

เอกสารแนบ 6

เอกสารสอบเทียบ
เครื่องมือที่ใช้ในการวิเคราะห์



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

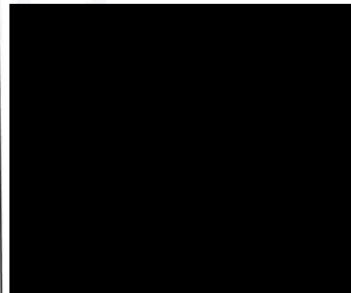
NOMENCLATURE : BALANCE
MANUFACTURER : METTLER TOLEDO
MODEL / TYPE : MS204TS/00
SERIAL NO. : B935191252[LA-002]
CLID. NO. : 362200356
JOB CONTROL NO. : 250215018254
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 15 February 2025

DATE OF ISSUED : 04 March 2025

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

Calibrated By :



Approved By :

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



CALIBRATION LABORATORY CO., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
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REPORT OF CALIBRATION

FOR

NOMENCLATURE : BALANCE
MANUFACTURER : METTLER TOLEDO
MODEL / TYPE : MS204TS/00
SERIAL NO. : B935191252[LA-002]
LOCATION SITE : LABORATORY - BALANCE ROOM
DATE OF CALIBRATION : 27 February 2025

ENVIRONMENT CONDITIONS :

Temperature : 23 °C to 24 °C

Relative Humidity : 49 % to 51 %

PROCEDURE USED :

This instrument was calibrated under procedure No. W1-305-46 based on EURAMET cg-18 Version 4.0 (11/2015).

The calibration was performed by Comparison with Weight Set which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Weight Set, Mettler Toledo Class E2 S/N. 158850.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand), Certificate No. MM-0165-23, Due Date 21 December 2025.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table 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)"



CALIBRATION LABORATORY CO., LTD.

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NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

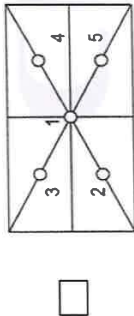
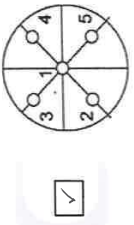
1. Error of indications

| Nominal Test Value (g) | Conventional mass (g) | Display Value (g) | Error of Balance (g) | Uncertainty \pm (mg) | Coverage factor k |
|--------------------------|-------------------------|---------------------|------------------------|--------------------------|-------------------|
| Unload | 0.0000 | 0.0000 | 0.0000 | 0.06 | 2.00 |
| 0.1000 | 0.1000 | 0.1000 | 0.0000 | 0.14 | 2.00 |
| 0.5000 | 0.5000 | 0.5000 | 0.0000 | 0.15 | 2.00 |
| 1.0000 | 1.0000 | 1.0001 | +0.0001 | 0.15 | 2.00 |
| 2.0000 | 2.0000 | 2.0001 | +0.0001 | 0.15 | 2.00 |
| 5.0000 | 5.0000 | 5.0000 | 0.0000 | 0.15 | 2.00 |
| 10.0000 | 10.0000 | 10.0001 | +0.0001 | 0.15 | 2.00 |

2. Repeatability of indications

| Nominal Test Value (g) | Standard Deviation of Reading (g) |
|--------------------------|-------------------------------------|
| 200.0000 | 0.00004 |

3. Effect of eccentric application of a load on the indication

|  |  | | | | |
|--|--|------------|------------|------------|------------|
| | <input checked="" type="checkbox"/> | | | | |
| Nominal Test Value (g) | Display Value (g) | | | | |
| | Position 1 | Position 2 | Position 3 | Position 4 | Position 5 |
| 100.0000 | 99.9999 | 100.0001 | 99.9999 | 99.9998 | 99.9998 |
| Maximum Difference of Center Value (g) | | | | | 0.0002 |

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 116 of 138

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

End of Certificate



CALIBRATION LABORATORY CO., LTD.

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NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : BALANCE
MANUFACTURER : SHIMADZU
MODEL / TYPE : AP225WD
SERIAL NO. : D316300692[L.A-001]
CLID. NO. : 362100172
JOB CONTROL NO. : 250215018253
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 15 February 2025

DATE OF ISSUED : 04 March 2025

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

Calibrated By :

Approved By :

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



CALIBRATION LABORATORY CO., LTD.

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NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

REPORT OF CALIBRATION

FOR

NOMENCLATURE : BALANCE
MANUFACTURER : SHIMADZU
MODEL / TYPE : AP225WD
SERIAL NO. : D316300692[LA-001]
LOCATION SITE : LABORATORY-BALANCE ROOM
DATE OF CALIBRATION : 27 February 2025

ENVIRONMENT CONDITIONS :

Temperature : 23 °C to 24 °C
Relative Humidity : 49 % to 51 %

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-46 based on EURAMET/cg-18/Version 4.0 (11/2015).

The calibration was performed by Comparison with Weight Set which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Weight Set, Mettler Toledo Class E2 S/N. 158850.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).

Certificate No. MM-0165-23, Due Date 21 December 2025.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor complies with the table 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)"



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NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

1. Error of indications

| Nominal Test Value (g) | Conventional mass (g) | Display Value (g) | Error of Balance (g) | Uncertainty ± (mg) | Coverage factor k |
|------------------------|-----------------------|-------------------|----------------------|--------------------|-------------------|
| Unload | 0.0000 | 0.0000 | 0.0000 | 0.07 | 2.00 |
| 5.0000 | 5.0000 | 5.0001 | +0.0001 | 0.11 | 2.00 |
| 10.0000 | 10.0000 | 10.0000 | 0.0000 | 0.11 | 2.00 |
| 20.0000 | 20.0000 | 20.0000 | 0.0000 | 0.12 | 2.00 |
| 40.0000 | 40.0000 | 39.9999 | -0.0001 | 0.14 | 2.00 |
| 60.0000 | 59.9999 | 59.9999 | 0.0000 | 0.15 | 2.00 |
| 80.0000 | 79.9999 | 80.0000 | +0.0001 | 0.19 | 2.00 |
| 100.0000 | 99.9999 | 100.0000 | +0.0001 | 0.17 | 2.00 |
| 120.0000 | 119.9999 | 120.0000 | +0.0001 | 0.21 | 2.00 |
| 140.0000 | 139.9999 | 139.9999 | 0.0000 | 0.25 | 2.00 |
| 160.0000 | 159.9998 | 159.9998 | 0.0000 | 0.26 | 2.00 |
| 180.0000 | 179.9998 | 179.9998 | 0.0000 | 0.30 | 2.00 |
| 200.0000 | 199.9997 | 199.9996 | -0.0001 | 0.26 | 2.00 |

2. Repeatability of indications

| Nominal Test Value (g) | Standard Deviation of Reading (g) |
|------------------------|-----------------------------------|
| 200.0000 | 0.00006 |

3. Effect of eccentric application of a load on the indication

| <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|--------------------------|--|
| Display Value (g) | |
| Nominal Test Value (g) | Maximum Difference of Center Value (g) |
| 100.0000 | 0.0001 |

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 116,117 of 138

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

End of Certificate



CALIBRATION LABORATORY CO., LTD.

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ANAB
Accredited Calibration and Measurement
ACCM 2514

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DO METER
MANUFACTURER : YSI
MODEL / TYPE : 5000-230V/5010
SERIAL NO. : 16D10162
CLID. NO. : 272100329
JOB CONTROL NO. : 250410042960
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 10 April 2025

DATE OF ISSUED : 18 April 2025

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

Calibrated By :

Approved By :

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



CALIBRATION LABORATORY CO., LTD.

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ANAB
Accredited Calibration and Measurement
ACCM 2514

REPORT OF CALIBRATION

FOR

NOMENCLATURE : DO METER
MANUFACTURER : YSI
MODEL / TYPE : 5000-230V/5010
SERIAL NO. : 16D101626/19D100367 [DOM-01]
DATE OF CALIBRATION : 11 April 2025

ENVIRONMENT CONDITIONS :

Temperature : $(25 \pm 2.5) ^\circ\text{C}$ Relative Humidity : $(50 \pm 15) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPCH-06. The calibration was performed by direct measurement with Certified Reference Material (CRM).

