๑
๓๙) นายสุริยัน นิธิเชิดชูวงศ์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๕๒
๔๐) นายอัษฎาวุธ ยนศิริ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๕๓
๔๑) นายเอกวุฒิ เสนอใจ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๕๔
๔๒) นายสุขสันต์ บุญเลี้ยง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๕๕
๔๓) นายธนเดช หวานเสนาะ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๕๖
๔๔) นายอภิสิทธิ์ ศรีคงแก้ว ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๕๘
๔๕) ว่าที่ร้อยตรีอุทัย แก้ววรากมุข ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๖๐
๔๖) นางสาววนารินทร์ สานนท์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๖๑
๔๗) นายศุภกร รินวงศ์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๖๒
๔๘) นางสาวจินตสุภา เปลี่ยนศรี ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๖๕
๔๙) นางสาวเนตรนภา กมลบูรณ์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๖๖
๕๐) นางสาวอารียา ทรารมย์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๖๗
๕๑) นายจิรวัฒน์ สุขเกษม ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๖๘
๕๒) นายกิติพงษ์ สอนชัยภูมิ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๖๙
๕๓) นายจุมพล สวนเพชร ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๗๐
๕๔) นางสาวพัชราภรณ์ แสงฟ้า ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๗๑
๕๕) นายรัตนชัย เหล่ามา ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๗๒
๕๖) นายอิทธิพงษ์ ศรวิเศษ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๗๓
๕๗) นางสาวกรรณิการ์ สำลีทา ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๗๔
๕๘) นางสาวณัฐชา พรหมคีรี ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๗๙
๕๙) นายนภสิทธิ์ ศรีพิมพ์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๘๕
๖๐) นางสาวลักษิกา จันทรสุข ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๘๖
๖๑) นายศักดิ์ศิธน์ นุ่มนิ่ม ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๘๙
๖๒) นายวรพงษ์ นนทจันทร์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๙๐
๖๓) นางสาวชนาภา มาคะมาตร ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๙๑
๖๔) นายณัฏฐชัย พรหมอารักษ์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๙๖
๖๕) นายชนินทร์ พานแก้ว ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๙๗
๖๖) นายปรัชชาพล โสภา ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๙๘
๖๗) นายวัชรินทร์ แสนงาม ทะเบียนเลขที่ ว-๑๔๕-จ-๐๐๙๙
๖๘) นายอาทิตย์ อุดมผล ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๐๐
๖๙) นายอิทธิเดช ไจบุญ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๐๓
๗๐) นายคณิติน พงษ์อิศรานุพร ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๐๔
๗๑) นายเสฏฐวุฒิ เอมกลิ่นบัว ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๐๖
๗๒) นางสาวนาตาชา แหวนในเมือง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๐๙
๗๓) นางสาวพิมลวรรณ สิมมา ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๑๐

๗๔) นายนันทวัฒน์...



๗๔) นายนันทวัฒน์ วงศ์คำ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๑๑
๗๕) นายประพันธ์ยุทธ์ เผือกนาง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๑๒
๗๖) นางสาวศมิษฐา ล่าชิต ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๑๓
๗๗) นางสาวนภาพร ขี้นนกขุ้ม ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๑๔
๗๘) นางสาวเบญญา มอมุงคุณ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๑๕
๗๙) นายอมรพล อมรลักษณ์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๑๖
๘๐) นางสาวศรีเพชร ทองขาว ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๑๗
๘๑) นางสาวณิชากร ศุภชาติไกรสร ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๑๘
๘๒) นางสาววิมลวรรณ คำต้น ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๑๙
๘๓) นายคุณานนท์ ฤทธาคุณานนท์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๒๓
๘๔) นายชาญณรงค์ อำลอย ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๒๔
๘๕) นางสาวจิตรมาส ศรีวรรณ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๒๕
๘๖) นายสุจิต โปขันเงิน ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๒๖
๘๗) นายเจษฎา ช่วยตรึก ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๒๗
๘๘) นายรชต เหมะธุลิน ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๒๘
๘๙) นายสุรโชค หล่าโท ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๓๐
๙๐) นายชัย บัวสด ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๓๑
๙๑) นางสาววรญา ประสานศรี ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๓๒
๙๒) นายนพดล เนียมนิยม ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๓๓
๙๓) นายศุภกร สวนศรี ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๓๔
๙๔) นายคณพล คิลานนท์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๓๕
๙๕) นายโชคชัย ทุ่มไสว ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๓๖
๙๖) นายธีรวัฒน์ ธรรมสุวรรณ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๓๘
๙๗) นายนัทธพงศ์ ชะขุนทด ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๓๙
๙๘) นางสาวณัฐกฤตา พลนิกรกิจ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๔๐
๙๙) นางสาวชไมพร ทองบูรณ์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๔๑
๑๐๐) นางสาวพรชิดา ขจรเนติยุทธ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๔๒
๑๐๑) นางสาวเพ็ญพิชชา รอดทอง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๔๕
๑๐๒) นางสาวณัชชา แสงสว่าง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๔๖
๑๐๓) นายกีรติ สีอาจ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๔๗
๑๐๔) นายตนุพร คงศรี ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๔๘
๑๐๕) นางสาวสุภัสสรา เฉี้ยนเงิน ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๔๙
๑๐๖) นางสาวพรรณทิพา อะโนนาม ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๕๐
๑๐๗) นายอนันต์ มูดอ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๕๑
๑๐๘) นางสาวพรพิมล ประชาพันธุ์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๕๒
๑๐๙) นายวีรภัทร บุญญาธิ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๕๓
๑๑๐) นางสาวณัฐชา แถวภาพ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๕๔
๑๑๑) นายสิทธิพล พร้อมพอชื่นบุญ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๕๖
๑๑๒) นางสาวนนท์ทิชา กลิ่นหนู ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๕๘