REFERENCE STANDARD USED :

Dissolved Oxygen, Sigma-Aldrich Product ID QC3077-500ML.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Merck Co., Ltd.
Lot L RAD8571, Due Date April 2026.

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)"



**CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION
MEASUREMENT RESULTS : (X) without adjustment () adjustment**

The table in the following gives the calibration results and associated measurement uncertainties of Do Meter.

CALIBRATION DATA

DO METER RESULT @ 20 °C

| Nominal Value (mg/L) | DUC Reading (mg/L) | Correction (mg/L) | Uncertainty (mg/L) |
|---------------------------|-------------------------|------------------------|-------------------------|
| 8.18 | 8.2 | -0.02 | ± 0.38 |

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 01.5 Page 5 of 68

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

End of Certificate



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL / TYPE : UF110
SERIAL NO. : B422.0026[LA-0012]
CLID. NO. : 332202464
JOB CONTROL NO. : 250306027140
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 06 March 2025

DATE OF ISSUED : 25 March 2025

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

Calibrated By :

Approved By :

This Calibration Certificate does

International System of Units (SI)



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

REPORT OF CALIBRATION

FOR

NOMENCLATURE : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL / TYPE : UF110
SERIAL NO. : B422.0026[LA-0012]
LOCATION SITE : LABORATORY-HOT ZONE
DATE OF CALIBRATION : 19 March 2025

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C

Relative Humidity : 49% to 51 %

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPH-07 based on TLAS G-20 as calibration guidelines.
The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 S/N: 5592550.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No. Q24052150, Due Date 27 May 2025.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor complies with the table 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)"

Accredited
ISO/IEC 17025

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring hot air oven.

CALIBRATION DATA

1. HOT AIR OVEN PERFORMANCE

| Setting (°C) | DUC | | Measured Uniformity (°C) | Measured Stability (°C) | Measured Overall Variation (°C) |
|----------------|-------------------|--|----------------------------|---------------------------|-----------------------------------|
| | Indicating (°C) | | | | |
| 104.0 | 104.0 | | 0.29 | 0.11 | 0.68 |
| 180.0 | 180.0 | | 0.83 | 0.22 | 1.40 |

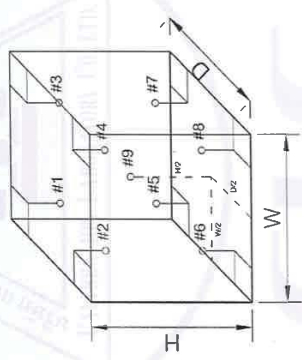
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

| DUC | | Measured Temperature (°C)@Probe No.9 is Ref. | | | | | | | | | Uncertainty ± (°C) | Coverage factor k |
|----------------|-------------------|--|--------|--------|--------|--------|--------|--------|--------|--------|-------------------------|----------------------|
| Setting (°C) | Indicating (°C) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| 104.0 | 104.0 | 103.64 | 103.91 | 103.49 | 103.54 | 103.67 | 103.61 | 103.47 | 103.96 | 103.72 | 0.43 | 2,00 |
| 180.0 | 180.0 | 179.19 | 179.91 | 178.87 | 179.17 | 179.38 | 179.38 | 178.90 | 179.22 | 179.63 | 0.51 | 2,00 |

Technical Note : W = 56 cm, D = 40 cm, H = 48 cm.

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 59 of 68



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

End of Certificate

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : INCUBATOR
MANUFACTURER : ACCUPLUS
MODEL / TYPE : SMART i250
SERIAL NO. : 2059-0718-0010[LA-002]
CLID. NO. : 332100155
JOB CONTROL NO. : 250215018255
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 15 February 2025

DATE OF ISSUED : 04 March 2025

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

Calibrated By :

Approved By :

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

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring incubator.

CALIBRATION DATA

1. INCUBATOR PERFORMANCE

| DUC | | Measured Uniformity (°C) | Measured Stability (°C) | Measured Overall Variation (°C) |
|----------------|-------------------|-------------------------------|------------------------------|--------------------------------------|
| Setting (°C) | Indicating (°C) | | | |
| 20.0 | 20.0 | 0.43 | 0.34 | 0.98 |

REPORT OF CALIBRATION

FOR

NOMENCLATURE : INCUBATOR

MANUFACTURER : ACCUPLUS

MODEL / TYPE : SMART i250

SERIAL NO. : 2059-0718-0010[LA-002]

LOCATION SITE : LABORATORY

DATE OF CALIBRATION : 27 February 2025

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C

Relative Humidity : 49 % to 51 %

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-165 based on TLAS G-20-102-08 as calibration guidelines.

The calibration was performed by using Hydra Series II which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Series II, Fluke Model 2635A S/N. 8209003.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.

Certificate No. Q24052151, Due Date 27 May 2025.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor complies with the table 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)"



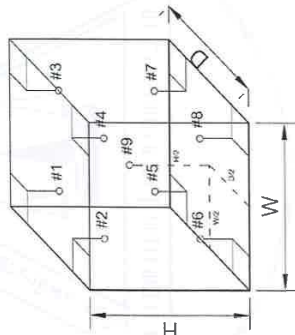
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

| DUC | | Measured Temperature (°C)@Probe No.9 is Ref. | | | | | | | | | Uncertainty ± (°C) | Coverage factor k |
|----------------|-------------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-------------------------|----------------------|
| Setting (°C) | Indicating (°C) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| 20.0 | 20.0 | 20.55 | 20.53 | 20.57 | 20.51 | 20.59 | 20.52 | 20.40 | 20.47 | 20.27 | 0.58 | 2.00 |

Technical Note : W = 50 cm, D = 48 cm, H = 110 cm.

The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 129 of 138



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

End of Certificate



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : pH METER
MANUFACTURER : APERA
MODEL / TYPE : PH700/201T-F
SERIAL NO. : PH700X1019061009/N/A [LA-008/PH-02]
CLID. NO. : 272401000
JOB CONTROL NO. : 250410042961
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 10 April 2025 DATE OF ISSUED : 18 April 2025

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

Calibrated By :

Approved By :

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



CALIBRATION LABORATORY CO., LTD.

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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com Email:sae@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : pH METER
MANUFACTURER : APERA
MODEL / TYPE : PH700/201T-F
SERIAL NO. : PH700X1019061009/N/A [LA-008/PH-02]
DATE OF CALIBRATION : 11 April 2025

ENVIRONMENT CONDITIONS :

Temperature : $(25 \pm 2.5) ^\circ\text{C}$ Relative Humidity : $(50 \pm 15) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-128, 238. The calibration was performed by direct measurement with Certified Reference Material (CRM) and comparison with Calibration Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. pH Standard Solution, NIMT TRM CODE TRM-S-2003, TRM CODE TRM-S-2007.
2. pH Standard Solution, Control Company Catalog Number 06664260, 11754256, Lot Number CC787362.
3. Calibration Bath, Kambic Model OB-222 ULT S/N. 17115653.
4. Precision Thermometer, ASL Model F250 S/N. 1334023800.
5. IPRT, Wika Model CTP5000-250-D S/N. PO00043543-1-10-1.



CALIBRATION LABORATORY CO., LTD.

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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com Email:sae@cal-laboratory.com



TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand), Lot Number. 080124, 120124, Due Date 23 January 2026.
2. The measurements are traceable to International System of Units (SI), through Control Company, Certificate No. 4281-14495731, Due Date 27 September 2025.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd., Certificate No. Q24120999, Due Date 26 November 2025.
4. The measurements are traceable to International System of Units (SI), through Thailand Institute of Scientific and Technological Research (TISTR), Certificate No. PSL-T 1042/67, Due Date 16 October 2025.
5. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand), Certificate No. TT-0146-24, Due Date 28 October 2025.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table 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)"



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 Email: sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of pH meter.

CALIBRATION DATA

1. pH METER RESULT @ 25 °C

| Standard pH Buffer Solution (pH) | pH Meter Reading (pH) | pH Meter Reading (mV) | Correction (pH) | Uncertainty of Measurement (\pm pH) | k Factor |
|----------------------------------|-----------------------|-----------------------|-----------------|--|----------|
| 4.003 | 4.01 | 134 | -0.007 | 0.014 | 2.00 |
| 7.005 | 7.00 | -43 | +0.005 | 0.014 | 2.00 |
| 10.015 | 10.01 | -208 | +0.005 | 0.100 | 2.05 |

Technical Note. Setting function CAL 3 point (4,7,10).