๑๑๓) นางสาวปิติยา...



๑๑๓) นางสาวปิติยา ชูเชิดเชื้อ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๖๐
๑๑๔) นางสาวลัดดาวัลย์ โพธิ์พันธ์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๖๑
๑๑๕) นายอาทิตย์ ดาภา ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๖๒
๑๑๖) นางสาวบุณยาพร บุญถนอมศรี ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๖๓
๑๑๗) นางสาวพัชราวรรณ จันธิบุตร ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๖๔
๑๑๘) นางสาวนฤภร ไถ้บ้านกวย ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๖๕
๑๑๙) นางสาวปวีณา แดนขนบ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๖๙
๑๒๐) นางสาวนันธิดา พรมกวยถ้ำ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๗๐
๑๒๑) นางสาวกมลชนก ปุนคำ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๗๒
๑๒๒) นางสาวปาริฉัตร ทองใบ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๗๔
๑๒๓) นายชัยวัฒน์ จันละคร ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๗๖
๑๒๔) นางสาวกัลยา สิงห์แก้ว ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๗๘
๑๒๕) นางสาวอารีนา มะดีเย๊าะ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๘๔
๑๒๖) นายฐาปกรณ์ อนุรา ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๘๕
๑๒๗) นางสาวชามันดา กิมาคม ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๘๖
๑๒๘) นายธนบดินทร์ ยาเหลี่ยม ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๘๗
๑๒๙) นายวีระพงษ์ แสงท่านั่ง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๘๘
๑๓๐) นางสาวปิยะณัฐชยา สำเภาพงษ์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๘๙
๑๓๑) นางสาวนภัสสร ศรีสถาน ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๙๐
๑๓๒) นางสาวจุรีย์รัตน์ โสแทน ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๙๑
๑๓๓) นายธีรวัฒน์ พรหมลา ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๙๒
๑๓๔) นายธนวิชช์ ปลั่งกลาง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๙๓
๑๓๕) นายณภัทร เตมียบุตร ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๙๔
๑๓๖) นางสาวจิตาภา ฤาชา ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๙๕
๑๓๗) นางสาวสุมณฑาทิพย์ สังข์ทอง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๙๖
๑๓๘) นางสาวชาริสา บาบุญ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๙๗
๑๓๙) นายภูวดล เป็งมา ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๙๘
๑๔๐) ว่าที่ร้อยตรีรณยุทธ ประทุมเขตต์ ทะเบียนเลขที่ ว-๑๔๕-จ-๐๑๙๙
๑๔๑) นายธนุศร พลสำโรง ทะเบียนเลขที่ ว-๑๔๕-จ-๐๒๐๐

เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด เลขทะเบียน ว-๑๔๕
ที่ อก ๐๓๑๐(๑)/ ๓ ๐ ๘ ๙ ลงวันที่ ๐๗ กุมภาพันธ์ ๒๕๖๘

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๕๗ รายการ

น้ำ/น้ำเสีย จำนวน 46 รายการ

| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Aldrin | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 2 | Arsenic | 1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 3 | Barium | Digestion, Inductively Coupled Plasma Method[4] |
| 4 | α-BHC | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 5 | β-BHC | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 6 | δ-BHC | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 7 | γ-BHC | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 8 | Biochemical Oxygen Demand | 1) 5-Day BOD Test, Azide Modification Method[4]<br>2) 5-Day BOD Test, Membrane Electrode Method[4] |
| 9 | Cadmium | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 10 | Chemical Oxygen Demand | 1) Closed Reflux, Titrimetric Method[4]<br>2) Closed Reflux, Colorimetric Method[4]<br>3) Open Reflux, Titrimetric Method[4] |
| 11 | Chlordane | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 12 | Chromium | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 13 | Color | ADMI Weighted-Ordinate Spectrophotometric Method[4] |
| 14 | Copper | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 15 | Cyanide | 1) Distillation, Colorimetric Method[4]<br>2) Total Cyanide after Distillation, by Flow Injection Analysis Method[4] |
| 16 | o,p'-DDT | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 17 | 4,4'-DDD | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 18 | 4,4'-DDE | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 19 | 4,4'-DDT | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 20 | Dieldrin | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 21 | Endosulfan I | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 22 | Endosulfan II | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 23 | Endosulfan sulfate | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 24 | Endrin | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |

25 Endrin aldehyde...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 25 | Endrin aldehyde | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 26 | Formaldehyde | Distillation, Colorimetric Method[2] |
| 27 | Free Chlorine | 1) Iodometric Method[4]<br>2) DPD Ferrous Titrimetric Method[4] |
| 28 | Heptachlor | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 29 | Heptachlor Epoxide | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 30 | Hexavalent Chromium | Colorimetric Method[4] |
| 31 | Lead | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 32 | Manganese | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 33 | Mercury | Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[4] |
| 34 | Methoxychlor | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 35 | Nickel | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 36 | Oil & Grease | 1) Liquid-Liquid, Partition-Gravimetric Method[4]<br>2) Soxhlet Extraction Method[4] |
| 37 | pH | Electrometric Method[4] |
| 38 | Phenols | 1) Distillation, Chloroform Extraction Method[4]<br>2) Distillation, Direct Photometric Method[4] |
| 39 | Selenium | 1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 40 | Sulfide | 1) Iodometric Method[4]<br>2) Methylene Blue Method[4] |
| 41 | Temperature | Laboratory and Field Methods[4] |
| 42 | Total Dissolved Solids | Dried at 180 °C[4] |
| 43 | Total Kjeldahl Nitrogen | Semi-Micro-Kjeldahl Method[4] |
| 44 | Total Suspended Solids | Dried from 103 to 105 °C[4] |
| 45 | Trivalent Chromium | 1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation[4]<br>2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[4] |
| 46 | Zinc | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |

น้ำใต้ดิน...



น้ำใต้ดิน จำนวน 126 รายการ

| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Acenaphthene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 2 | Acetone | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 3 | Aldrin | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 4 | Anthracene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 5 | Antimony | Digestion, Inductively Coupled Plasma Method[4] |
| 6 | Arsenic | 1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 7 | Atrazine | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 8 | Barium | Digestion, Inductively Coupled Plasma Method[4] |
| 9 | Benz(a)anthracene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 10 | Benzene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 11 | Benzo(b)fluoranthene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 12 | Benzo(k)fluoranthene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 13 | Benzoic acid | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |

14 Benzo(a)pyrene...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 14 | Benzo(a)pyrene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 15 | Benzo(g,h,i)perylene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 16 | Beryllium | Digestion, Inductively Coupled Plasma Method[4] |
| 17 | Bis(2-chloroethyl)ether | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 18 | Bis(2-ethylhexyl)phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 19 | Bromodichloromethane | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 20 | Bromoform | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 21 | Butanol | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 22 | Butyl benzyl phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 23 | Cadmium | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4]<br>3) Digestion, Inductively Coupled Plasma Method[4] |
| 24 | Carbazole | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 25 | Carbon disulfide | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 26 | Carbon tetrachloride | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 27 | Chlordane | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 28 | p-Chloroaniline | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |

29 Chlorobenzene...

| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 29 | Chlorobenzene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 30 | Chlorodibromomethane | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 31 | Chloroform | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 32 | 2-Chlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 33 | Chromium | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 34 | Chromium (III) | 1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation[4]<br>2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[4] |
| 35 | Chromium (VI) | Colorimetric Method[4] |
| 36 | Chrysene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 37 | Cyanide | Distillation, Colorimetric Method[4] |
| 38 | 2,4-D | Liquid-Liquid Extraction, Gas Chromatographic Method[4] |
| 39 | DDD | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 40 | DDE | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 41 | DDT | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 42 | Dibenz(a,h)anthracene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |

43 Di-n-butyl phthalate...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 43 | Di-n-butyl phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 44 | 1,2-Dichlorobenzene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 45 | 1,3-Dichlorobenzene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 46 | 1,4-Dichlorobenzene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 47 | 3,3′-Dichlorobenzidine | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 48 | 1,1-Dichloroethane | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 49 | 1,2-Dichloroethane | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 50 | 1,1-Dichloroethylene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 51 | cis-1,2-Dichloroethylene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 52 | trans-1,2-Dichloroethylene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 53 | 2,4-Dichlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 54 | 1,2-Dichloropropane | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 55 | 1,3-Dichloropropane | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 56 | 1,3-Dichloropropene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 57 | Dieldrin | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 58 | Diethyl phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 59 | 2,4-Dimethylphenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 60 | 2,4-Dinitrophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |