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 91 of 138

*2. TEMPERATURE RESULT

| Immersion depth (mm) | Actual Temperature (°C) | DUC Reading (°C) | Correction (°C) | Uncertainty \pm (°C) |
|----------------------|---------------------------|--------------------|-------------------|--------------------------|
| 100 | 25.01 | 24.9 | +0.11 | 0.07 |

Technical Note. Type of sensor : pH Probe

Probe \varnothing 12 mm

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of $k = 2.00$.

Note. * means Calibrations marked " Not TISI Accredited " in this Certificate have been included for completeness.

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

End of Certificate

page 4 of 4



METROLOGY SYSTEM (THAILAND) CO., LTD.

a Trescal company



ID LINE : IEC17025

Certificate of Calibration

Certificate Number : SPR25050011-3 Page : 1 of 3

Customer : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 Baan Klang Krung Biz Town, Soi Sinagarindra 46/1 (Pramote),

Nongbon Sub-district, Prawet District, Bangkok 10250

Equipment Name : Refrigerator
Manufacturer : Medicoool
Model : BB-117
Serial Number : BB117-190725001
ID. Number : LA-003

Environmental Conditions

Ambient Temperature : $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ Received Date : 02 May 2025
Relative Humidity : $60\% \pm 20\%$ Calibration Date : 06 May 2025
Location of Calibration : On-Site Recommend Due Date : N/A
Calibration Procedure : SP-CPT-04-01 Date of Issue : 07 May 2025

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in System (Thailand).



ID LINE : IEC17025

Calibration Report

Certificate Number : SPR25050011-3

Page : 2 of 3

Reference Standards

| Equipment Name | Model | Serial No. | Certificate No. | Due. Date |
|------------------------------|--------|------------|-----------------|-------------|
| Data Acquisition/Switch Unit | 34970A | MY44074688 | SPR24080102-24 | 07 Sep 2025 |

Traceability

This certification is traceable to the International System of Unit maintained at :
SP Metrology - SP Metrology system (Thailand) Co.Ltd.

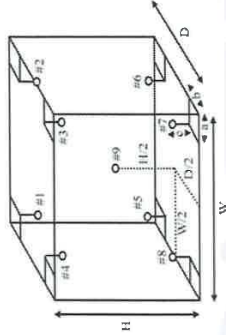


ID LINE : IEC17025

Result of Calibration

Certificate Number : SPR25050011-3

Page : 3 of 3



Temperature Accuracy in the Measurement Zone.

| UUC Setting | Measured Temperature (°C) @ Probe No. 9 is REF.) | | | | | | | | | Uncertainty (±) |
|-------------|--|------|------|------|------|------|------|------|------|-------------------|
| | # 1 | # 2 | # 3 | # 4 | # 5 | # 6 | # 7 | # 8 | # 9 | |
| 4.0 | 3.37 | 4.12 | 4.25 | 4.13 | 3.93 | 3.98 | 3.95 | 4.23 | 4.16 | 0.60 |

Unit : °C

Temperature Uniformity, Stability, Overall Variation

| UUC Setting | UUC Reading | Temperature Stability | Temperature Uniformity | Overall Variation |
|-------------|-------------|-----------------------|------------------------|-------------------|
| 4.0 | 4.0 | 0.09 | 0.94 | 1.07 |

Unit : °C

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2$, providing a level of confidence approximately 95 %

- End of Certificate -



CALIBRATION LABORATORY Co., LTD.

210-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cah-laboratory.com E-mail:sale@cah-laboratory.com



CALIBRATION LABORATORY Co., LTD.

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CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOMETER WITH PROBE
MANUFACTURER : LUTRON
MODEL / TYPE : MTM-380SD
SERIAL NO. : I.570147/N/A[LA-0013/LA-0013/A]
CLID. NO. : 232204019
JOB CONTROL NO. : 250408041416
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 08 April 2025

DATE OF ISSUED : 11 April 2025

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

Calibrated By :

Approved By :

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

page 1 of 3

REPORT OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOMETER WITH PROBE
MANUFACTURER : LUTRON
MODEL / TYPE : MTM-380SD
SERIAL NO. : I.570147/N/A[LA-0013/LA-0013/A]
DATE OF CALIBRATION : 10 April 2025

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$

Relative Humidity : $(55 \pm 10) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPTH-06 based on ASTM E 220-86 as calibration guidelines.

The calibration was performed by using 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. I7115653, I7115654.
2. Precision Thermometer, ASL Model F250 S/N. 1334023800.
3. IPRT, Wika, ASL Model CTP5000-450-D, T100-250-ID S/N. PO00036374-1-10-12, PO106346-1-18.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q24120999, Q24112862. Due Date 26 November 2025, 12 November 2025.
2. The measurements are traceable to International System of Units (SI), through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 1042/67, Due Date 16 October 2025.
3. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand). Certificate No. TT-0147-24, TT-0110-24. Due Date 28 October 2025, 06 August 2025.

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)"

page 2 of 3



Accredited
ISO/IEC 17025



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ACCM-2814



ILAC-MRA
ACCM-2814

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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cali-laboratory.com E-mail: sale@cali-laboratory.com

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 five times measurement in the table below.

CALIBRATION DATA

CORRECTION OF TEMPERATURE : T1

| Immersion depth (mm) | Actual Temperature (°C) | DUC Reading (°C) | Correction (°C) | Uncertainty \pm (°C) |
|----------------------|---------------------------|--------------------|-------------------|--------------------------|
| 200 | 4.00 | 4.0 | 0.00 | 0.52 |
| | 20.02 | 20.1 | -0.08 | |
| | 95.02 | 96.1 | -1.08 | |
| | 104.02 | 105.1 | -1.08 | |
| | 180.00 | 181.6 | -1.60 | |

Technical Note. Type of sensor : Thermocouple Type K.

Note. The Scope of Accredited ANAB Certificate No. ACCM-2814 Version 015 Page 57 of 68

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

End of Certificate



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ANAB Accredited
ACCM-2814



ILAC-MRA
ACCM-2814

CALIBRATION LABORATORY Co., LTD.
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CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER
MANUFACTURER : DIGICON
MODEL / TYPE : TH-02A
SERIAL NO. : 1919E0284991 [DTH-01]
CLID. NO. : 232100200
JOB CONTROL NO. : 250408041414
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 08 April 2025

DATE OF ISSUED : 11 April 2025

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

Calibrated By :

Approved By :

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. Q25041414

F3-011-05/12-23



REPORT OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER
MANUFACTURER : DIGICON
MODEL / TYPE : TH-02A
SERIAL NO. : 1919E0284991[DTH-01]
DATE OF CALIBRATION : 10 April 2025

ENVIRONMENT CONDITIONS :

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

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPTH-11. The calibration was performed by using Chilled Mirror Hygrometer which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Chilled Mirror Hygrometer, Edgetech Model Dew Master S/N. 44602.
Temperature & Humidity Chamber, PGC Model 9141-5116 S/N. 1304261.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Thunder Scientific Corporation.
Certificate No. 22724, Due Date 03 October 2025.

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)"



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring digital thermohygrometer.