61 2,4-Dinitrotoluene...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 61 | 2,4-Dinitrotoluene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 62 | 2,6-Dinitrotoluene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 63 | Di-n-Octyl phthalate | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 64 | Endosulfan | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 65 | Endrin | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 66 | Ethylbenzene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 67 | Fluoranthene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 68 | Fluorene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 69 | Heptachlor | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 70 | Heptachlor epoxide | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 71 | Hexachlorobenzene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 72 | Hexachloro-1,3-butadiene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 73 | n-Hexane | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |

74 α-HCH...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 74 | α-HCH | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 75 | β-HCH | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 76 | γ-HCH | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 77 | Hexachlorocyclopentadiene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 78 | Hexachloroethane | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 79 | Indeno(1,2,3-cd)pyrene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 80 | Isophorone | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 81 | Lead | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4]<br>3) Digestion, Inductively Coupled Plasma Method[4] |
| 82 | Manganese | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 83 | Mercury | Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[4] |
| 84 | Methanol | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 85 | Methoxychlor | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 86 | Methyl bromide | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |

87 Methylene chloride...

ANAB สำเนาถูกต้อง
ENVIRONMENTAL ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED

| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 87 | Methylene chloride | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 88 | 2-Methylphenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 89 | 2-Methylnaphthalene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 90 | Methyl tert-butyl ether | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 91 | Naphthalene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 92 | Nickel | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 93 | Nitrobenzene | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 94 | N-Nitrosodiphenylamine | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 95 | N-Nitrosodi-n-propylamine | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 96 | Polychlorinated Biphenyls<br>- PCB 1016<br>- PCB 1221<br>- PCB 1232<br>- PCB-1242<br>- PCB-1248<br>- PCB-1254<br>- PCB-1260 | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 97 | Pentachlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 98 | pH | Electrometric Method[4] |
| 99 | Phenanthrene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |

100 Phenol...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 100 | Phenol | 1) Distillation, Chloroform Extraction Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 101 | Pyrene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 102 | Selenium | 1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |
| 103 | Silver | Digestion, Inductively Coupled Plasma Method[4] |
| 104 | Styrene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 105 | 1,1,2,2-Tetrachloroethane | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 106 | Tetrachloroethylene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 107 | Toluene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 108 | Toxaphene | 1) Liquid-Liquid Extraction, Gas Chromatographic Method[4]<br>2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 109 | TPH ($C_5$ - $C_8$) | 1) Purge and Trap, Gas Chromatographic Method[12,22]<br>2) Purge and Trap, Gas Chromatographic/Mass spectrometric Method[12,27] |
| 110 | TPH ($C_{>8}$ – $C_{16}$) | Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[9,22] |
| 111 | TPH ($C_{>16}$ – $C_{35}$) | Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[9,22] |
| 112 | 1,2,4-Trichlorobenzene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 113 | 1,1,1-Trichloroethane | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 114 | 1,1,2-Trichloroethane | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 115 | Trichloroethylene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |

116 2,4,5-Trichlorophenol...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 116 | 2,4,5-Trichlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 117 | 2,4,6-Trichlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4] |
| 118 | 1,3,5-Trimethylbenzene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 119 | Vanadium | Digestion, Inductively Coupled Plasma Method[4] |
| 120 | Vinyl acetate | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 121 | Vinyl chloride | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 122 | m-Xylene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 123 | o-Xylene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 124 | p-Xylene | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 125 | Xylene (Total) | Purge and Trap Gas Chromatographic/Mass Spectrometric Method[4] |
| 126 | Zinc | 1) Digestion, Direct Air-Acetylene Flame Method[4]<br>2) Digestion, Inductively Coupled Plasma Method[4] |

<u>อากาศเสีย (ปล่องระบาย) จำนวน 25 รายการ</u>

| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Antimony | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 2 | Arsenic | 1) Isokinetic Sampling, Digestion, Hydride Generation/ Atomic Absorption Spectrometric Method[5]<br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 3 | Cadmium | 1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5]<br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 4 | Carbon Monoxide | Instrumental Analyzer Method[5] |
| 5 | Chlorine | Isokinetic Sampling, Ion Chromatographic Method[5] |
| 6 | Chromium | 1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5] |

Chromium (ต่อ)...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 6 | Chromium (ต่อ) | 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 7 | Cobalt | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 8 | Copper | 1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5]<br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 9 | Cresol | Absorption Sampling, Gas Chromatographic Method[5] |
| 10 | Dioxins/Furans | Isokinetic Sampling[5] |
| 11 | Hydrogen Chloride | Isokinetic Sampling, Ion Chromatographic Method[5] |
| 12 | Hydrogen Fluoride | Isokinetic Sampling, Ion Chromatographic Method[5] |
| 13 | Hydrogen Sulfide | Absorption Sampling, Iodometric Method[5] |
| 14 | Lead | 1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5]<br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 15 | Manganese | 1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5]<br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 16 | Mercury | Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[5] |
| 17 | Nickel | 1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5]<br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 18 | Opacity | Ringelmann's Method[1] |
| 19 | Oxides of Nitrogen | 1) Absorption Sampling, Phenoldisulfonic acid Method[5]<br>2) Instrumental Analyzer Method[5] |
| 20 | Selenium | 1) Isokinetic Sampling, Digestion, Hydride Generation/ Atomic Absorption Spectrometric Method[5]<br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 21 | Sulfur Dioxide | 1) Absorption Sampling, Barium-Thorin Titrimetric Method[5]<br>2) Instrumental Analyzer Method[5] |
| 22 | Sulfuric Acid | Isokinetic Sampling, Barium-Thorin Titrimetric Method[5] |

23 Total Suspended Particulate...

| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 23 | Total Suspended Particulate | Isokinetic Sampling, Gravimetric Method[5] |
| 24 | Vanadium | Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] |
| 25 | Xylene | 1) Bag Sampling, Gas Chromatographic Method[5]<br>2) Adsorption Sampling, Gas Chromatographic Method[5] |

<u>สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ</u>

| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Aldrin | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[3,9,23]<br>2) Ultrasonic Extraction, Gas Chromatographic Method[10,23] |
| 2 | Antimony | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |
| 3 | Arsenic | 1) Waste Extraction, Digestion, Hydride Generation/ Atomic Absorption Spectrometric Method[3,6,16]<br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[7,16]<br>4) Digestion, Inductively Coupled Plasma Method[7,14] |
| 4 | Barium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |
| 5 | Beryllium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |
| 6 | Cadmium | 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[3,6,15]<br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,16]<br>3) Digestion, Flame Atomic Absorption Spectrometric Method[7,15]<br>4) Digestion, Inductively Coupled Plasma Method[7,14] |
| 7 | Chlordane | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[3,9,23]<br>2) Ultrasonic Extraction, Gas Chromatographic Method[10,23] |

8 Chromium...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 8 | Chromium | 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[3,6,15]<br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>3) Digestion, Flame Atomic Absorption Spectrometric Method[7,15]<br>4) Digestion, Inductively Coupled Plasma Method[7,14] |
| 9 | Chromium (III) | 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation[3,6,15,17]<br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation[3,6,14,17]<br>3) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation[7,8,15,17]<br>4) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation[7,8,14,17] |
| 10 | Chromium (VI) | 1) Waste Extraction, Colorimetric Method[3,17]<br>2) Alkaline Digestion, Colorimetric Method[8,17] |
| 11 | Cobalt | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |
| 12 | Copper | 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[3,6,15]<br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>3) Digestion, Flame Atomic Absorption Spectrometric Method[7,15]<br>4) Digestion, Inductively Coupled Plasma Method[7,14] |
| 13 | 2,4-D | 1) Waste Extraction, Gas Chromatographic Method[3,26]<br>2) Ultrasonic Extraction, Gas Chromatographic Method[24] |
| 14 | DDD | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[3,9,23]<br>2) Ultrasonic Extraction, Gas Chromatographic Method[10,23] |

15 DDE...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 15 | DDE | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[3,9,23]<br>2) Ultrasonic Extraction, Gas Chromatographic Method[10,23] |
| 16 | DDT | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[3,9,23]<br>2) Ultrasonic Extraction, Gas Chromatographic Method[10,23] |
| 17 | Dieldrin | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[3,9,23]<br>2) Ultrasonic Extraction, Gas Chromatographic Method[10,23] |
| 18 | Endrin | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[3,9,23]<br>2) Ultrasonic Extraction, Gas Chromatographic Method[10,23] |
| 19 | Heptachlor | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[3,9,23]<br>2) Ultrasonic Extraction, Gas Chromatographic Method[10,23] |
| 20 | Lead | 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[3,6,15]<br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>3) Digestion, Flame Atomic Absorption Spectrometric Method[7,15]<br>4) Digestion, Inductively Coupled Plasma Method[7,14] |
| 21 | Lindane | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[3,9,23]<br>2) Ultrasonic Extraction, Gas Chromatographic Method[10,23] |
| 22 | Mercury | 1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[3,19]<br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[19]<br>4) Digestion, Inductively Coupled Plasma Method[7,14] |