CALIBRATION DATA

1. CORRECTION OF TEMPERATURE

| Test point ($^\circ\text{C}$) | Actual Temperature ($^\circ\text{C}$) | DUC Reading ($^\circ\text{C}$) | Correction ($^\circ\text{C}$) | Uncertainty \pm ($^\circ\text{C}$) |
|------------------------------------|--|-------------------------------------|------------------------------------|---|
| 20.0 | 20.00 | 19.6 | +0.40 | 0.27 |
| 25.0 | 25.00 | 24.5 | +0.50 | |
| 30.0 | 30.00 | 29.5 | +0.50 | |

2. CORRECTION OF HUMIDITY

| STD Temperature ($^\circ\text{C}$) | STD Reading (%RH) | DUC Reading (%RH) | Correction (%RH) | Uncertainty \pm (%RH) |
|---|----------------------|----------------------|---------------------|----------------------------|
| 25 | 40.0 | 30 | +10.0 | 0.8 |
| 25 | 60.0 | 50 | +10.0 | 0.8 |

Note: The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 60 of 68

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

End of Certificate



CALIBRATION LABORATORY Co., LTD.
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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cahlaboratory.com E-mail:sale@cahlaboratory.com



CLC
Accredited
ISO/IEC 17025

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER
MANUFACTURER : DIGICON
MODEL / TYPE : TH-02A
SERIAL NO. : 1919E0284980[DTH-02]
CLID. NO. : 232100201
JOB CONTROL NO. : 250408041415
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAK KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 08 April 2025

DATE OF ISSUED : 11 April 2025

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

Calibrated By :

Approved By :

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. Q25041415
F3-011-05/12-23

page 1 of 3



CALIBRATION LABORATORY Co., LTD.
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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cahlaboratory.com E-mail:sale@cahlaboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER
MANUFACTURER : DIGICON
MODEL / TYPE : TH-02A
SERIAL NO. : 1919E0284980[DTH-02]
DATE OF CALIBRATION : 10 April 2025

ENVIRONMENT CONDITIONS :

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

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPTH-11. The calibration was performed by using Chilled Mirror Hygrometer which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Chilled Mirror Hygrometer, Edgetech Model Dew Master S/N. 44602.
Temperature & Humidity Chamber, PGC Model 9141-5116 S/N. 1304261.

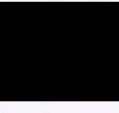
TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Thunder Scientific Corporation.
Certificate No. 22724, Due Date 03 October 2025.

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)"

page 2 of 3



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring digital thermohygro meter.

CALIBRATION DATA

1. CORRECTION OF TEMPERATURE

| Test point (° C) | Actual Temperature (° C) | DUC Reading (° C) | Correction (° C) | Uncertainty ± (° C) |
|-----------------------|-------------------------------|------------------------|-----------------------|--------------------------|
| 20.0 | 20.00 | 19.7 | +0.30 | 0.27 |
| 25.0 | 25.00 | 24.6 | +0.40 | |
| 30.0 | 30.00 | 29.5 | +0.50 | |

2. CORRECTION OF HUMIDITY

| STD Temperature (° C) | STD Reading (%RH) | DUC Reading (%RH) | Correction (%RH) | Uncertainty ± (%RH) |
|----------------------------|------------------------|------------------------|-----------------------|--------------------------|
| 25 | 40.0 | 33 | +7.0 | 0.8 |
| 25 | 60.0 | 53 | +7.0 | 0.8 |

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 01.5 Page 60 of 68

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

End of Certificate

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : WATER BATH

MANUFACTURER : M-LAB

MODEL / TYPE : WBN 15

SERIAL NO. : 0335[LA-007]

CLID. NO. : 332300657

JOB CONTROL NO. : 250215018258

CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KIANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 15 February 2025

DATE OF ISSUED : 04 March 2025

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

Calibrated By :

Approved By :

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. Q25018258

F3-011-05/12-23



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 : WATER BATH
MANUFACTURER : M-LAB
MODEL / TYPE : WBN 15
SERIAL NO. : 0335[LA-007]
LOCATION SITE : LABORATORY - HOT ZONE
DATE OF CALIBRATION : 27 February 2025

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C Relative Humidity : 49% to 51%

PROCEDURE USED :

This instrument was calibrated under procedure No. W1-305-135 based on ASTM E 715-80:2016 as calibration guidelines.
The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 S/N. 5592550.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No. Q24120965, Due Date 13 May 2025.

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)"



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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring water bath.

CALIBRATION DATA

1. WATER BATH PERFORMANCE

| Test Point (°C) | DUC Reading (°C) | Uniformity (°C) | Stability (°C) |
|-------------------|--------------------|-------------------|------------------|
| 85.0 | 85.0 | 0.40 | 0.28 |



CALIBRATION LABORATORY CO., LTD.
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NSC-TISI-TIS 17025
CALIBRATION 0659
CLC

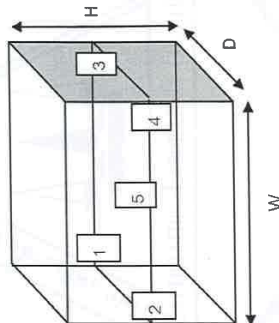
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

| Test Point (° C) | DUC Reading (° C) | STD Reading (° C) | | | | | Uncertainty ± (° C) |
|-----------------------|------------------------|---------------------|-------------|-------------|-------------|-------------|--------------------------|
| | | Probe No. 1 | Probe No. 2 | Probe No. 3 | Probe No. 4 | Probe No. 5 | |
| 85.0 | 85.0 | 85.15 | 84.79 | 84.96 | 84.89 | 85.06 | 0.58 |

Technical Note : W = 35 cm, D = 30 cm, H = 15 cm.

The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 128 of 138



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

End of Certificate



CALIBRATION LABORATORY CO., LTD.
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NSC-TISI-TIS 17025
CALIBRATION 0659
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CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : WATER BATH
MANUFACTURER : MEMMERT
MODEL / TYPE : WNB14
SERIAL NO. : L418.0758[LA-004]
CLID. NO. : 332100157
JOB CONTROL NO. : 250215018257
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 15 February 2025

DATE OF ISSUED : 04 March 2025

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

Calibrated By :

Approved By :

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

REPORT OF CALIBRATION

FOR

NOMENCLATURE : WATER BATH
MANUFACTURER : MEMMERT
MODEL / TYPE : WNB14
SERIAL NO. : L418.0758[LA-004]
LOCATION SITE : LABORATORY - HOT ZONE
DATE OF CALIBRATION : 27 February 2025

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C
Relative Humidity : 49% to 51%

PROCEDURE USED :

This instrument was calibrated under procedure No. W1-305-135 based on ASTM E 715-80:2016 as calibration guidelines.
The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 S/N. 5592550.

TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Calibration Laboratory Co., Ltd.
Certificate No. Q24120965, Due Date 13 May 2025.

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)"

Certificate No. Q25018257

F3-011-05/12-23

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring water bath.

CALIBRATION DATA

1. WATER BATH PERFORMANCE

| Test Point (°C) | DUC Reading (°C) | Uniformity (°C) | Stability (°C) |
|-------------------|--------------------|-------------------|------------------|
| 95.0 | 95.0 | 0.39 | 0.17 |



CALIBRATION LABORATORY CO., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
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NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

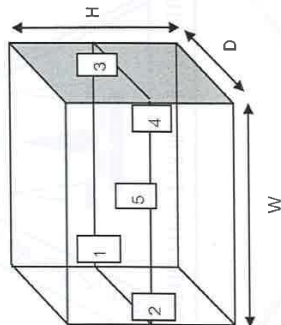
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

| Test Point (° C) | DUC Reading (° C) | STD Reading (° C) | | | | | Uncertainty ± (° C) |
|-----------------------|------------------------|---------------------|-------------|-------------|-------------|-------------|--------------------------|
| | | Probe No. 1 | Probe No. 2 | Probe No. 3 | Probe No. 4 | Probe No. 5 | |
| 95.0 | 95.0 | 96.45 | 96.30 | 96.22 | 96.04 | 96.26 | 0.51 |

Technical Note : W = 35 cm, D = 29 cm, H = 14 cm.