Mercury (ต่อ)...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 22 | Mercury (ต่อ) | 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method[20] |
| 23 | Methoxychlor | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[3,9,23]<br>2) Ultrasonic Extraction, Gas Chromatographic Method[10,23] |
| 24 | Molybdenum | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |
| 25 | Nickel | 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[3,6,15]<br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>3) Digestion, Flame Atomic Absorption Spectrometric Method[7,15]<br>4) Digestion, Inductively Coupled Plasma Method[7,14] |
| 26 | Polychlorinated Biphenyls<br>- Aroclor 1016<br>- Aroclor 1221<br>- Aroclor 1232<br>- Aroclor 1242<br>- Aroclor 1248<br>- Aroclor 1254<br>- Aroclor 1260<br>- 2-Chlorobiphenyl<br>- 2,3-Dichlorobiphenyl<br>- 2,2',5-Trichlorobiphenyl<br>- 2,4',5-Trichlorobiphenyl<br>- 2,2',3,5'-Tetrachlorobiphenyl<br>- 2,2',5,5'-Tetrachlorobiphenyl<br>- 2,3',4,4'-Tetrachlorobiphenyl<br>- 2,2',3,4,5'-Pentachlorobiphenyl<br>- 2,2',4,5,5'-Pentachlorobiphenyl<br>- 2,3,3',4',6-Pentachlorobiphenyl | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[3,9,24]<br>2) Ultrasonic Extraction, Gas Chromatographic Method[10,24] |

Polychlorinated Biphenyls(ต่อ)...

| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| | Polychlorinated Biphenyls(ต่อ)<br>- 2,2',3,4,4',5'-Hexachlorobiphenyl<br>- 2,2',3,4,5,5'-Hexachlorobiphenyl<br>- 2,2',3,5,5',6-Hexachlorobiphenyl<br>- 2,2',4,4',5,5'-Hexachlorobiphenyl<br>- 2,2',3,3',4,4',5-Heptachlorobiphenyl<br>- 2,2',3,4,4',5,5'-Heptachlorobiphenyl<br>- 2,2',3,4,4',5',6-Heptachlorobiphenyl<br>- 2,2',3,4',5,5',6-Heptachlorobiphenyl<br>- 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl | |
| 27 | Pentachlorophenol | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[3,9,28]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 28 | pH | Electrometric Method[31,32] |
| 29 | Selenium | 1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[3,6,21]<br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[7,21]<br>4) Digestion, Inductively Coupled Plasma Method[7,14] |
| 30 | Silver | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |
| 31 | Thallium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |

32 Toxaphene...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 32 | Toxaphene | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[3,9,23]<br>2) Ultrasonic Extraction, Gas Chromatographic Method[10,23] |
| 33 | Trichloroethylene | 1) Waste Extraction, Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[3,12,27]<br>2) Waste Extraction, Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method[3,11,27]<br>3) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>4) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method[11,27] |
| 34 | Vanadium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |
| 35 | Zinc | 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[3,6,15]<br>2) Waste Extraction, Digestion, Inductively Coupled Plasma Method[3,6,14]<br>3) Digestion, Flame Atomic Absorption Spectrometric Method[7,15]<br>4) Digestion, Inductively Coupled Plasma Method[7,14] |

ดิน จำนวน 125 รายการ

| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Acenaphthene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 2 | Acetone | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 3 | Aldrin | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 4 | Anthracene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25] |

Anthracene (ต่อ)...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 4 | Anthracene (ต่อ) | 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 5 | Antimony | Digestion, Inductively Coupled Plasma Method[7,14] |
| 6 | Arsenic | 1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[7,16]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |
| 7 | Atrazine | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 8 | Barium | Digestion, Inductively Coupled Plasma Method[7,14] |
| 9 | Benz(a)anthracene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 10 | Benzene | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method [11,27] |
| 11 | Benzo(b)fluoranthene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 12 | Benzo(k)fluoranthene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 13 | Benzoic acid | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 14 | Benzo(a)pyrene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 15 | Benzo(g,h,i)perylene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 16 | Beryllium | Digestion, Inductively Coupled Plasma Method[7,14] |

17 Bis(2-chloroethyl)ether...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 17 | Bis(2-chloroethyl)ether | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 18 | Bis(2-ethylhexyl)phthalate | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 19 | Bromodichloromethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 20 | Bromoform | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 21 | Butanol | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 22 | Butyl benzyl phthalate | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 23 | Cadmium | 1) Digestion, Flame Atomic Absorption Spectrometric Method[7,15]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |
| 24 | Carbazole | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 25 | Carbon disulfide | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 26 | Carbon tetrachloride | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method[11,27] |
| 27 | Chlordane | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 28 | p-Chloroaniline | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 29 | Chlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 30 | Chlorodibromomethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 31 | Chloroform | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 32 | 2-Chlorophenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |

33 Chromium...

| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 33 | Chromium | 1) Digestion, Flame Atomic Absorption Spectrometric Method[7,15]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |
| 34 | Chromium (III) | 1) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation[7,8,15,17]<br>2) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation[7,8,14,17] |
| 35 | Chromium (VI) | Alkaline Digestion, Colorimetric Method[8,17] |
| 36 | Chrysene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 37 | Cyanide | Extraction, Distillation, Colorimetric Method[29,30] |
| 38 | 2,4-D | Ultrasonic Extraction, Gas Chromatographic Method[26] |
| 39 | DDD | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 40 | DDE | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 41 | DDT | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 42 | Dibenz(a,h)anthracene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 43 | Di-n-butyl phthalate | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 44 | 1,2-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |

45 1,3-Dichlorobenzene...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 45 | 1,3-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 46 | 1,4-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 47 | 3,3'-Dichlorobenzidine | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 48 | 1,1-Dichloroethane | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method [11,27] |
| 49 | 1,2-Dichloroethane | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method [11,27] |
| 50 | 1,1-Dichloroethylene | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method [11,27] |
| 51 | cis-1,2-Dichloroethylene | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method [11,27] |
| 52 | trans-1,2-Dichloroethylene | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method [11,27] |
| 53 | 2,4-Dichlorophenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 54 | 1,2-Dichloropropane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 55 | 1,3-Dichloropropane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 56 | 1,3-Dichloropropene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 57 | Dieldrin | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |

58 Diethyl phthalate...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 58 | Diethyl phthalate | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 59 | 2,4-Dimethylphenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 60 | 2,4-Dinitrophenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 61 | 2,4-Dinitrotoluene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 62 | 2,6-Dinitrotoluene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 63 | Di-n-Octyl phthalate | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 64 | Endosulfan | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 65 | Endrin | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 66 | Ethylbenzene | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method [11,27] |
| 67 | Fluoranthene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 68 | Fluorene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 69 | Heptachlor | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 70 | Heptachlor epoxide | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23] |

Heptachlor epoxide (ต่อ)...





| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 70 | Heptachlor epoxide (ต่อ) | 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 71 | Hexachlorobenzene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 72 | Hexachloro-1,3-butadiene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 73 | n-Hexane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 74 | α-HCH | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 75 | β-HCH | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 76 | γ-HCH | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 77 | Hexachlorocyclopentadiene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 78 | Hexachloroethane | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 79 | Indeno(1,2,3-cd)pyrene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 80 | Isophorone | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 81 | Lead | 1) Digestion, Flame Atomic Absorption Spectrometric Method[7,15]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |
| 82 | Manganese | 1) Digestion, Flame Atomic Absorption Spectrometric Method[7,15]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |

83 Mercury...

| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 83 | Mercury | 1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[19]<br>2) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method[20] |
| 84 | Methanol | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 85 | Methoxychlor | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,23]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 86 | Methyl bromide | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 87 | Methylene chloride | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method [11,27] |
| 88 | 2-Methylphenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 89 | 2-Methylnaphthalene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 90 | Methyl tert-butyl ether | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 91 | Naphthalene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 92 | Nickel | 1) Digestion, Flame Atomic Absorption Spectrometric Method[7,15]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |
| 93 | Nitrobenzene | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 94 | N-Nitrosodiphenylamine | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 95 | N-Nitrosodi-n-propylamine | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 96 | Polychlorinated Biphenyls - Aroclor 1016 | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,24] |

Polychlorinated Biphenyls(ต่อ)...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 96 | Polychlorinated Biphenyls(ต่อ)<br>- Aroclor 1221<br>- Aroclor 1232<br>- Aroclor 1242<br>- Aroclor 1248<br>- Aroclor 1254<br>- Aroclor 1260<br>Polychlorinated Biphenyls<br>- 2-Chlorobiphenyl<br>- 2,3-Dichlorobiphenyl<br>- 2,2',5-Trichlorobiphenyl<br>- 2,4',5-Trichlorobiphenyl<br>- 2,2',3,5'-Tetrachlorobiphenyl<br>- 2,2',5,5'-Tetrachlorobiphenyl<br>- 2,3',4,4'-Tetrachlorobiphenyl<br>- 2,2',3,4,5'-Pentachlorobiphenyl<br>- 2,2',4,5,5'-Pentachlorobiphenyl<br>- 2,3,3',4',6-Pentachlorobiphenyl<br>- 2,2',3,4,4',5'-Hexachlorobiphenyl<br>- 2,2',3,4,5,5'-Hexachlorobiphenyl<br>- 2,2',3,5,5',6-Hexachlorobiphenyl<br>- 2,2',4,4',5,5'-Hexachlorobiphenyl<br>- 2,2',3,3',4,4',5-Heptachlorobiphenyl<br>- 2,2',3,4,4',5,5'-Heptachlorobiphenyl<br>- 2,2',3,4,4',5',6-Heptachlorobiphenyl<br>- 2,2',3,4',5,5',6-Heptachlorobiphenyl<br>- 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl | 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28]<br>Ultrasonic Extraction, Gas Chromatographic Method[10,24] |