The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 128 of 138



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

End of Certificate

Certificate No. Q25018257

F3-011-05/12-23

page 4 of 4

| List Certificate of Instrument for Environmental Quality Analysis. | | | | | | | | |
|--|--|---|----------------------|---------------------------------|---|---|---------------------|--------------------------|
| No. | Instrument/Equipment | Parameter | Manufacturer | Model/Serial No. | Calibrator | Certification No. | Date of Calibration | Due date of Calibration* |
| เครื่องใช้ในห้องปฏิบัติการคุณภาพน้ำ | | | | | | | | |
| 1 | UV-Vis Spectrophotometer | Color (SCM), Fluoride | Agilent Technologies | Cary60-06860 / MY15410009 | DQE Services Co.,Ltd. | SP25-019 | 26 May 25 | 29 May 26 |
| 2 | UV-Vis Spectrophotometer | Chemical Oxygen Demand | HACH | U-5100 / 2344-008 | DQE Services Co.,Ltd. | SP25-024 | 17 Jun 25 | 16 Jun 26 |
| 3 | DO Reactor (Reading Block) | Nitrate, Phosphorus | Hanna | HI91420 | DQE Services Co.,Ltd. | SP25-024 | 17 Jun 25 | 16 Jun 26 |
| 4 | Cyanuric Acid Portable Photometer | Nitrogen-Ammonia | Hanna | HI97722C / HI018500 | Hanna Instruments (Thailand) Ltd. | HT-2510-0375 | 7 Mar 25 | 6 Mar 26 |
| 5 | Atomic Absorption Spectrophotometer (AAS) | Nitrogen-Nitrate | Hanna | HI97722C / HI018500 | Hanna Instruments | HT-2511-0437 | 24 Mar 25 | 23 Mar 26 |
| 6 | Atomic Absorption Spectrophotometer (AAS) | Cyanuric acid | Agilent Technologies | System G1909A / 80160501811 | Thailand Institute of Scientific and Technological Research (TISTR) | MIT-ACL-18-31218 | 3 Feb 25 | 2 Feb 26 |
| 7 | Inductively Coupled Plasma (ICP) | Iron, Cadmium, Chromium, Copper, Iron, Manganese, Zinc, Potassium | Perkin Elmer | Perkin Elmer 900F / PF830031902 | Perkin Elmer Co.,Ltd. | PerkinElmer 900F Preventive Maintenance Checklist | 29 Apr 25 | 28 Apr 26 |
| 8 | Cold Vapor Atomic Absorption Spectrophotometer (EVAAS) | Calcium, Lead, Mercury | Agilent Technologies | System G1909A / 80160501811 | Agilent Technologies (Thailand) Co.,Ltd. | Preventive Maintenance Checklist | 3 Nov 25 | 2 Nov 26 |
| 9 | Digester Unit | Mercury(Pd) | MLESTONE | DMA-80 / 28118048 | Silphom Associates Co.,Ltd. | Service Protocol Report | 31 Jan 25 | 30 Jan 26 |
| 10 | Distillation Unit (Kjeldahl Method) | Total Kjeldahl Nitrogen | ROSS | ROSS / 919056 | National Food Institute, Ministry of Industry, Thailand | 2501840-001-01 | 27 Jan 25 | 26 Jan 26 |
| | | | ROSS | ROSS / 919056 | ROSS South East Asia | 13851 | 25 Feb 25 | 24 Feb 26 |

เอกสารไม่ควบคุม

| List Certificate of Instrument for Environmental Quality Analysis. | | | | | | | | |
|--|----------------------|-------------------------|--------------|--------------------|---|-------------------|---------------------|--------------------------|
| No. | Instrument/Equipment | Parameter | Manufacturer | Model/Serial No. | Calibrator | Certification No. | Date of Calibration | Due date of Calibration* |
| เครื่องใช้ในห้องปฏิบัติการคุณภาพน้ำ | | | | | | | | |
| 11 | Incubator | Total Bacteria | Mettler | BP 260 / 16151087 | National Food Institute, Ministry of Industry, Thailand | 2502229-001-01 | 19 Mar 25 | 18 Mar 26 |
| 12 | Incubator | Total Coliform Bacteria | Mettler | BP 260 / 16151087 | National Food Institute, Ministry of Industry, Thailand | 2502229-001-01 | 19 Mar 25 | 18 Mar 26 |
| 13 | Water Bath | Fecal Coliform Bacteria | Mettler | BP 260 / 16151087 | National Food Institute, Ministry of Industry, Thailand | 2502229-001-01 | 19 Mar 25 | 18 Mar 26 |
| 14 | Water Bath | Escherichia coli | Mettler | BP 260 / 16151087 | National Food Institute, Ministry of Industry, Thailand | 2502229-001-01 | 19 Mar 25 | 18 Mar 26 |
| 15 | Auto Clave | Pseudomonas Aeruginosa | Mettler | BP 260 / 16151087 | National Food Institute, Ministry of Industry, Thailand | 2502229-001-01 | 19 Mar 25 | 18 Mar 26 |
| 16 | Auto Clave | Staphylococcus Aureus | Mettler | BP 260 / 16151087 | National Food Institute, Ministry of Industry, Thailand | 2502229-001-01 | 19 Mar 25 | 18 Mar 26 |
| 17 | Analytical Balance | | ALP | CL-40L / 808763 | National Food Institute, Ministry of Industry, Thailand | 2502229-001-01 | 19 Mar 25 | 18 Mar 26 |
| | | | ALP | CL-40L / 810010 | National Food Institute, Ministry of Industry, Thailand | 2501847-001-01 | 5 Jun 25 | 4 Jun 26 |
| | | | CHAUSS | FX623 / C276714745 | National Food Institute, Ministry of Industry, Thailand | 2502227-001-01 | 19 Mar 25 | 18 Mar 26 |

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

เอกสารไม่ควบคุม

DQE Services

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

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CERTIFICATE OF CALIBRATION

Certificate No. : SP25-019

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Instrument room (207)

Equipment : UV-Vis Spectrophotometer

Manufacturer : Agilent Technologies

Model : Cary 60

Serial No. : MY15410009

ID No. : UAE.WAT.020/2558

Received Date : 26 May 2025

Calibration Date : 26 May 2025

Issue Date : 29 May 2025

Condition Instrument : Good

Calibrated by :

Approved by :

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.

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เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

DQE Services

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REPORT OF CALIBRATION

Certificate No. : SP25-019

Environment Condition : Ambient Temperature 25 ± 5 °C

Relative humidity 55 ± 20 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

| Material | Serial No. | Certificate No. | Due date |
|-------------------------|------------|-----------------|-----------------|
| Absorbance Standard set | 25760 | 115663 | 25 October 2025 |
| Absorbance Standard set | 25757 | 115638 | 25 October 2025 |
| Wavelength Standard set | 25806 | 115657 | 25 October 2025 |
| Wavelength Standard set | 25758 | 115665 | 25 October 2025 |

Traceability : This certification is traceable to the International System of Unit maintained at National - Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 1.5 nm.

Scan Speed of UUC : 60 nm/min

Scan Interval of UUC : 0.15 nm.

Resolution of UUC : Photometric 0.0001 Abs.

Wavelength 0.1 nm.



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เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

น.6/22

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REPORT OF CALIBRATION

Certificate No. : SP25-019Page 3 of 5



Calibration Results : Without adjustment

Photometric Accuracy :

| Wavelength (nm.) | CRMs Values (Abs) | UUC Reading (Abs) | Correction (Abs) | Uncertainty (Abs) | Coverage factor k |
|---------------------|----------------------|----------------------|---------------------|----------------------|----------------------|
| 420 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5780 | 0.5739 | 0.0041 | 0.0031 | 2.00 |
| | 1.0484 | 1.0430 | 0.0054 | 0.0029 | 2.00 |
| | 2.1876 | 2.1876 | 0.0000 | 0.0084 | 2.00 |
| 440 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5595 | 0.5581 | 0.0014 | 0.0034 | 2.00 |
| | 1.0239 | 1.0219 | 0.0020 | 0.0035 | 2.00 |
| | 2.1230 | 2.1207 | 0.0023 | 0.0085 | 2.00 |
| 465 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5230 | 0.5190 | 0.0040 | 0.0029 | 2.00 |
| | 0.9633 | 0.9609 | 0.0024 | 0.0029 | 2.00 |
| | 1.9753 | 1.9719 | 0.0034 | 0.0079 | 2.00 |
| 546.1 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5181 | 0.5161 | 0.0020 | 0.0031 | 2.00 |
| | 1.0002 | 0.9979 | 0.0023 | 0.0033 | 2.00 |
| | 1.9973 | 2.0021 | -0.0048 | 0.0102 | 2.00 |
| 590 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5517 | 0.5503 | 0.0014 | 0.0030 | 2.00 |
| | 1.0803 | 1.0808 | -0.0005 | 0.0031 | 2.00 |
| | 2.0373 | 2.0324 | 0.0049 | 0.0105 | 2.00 |
| 635 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5591 | 0.5583 | 0.0008 | 0.0031 | 2.00 |
| | 1.0518 | 1.0513 | 0.0005 | 0.0030 | 2.00 |
| | 1.9274 | 1.9281 | -0.0007 | 0.0102 | 2.00 |