97 Pentachlorophenol...



| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 97 | Pentachlorophenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 98 | Phenanthrene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 99 | Phenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 100 | Pyrene | 1) Ultrasonic Extraction, Gas Chromatographic Method[10,25]<br>2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 101 | Selenium | 1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[7,21]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |
| 102 | Silver | Digestion, Inductively Coupled Plasma Method[7,14] |
| 103 | Styrene | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method[11,27] |
| 104 | 1,1,2,2-Tetrachloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 105 | Tetrachloroethylene | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method[11,27] |
| 106 | Toluene | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method[11,27] |
| 107 | Toxaphene | Ultrasonic Extraction, Gas Chromatographic Method[10,23] |
| 108 | TPH ($C_5$-$C_8$) | 1) Purge and Trap, Gas Chromatographic Method[13,22]<br>2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,22] |
| 109 | TPH ($C_{>8}$-$C_{16}$) | Ultrasonic Extraction, Gas Chromatographic Method[10,22] |
| 110 | TPH ($C_{>16}$-$C_{35}$) | Ultrasonic Extraction, Gas Chromatographic Method[10,22] |

111 1,2,4-Trichlorobenzene...





| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 111 | 1,2,4-Trichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 112 | 1,1,1-Trichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 113 | 1,1,2-Trichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 114 | Trichloroethylene | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method[11,27] |
| 115 | 2,4,5-Trichlorophenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 116 | 2,4,6-Trichlorophenol | Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[10,28] |
| 117 | 1,3,5-Trimethylbenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 118 | Vanadium | Digestion, Inductively Coupled Plasma Method[7,14] |
| 119 | Vinyl acetate | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 120 | Vinyl chloride | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27] |
| 121 | m-Xylene | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method[11,27] |
| 122 | o-Xylene | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method[11,27] |
| 123 | p-Xylene | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method[11,27] |
| 124 | Xylene (Total) | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[13,27]<br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method[11,27] |

125 Zinc...

| ลำดับ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 125 | Zinc | 1) Digestion, Flame Atomic Absorption Spectrometric Method[7,15]<br>2) Digestion, Inductively Coupled Plasma Method[7,14] |

เอกสารอ้างอิง


1. กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2549. เรื่อง กำหนดค่าปริมาณเขม่าควันที่เจือปนในอากาศที่ระบายออกจากปล่องของหม้อน้ำโรงสีข้าวที่ใช้แกลบเป็นเชื้อเพลิง. ราชกิจจานุเบกษา. 4 ธันวาคม 2549. เล่มที่ 123 ตอนพิเศษ 125ง.

2. สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4. กรุงเทพฯ: เรือนแก้วการพิมพ์, 2547.

3. กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2566. เรื่อง การจัดการสิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว.ราชกิจจานุเบกษา. 31 พฤษภาคม 2566. เล่มที่ 140 ตอนพิเศษ 126 ง.

4. APHA, AWWA, WEF. **Standard Methods for the Examination of Water and Wastewater.** 24th ed. Washington, DC: APHA, 2023.

5. United States Environmental Protection Agency. **Standards of Performance for New Stationary Sources.** 40 CFR 60. Appendix A, 2020.

6. United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. SW-846,** 2014.

7. 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.

8. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Alkaline Digestion for Hexavalent Chromium. SW-846 Method 3060A,** 1996.

9. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste 3. Physical/Chemical Methods. **Separatory Funnel Liquid-Liquid Extraction. SW-846 Method 3510C,** 1996.

10. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Ultrasonic Extraction. SW-846 Method 3550C,** 2007.

11. 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.

12. 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.

13. 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...




14. 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.

15. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Flame Atomic Absorption Spectrophotometry. SW-846 Method 7000B,** 2007.

16. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Arsenic (Atomic Absorption, Gaseous Hydride). SW-846 Method 7061A,** 1992.

17. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Chromium, Hexavalent (Colorimetric). SW-846 Method 7196A,** 1992.

18. 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.

19. 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.

20. 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.

21. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Selenium (Atomic Absorption, Borohydride Reduction). SW-846 Method 7742,** 1994.

22. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Nonhalogenated Organics Using GC/FID. SW-846 Method 8015D,** 2003.

23. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Organochlorine Pesticides by Gas Chromatography. SW-846 Method 8081B,** 2007.

24. 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.

25. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Organochlorine Pesticides by Gas Chromatography. SW-846 Method 8081B,** 2007.

26. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Chlorinated Herbicides by GC Using Methylation or Pentafluorobenzylation Derivertization. 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.


UNITED ANALYST AND ENGINEERING CONSULTANT COMPANY LIMITED สำเนาถูกต้อง