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REPORT OF CALIBRATION



Certificate No. : SP25-019Page 4 of 5

Photometric Accuracy :

| Wavelength (nm.) | CRMs Values (Abs) | UUC Reading (Abs) | Correction (Abs) | Uncertainty (Abs) | Coverage factor k |
|---------------------|----------------------|----------------------|---------------------|----------------------|----------------------|
| 235 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 2.00 |
| | 0.7469 | 0.7488 | -0.0019 | 0.0063 | 2.00 |
| 257 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 2.00 |
| | 0.8674 | 0.8663 | 0.0011 | 0.0067 | 2.00 |
| 313 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 2.00 |
| | 0.2919 | 0.2902 | 0.0017 | 0.0052 | 2.00 |
| 350 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 2.00 |
| | 0.6430 | 0.6428 | 0.0002 | 0.0063 | 2.00 |

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REPORT OF CALIBRATION

Certificate No. : SP25-019Page 5 of 5

Wavelength Accuracy :



| CRMs Values (nm.) | UUC Reading (nm.) | Correction (nm.) | Uncertainty (nm.) | Coverage factor k |
|----------------------|----------------------|---------------------|----------------------|----------------------|
| 241.72 | 242.0 | -0.28 | 0.18 | 2.00 |
| 279.45 | 279.5 | -0.05 | 0.18 | 2.00 |
| 287.81 | 287.6 | 0.21 | 0.18 | 2.00 |
| 334.06 | 333.8 | 0.26 | 0.18 | 2.00 |
| 360.93 | 360.5 | 0.43 | 0.18 | 2.00 |
| 418.59 | 417.9 | 0.69 | 0.18 | 2.00 |
| 445.94 | 445.4 | 0.54 | 0.18 | 2.00 |
| 453.66 | 453.2 | 0.46 | 0.18 | 2.00 |
| 460.02 | 459.6 | 0.42 | 0.18 | 2.00 |
| 536.59 | 536.5 | 0.09 | 0.18 | 2.00 |
| 637.98 | 638.5 | -0.52 | 0.18 | 2.00 |
| 431.38 | 430.7 | 0.68 | 0.18 | 2.00 |
| 472.50 | 472.3 | 0.20 | 0.18 | 2.00 |
| 513.47 | 513.5 | -0.03 | 0.18 | 2.00 |
| 528.88 | 528.9 | -0.02 | 0.18 | 2.00 |
| 573.17 | 573.8 | -0.63 | 0.18 | 2.00 |
| 585.35 | 585.2 | 0.15 | 0.20 | 2.00 |
| 684.40 | 685.1 | -0.70 | 0.18 | 2.00 |
| 740.72 | 741.1 | -0.38 | 0.20 | 2.00 |
| 748.55 | 748.9 | -0.35 | 0.18 | 2.00 |
| 807.03 | 807.1 | -0.07 | 0.18 | 2.00 |
| 879.28 | 879.1 | 0.18 | 0.18 | 2.00 |

Remark : - UUC = Unit Under Calibration
- N/A = Not Available
- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k ,
which for a normal distribution corresponds to a coverage probability of approximately 95%

- End of Certificate -

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CERTIFICATE OF CALIBRATION

Certificate No. : SP25-024Page 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 : 17 June 2025

Calibration Date : 17 June 2025

Issue Date : 20 June 2025

Condition Instrument : Good

Calibrated by : Approved by :

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.


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DQE Services Co.,Ltd.

DQE Services

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Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



ISO 9001:2015

ISO 17025:2017

CALIBRATION DATA

REPORT OF CALIBRATION

Certificate No. : SP25-024

Page 2 of 5

Environment Condition : Ambient Temperature 25 ± 5 °C

Relative humidity 55 ± 20 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

| Material | Serial No. | Certificate No. | Due date |
|-------------------------|------------|-----------------|-----------------|
| Absorbance Standard set | 25760 | 115663 | 25 October 2025 |
| Absorbance Standard set | 25757 | 115638 | 25 October 2025 |
| Wavelength Standard set | 25806 | 115657 | 25 October 2025 |
| Wavelength Standard set | 25758 | 115665 | 25 October 2025 |

Traceability : This certification is traceable to the International System of Unit maintained at National -

Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 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.

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FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.

DQE Services

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ISO 9001:2015

ISO 17025:2017

CALIBRATION DATA

REPORT OF CALIBRATION

Certificate No. : SP25-024

Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

| Wavelength (nm.) | CRMs Values (Abs) | UUC Reading (Abs) | Correction (Abs) | Uncertainty (Abs) | Coverage factor k |
|------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| 420 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5780 | 0.574 | 0.0040 | 0.0031 | 2.00 |
| | 1.0484 | 1.044 | 0.0044 | 0.0029 | 2.00 |
| | 2.1876 | 2.185 | 0.0026 | 0.0075 | 2.00 |
| 440 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5595 | 0.558 | 0.0015 | 0.0035 | 2.00 |
| | 1.0239 | 1.021 | 0.0029 | 0.0035 | 2.00 |
| | 2.1230 | 2.122 | 0.0010 | 0.0079 | 2.00 |
| 465 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5230 | 0.519 | 0.0040 | 0.0030 | 2.00 |
| | 0.9633 | 0.961 | 0.0023 | 0.0029 | 2.00 |
| | 1.9753 | 1.975 | 0.0003 | 0.0071 | 2.00 |
| 546.1 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5181 | 0.515 | 0.0031 | 0.0031 | 2.00 |
| | 1.0002 | 0.996 | 0.0042 | 0.0033 | 2.00 |
| | 1.9973 | 1.994 | 0.0033 | 0.0084 | 2.00 |
| 590 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5517 | 0.549 | 0.0027 | 0.0030 | 2.00 |
| | 1.0803 | 1.078 | 0.0023 | 0.0030 | 2.00 |
| | 2.0373 | 2.031 | 0.0063 | 0.0082 | 2.00 |
| 635 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5591 | 0.557 | 0.0021 | 0.0031 | 2.00 |
| | 1.0518 | 1.049 | 0.0028 | 0.0030 | 2.00 |
| | 1.9274 | 1.924 | 0.0034 | 0.0081 | 2.00 |

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FM-708-02 R01 1/11/2021

DQE Services Co.,Ltd.

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ISO 9001:2015

ISO 17025:2017

CALIBRATION DATA

REPORT OF CALIBRATION

Certificate No. : SP25-024

Page 4 of 5

Photometric Accuracy :

| Wavelength (nm.) | CRMs Values (Abs) | UUC Reading (Abs) | Correction (Abs) | Uncertainty (Abs) | Coverage factor k |
|------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| 235 | 0.0000 | 0.000 | 0.0000 | 0.0050 | 2.00 |
| | 0.7469 | 0.747 | -0.0001 | 0.0057 | 2.00 |
| 257 | 0.0000 | 0.000 | 0.0000 | 0.0050 | 2.00 |
| | 0.8674 | 0.864 | 0.0034 | 0.0059 | 2.00 |
| 313 | 0.0000 | 0.000 | 0.0000 | 0.0050 | 2.00 |
| | 0.2919 | 0.293 | -0.0011 | 0.0051 | 2.00 |
| 350 | 0.0000 | 0.000 | 0.0000 | 0.0050 | 2.00 |
| | 0.6430 | 0.639 | 0.0040 | 0.0055 | 2.00 |

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DQE Services Co.,Ltd.

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ISO 9001:2015

ISO 17025:2017

CALIBRATION DATA

REPORT OF CALIBRATION

Certificate No. : SP25-024

Page 5 of 5

Wavelength Accuracy :

| CRMs Values (nm.) | UUC Reading (nm.) | Correction (nm.) | Uncertainty (nm.) | Coverage factor k |
|-------------------|-------------------|------------------|-------------------|-------------------|
| 241.00 | 240.4 | 0.60 | 0.18 | 2.00 |
| 279.30 | 278.8 | 0.50 | 0.18 | 2.00 |
| 288.90 | 288.3 | 0.60 | 0.18 | 2.00 |
| 334.50 | 333.9 | 0.60 | 0.18 | 2.00 |
| 361.40 | 360.8 | 0.60 | 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 | 459.1 | 0.20 | 0.18 | 2.00 |
| 537.00 | 536.4 | 0.60 | 0.18 | 2.00 |
| 638.00 | 637.5 | 0.50 | 0.18 | 2.00 |
| 441.29 | 440.7 | 0.59 | 0.18 | 2.00 |
| 479.88 | 479.4 | 0.48 | 0.18 | 2.00 |
| 513.75 | 513.3 | 0.45 | 0.18 | 2.00 |
| 528.59 | 528.2 | 0.39 | 0.18 | 2.00 |
| 575.10 | 574.5 | 0.60 | 0.18 | 2.00 |
| 585.56 | 585.4 | 0.16 | 0.20 | 2.00 |
| 684.70 | 684.1 | 0.60 | 0.18 | 2.00 |
| 740.51 | 740.2 | 0.31 | 0.20 | 2.00 |
| 747.61 | 747.0 | 0.61 | 0.18 | 2.00 |
| 807.04 | 806.4 | 0.64 | 0.18 | 2.00 |
| 879.68 | 879.1 | 0.58 | 0.18 | 2.00 |

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%

- End of Certificate -

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FM-708-02 R01 1/11/2021

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Certificate No. : HIT-2510-0375

Page : 1 of 2

CERTIFICATE OF CALIBRATION

Equipment : COD Test Tube Heater

Meter Model : HI839800-02 Serial No. : H018500I

Tube Heater : 25 Vial Capacity Resolution : 0.1°C

Temperature Range : (-10 to 160)°C Temperature of Reaction : 150°C

Manufacturer : Hanna Instruments Made in : Romania

Condition As-Received : Used Product Reference : RE25040I

Ambient Temperature : (25 ± 2)°C Relative Humidity : (50 ± 15) % RH

Customer name : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Rd., Bangchak,
Phrakhanong, Bangkok 10260

Received date : 5 March 2025

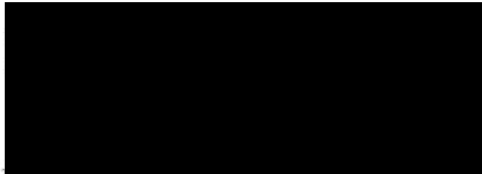
Calibrate date : 7 March 2025

Issue date : 7 March 2025

Calibrated Location : Hanna Instruments (Thailand) Ltd.

Calibration Procedure : This calibrator was conducted by using in-house: calibration procedure
CP-04 by using certified reference standard instruments.

Calibrated by :



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) เอกสารไม่ควบคุม

Condition of this calibration result:

Reference Standard Instruments : This certification is traceable to the international unit of unit maintained through:

| Instruments | Model | Serial No. | Certificate No. | Traceable |
|------------------------------|----------|------------|-----------------|---|
| Data Acquisition Switch Unit | 34970A | MY44065265 | WK2407-141-1 | WK Electric Co., Ltd. |
| Digital Thermo-Hygrometer | HT-771SD | AI.07155 | 25H171 | Technology Promotion Association (Thailand-Japan). |

Calibration Result:

Measurement Temperature Source Accuracy for COD Reactor.

| Capacity (Vial) | Nominal Value (°C) | Average Value (°C) | Uncertainty of Measurement (±°C) |
|--------------------|-----------------------|-----------------------|-------------------------------------|
| 25 Vial | 150.0 | 150.4 | 0.47 |

Unit : °C

| | | | | |
|---------|---------|---------|---------|---------|
| (1A) | (2A) | (3A) | (4A) | (5A) |
| 150.407 | 150.377 | 150.269 | 150.402 | 150.422 |
| (1B) | (2B) | (3B) | (4B) | (5B) |
| 150.426 | 150.394 | 150.644 | 150.690 | 150.542 |
| (1C) | (2C) | (3C) | (4C) | (5C) |
| 150.477 | 150.303 | 150.627 | 150.257 | 150.176 |
| (1D) | (2D) | (3D) | (4D) | (5D) |
| 150.462 | 150.456 | 150.199 | 150.406 | 150.102 |
| (1E) | (2E) | (3E) | (4E) | (5E) |
| 150.185 | 150.513 | 150.235 | 150.460 | 150.442 |

Figure: Shows the location of the temperature source.

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

** End of certificate **

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Certificate No. : HIT-2513-0437

Page : 1 of 2

CERTIFICATE OF ANALYSIS

Equipment : Cyanuric Acid Portable Photometer

Meter Model : HI97722C Serial No. : 905060058111

Manufacturer : Hanna Instruments

Made in : Romania

Condition As-Received : Used Product

Reference : RE250509

Customer name : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Rd., Bangchak,
Phrakhanong, Bangkok 10260

Received date : 20 March 2025

Calibrate date : 24 March 2025

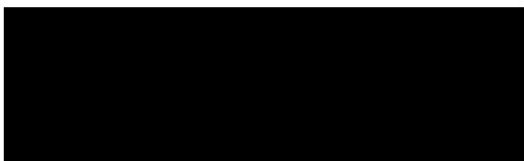
Issue date : 24 March 2025

Ambient Temperature : (25 ± 2)°C

Relative Humidity : (50 ± 15) % RH

Calibrated Location : Hanna Instruments (Thailand) Ltd.

Calibrated by :



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) เอกสารไม่ควบคุม

Condition of this result of analysis

Cal Check Standard Cuvettes Specifications :

Product code: HI97722-11 Lot number: SC0391/24

| Standard cuvette | Standard Value (mg/L) | Lot Standard Deviation (mg/L) | Lot number | Best used before |
|------------------|--------------------------|----------------------------------|------------|------------------|
| A, ZERO | 0 | 0.001 | 8366 | April 2026 |
| B, HI97722 | 20 | 0.207 | 7872 | April 2026 |

Specifications for validation procedure:

| Standard cuvette | Standard Value (mg/L) | Lot Standard Deviation (mg/L) | Lot number | Best used before |
|------------------|--------------------------|----------------------------------|------------|------------------|
| B, HI97722 | 20 ± 1 | 19 to 21 | 7872 | April 2026 |

Method of Standardization

This quality is standardized using which is calibrated by adaptation of Turbidimetric Method as the following details
below :

Result of analysis :

| Cyanuric Acid Standard (mg/L) | Reading (mg/L) | Error (mg/L) |
|-------------------------------|----------------|--------------|
| 0 | 0 | 0 |
| 20 ± 1 | 20 | 0 |

** End of certificate **

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Request No. 25-68 / 0320

MTC. ACL.No. 372 / 68

CALIBRATION CERTIFICATE

NOMENCLATURE : 1. Atomic Absorption Spectrophotometer "Agilent Technologies"

Model AA240FS, Serial No. MY13160001

2. Working standard solution "CPA chem"

Solution of 29 components, Lot No. 1012852

SUBMITTED BY : United Analyst and Engineering Consultant Co., Ltd.

3 Soi Udornasuk 41, Sukhumvit Road, Bangchak, Prakanong, Bangkok 10260

CALIBRATION PROCEDURE : 1. Performance Verification of Atomic Absorption Spectrophotometer (WI-500-02-30)

2. Estimation Uncertainty of Measurement in Analytical Chemistry (QP-513)

CALIBRATION RANGE: 0.02, 0.10, 0.30, 0.50, 0.70 mg/l at 228.8 nm.Cd, 0.10, 0.20, 0.30, 0.50, 0.70 mg/l at 357.9 nm.Cr,
0.05, 0.10, 0.30, 0.50, 0.70 mg/l at 324.7 nm.Cu, 0.10, 0.30, 0.50, 0.70, 1.00 mg/l at 248.3 nm.Fe,
0.20, 0.50, 0.70, 1.00, 1.50 mg/l at 217.0 nm.Pb, 0.05, 0.10, 0.30, 0.50, 0.70 mg/l at 279.5 nm.Mn,
0.10, 0.30, 0.50, 0.70, 1.00 mg/l at 232.0 nm.Ni, 0.05, 0.10, 0.30, 0.50, 0.70 mg/l at 213.9 nm.Zn

CALIBRATION DATE : 3 February 2025

REFERENCE MATERIAL : Traceable to NIST "Agilent Technologies", "CARLO ERBA", "PanReac AppliChem"

Cadmium Lot No. 0001152457, Chromium Lot No. 0106315418, Copper Batch No. 0001268514, Iron Batch No. T126087A,

Lead Lot No. 0123204734, Manganese Batch No. 0106301952, Nickel Batch No. 0104978044, Zinc Batch No. 0100792297

AMBIENT CONDITIONS : Temperature 25 ± 5 °C Relative humidity 50 ± 20 %

The Atomic Absorption Spectrophotometer has been calibrated against Reference Material traceable to National Institute of Standards and Technology (NIST) by The Analytical Chemistry Laboratory.

The results are attached

Calibrated by

(M)

Issued Date : 7 March 2025

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Request No. 25-68 / 0320

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MTC. ACL. No. 372 / 68

CALIBRATION DATA

1. Noise Level

| Element | Cd | Cr | Cu | Fe | Pb | Mn | Ni | Zn |
|--------------------|---------|---------|---------|--------|---------|---------|---------|---------|
| Absorbance | 0.0006 | 0.0001 | -0.0009 | 0.0003 | 0.0009 | 0.0010 | 0.0007 | 0.0008 |
| | -0.0001 | -0.0012 | -0.0007 | 0.0005 | 0.0000 | 0.0002 | 0.0009 | 0.0002 |
| | -0.0007 | -0.0010 | -0.0002 | 0.0008 | 0.0003 | 0.0014 | 0.0009 | 0.0002 |
| | -0.0002 | -0.0002 | -0.0005 | 0.0009 | 0.0003 | 0.0002 | 0.0008 | 0.0011 |
| | 0.0000 | -0.0005 | -0.0008 | 0.0008 | 0.0007 | 0.0001 | -0.0004 | 0.0013 |
| | 0.0001 | -0.0002 | -0.0007 | 0.0006 | -0.0002 | -0.0001 | 0.0002 | 0.0005 |
| | -0.0002 | 0.0000 | -0.0004 | 0.0009 | -0.0002 | -0.0008 | 0.0001 | 0.0008 |
| | 0.0006 | -0.0007 | -0.0001 | 0.0004 | -0.0001 | -0.0003 | 0.0009 | 0.0003 |
| | 0.0008 | -0.0008 | -0.0008 | 0.0014 | 0.0007 | -0.0005 | 0.0009 | 0.0005 |
| | -0.0005 | -0.0008 | -0.0009 | 0.0013 | 0.0006 | -0.0002 | 0.0002 | 0.0014 |
| | -0.0002 | -0.0013 | 0.0010 | 0.0011 | 0.0004 | -0.0005 | 0.0001 | 0.0006 |
| | -0.0005 | -0.0018 | 0.0012 | 0.0014 | 0.0004 | -0.0006 | 0.0005 | 0.0014 |
| | -0.0009 | -0.0012 | 0.0006 | 0.0014 | 0.0003 | -0.0003 | 0.0004 | 0.0010 |
| | 0.0003 | -0.0017 | 0.0002 | 0.0016 | 0.0003 | 0.0000 | -0.0005 | 0.0002 |
| | 0.0003 | -0.0015 | 0.0003 | 0.0002 | 0.0006 | 0.0003 | 0.0007 | 0.0009 |
| | 0.0004 | -0.0005 | 0.0001 | 0.0014 | 0.0007 | 0.0009 | 0.0007 | 0.0007 |
| | -0.0001 | 0.0018 | 0.0010 | 0.0016 | 0.0001 | -0.0002 | 0.0012 | -0.0002 |
| | 0.0003 | -0.0017 | 0.0012 | 0.0011 | 0.0003 | 0.0005 | 0.0011 | -0.0002 |
| | 0.0010 | -0.0018 | -0.0007 | 0.0009 | 0.0010 | 0.0009 | 0.0001 | 0.0004 |
| | 0.0004 | 0.0007 | -0.0008 | 0.0004 | 0.0011 | 0.0003 | 0.0002 | 0.0000 |
| Average Absorbance | 0.000 | -0.001 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.001 |

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INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

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Request No. 25-68 / 0320

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MTC. ACL. No. 372 / 68

2. Precision

| Element | Conc. (mg/l) | Absorbance | | | | | | | | | | Ave. Abs. | SD | %RSD |
|---------|-----------------|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------------|--------|------|
| Cd | 0.02 | 0.0076 | 0.0066 | 0.0071 | 0.0065 | 0.0075 | 0.0066 | 0.0077 | 0.0065 | 0.0065 | 0.0065 | 0.007 | 0.0005 | 7.39 |
| | 0.30 | 0.0923 | 0.0921 | 0.0920 | 0.0917 | 0.0919 | 0.0904 | 0.0929 | 0.0910 | 0.0915 | 0.0927 | 0.092 | 0.0008 | 0.82 |
| | 0.70 | 0.2083 | 0.2082 | 0.2100 | 0.2114 | 0.2102 | 0.2091 | 0.2094 | 0.2093 | 0.2088 | 0.2082 | 0.209 | 0.0010 | 0.49 |
| Cr | 0.10 | 0.0095 | 0.0104 | 0.0097 | 0.0095 | 0.0093 | 0.0091 | 0.0096 | 0.0095 | 0.0082 | 0.0080 | 0.009 | 0.0007 | 7.63 |
| | 0.30 | 0.0234 | 0.0243 | 0.0237 | 0.0242 | 0.0214 | 0.0226 | 0.0232 | 0.0233 | 0.0237 | 0.023 | 0.023 | 0.0008 | 3.61 |
| | 0.70 | 0.0474 | 0.0490 | 0.0497 | 0.0516 | 0.0487 | 0.0476 | 0.0474 | 0.0484 | 0.0473 | 0.0474 | 0.048 | 0.0014 | 2.85 |
| Cu | 0.05 | 0.0073 | 0.0072 | 0.0060 | 0.0068 | 0.0067 | 0.0065 | 0.0070 | 0.0066 | 0.0068 | 0.0070 | 0.007 | 0.0004 | 5.53 |
| | 0.30 | 0.0380 | 0.0385 | 0.0377 | 0.0382 | 0.0394 | 0.0375 | 0.0381 | 0.0392 | 0.0389 | 0.0385 | 0.038 | 0.0006 | 1.62 |
| | 0.70 | 0.0888 | 0.0895 | 0.0890 | 0.0902 | 0.0897 | 0.0893 | 0.0899 | 0.0890 | 0.0902 | 0.0898 | 0.090 | 0.0005 | 0.56 |
| Fe | 0.10 | 0.0102 | 0.0103 | 0.0100 | 0.0092 | 0.0109 | 0.0094 | 0.0101 | 0.0098 | 0.0092 | 0.0101 | 0.010 | 0.0005 | 5.39 |
| | 0.50 | 0.0421 | 0.0421 | 0.0424 | 0.0421 | 0.0425 | 0.0412 | 0.0419 | 0.0425 | 0.0419 | 0.0429 | 0.042 | 0.0005 | 1.09 |
| | 1.00 | 0.0791 | 0.0782 | 0.0780 | 0.0780 | 0.0776 | 0.0792 | 0.0780 | 0.0782 | 0.0786 | 0.0794 | 0.078 | 0.0006 | 0.78 |
| Pb | 0.20 | 0.0092 | 0.0087 | 0.0081 | 0.0092 | 0.0090 | 0.0087 | 0.0091 | 0.0082 | 0.0091 | 0.0088 | 0.009 | 0.0004 | 4.49 |
| | 0.70 | 0.0275 | 0.0290 | 0.0288 | 0.0283 | 0.0272 | 0.0286 | 0.0280 | 0.0285 | 0.0288 | 0.0286 | 0.028 | 0.0006 | 2.09 |
| | 1.50 | 0.0592 | 0.0580 | 0.0591 | 0.0596 | 0.0577 | 0.0589 | 0.0591 | 0.0584 | 0.0575 | 0.0595 | 0.059 | 0.0008 | 1.28 |
| Mn | 0.05 | 0.0126 | 0.0130 | 0.0123 | 0.0113 | 0.0115 | 0.0126 | 0.0122 | 0.0123 | 0.0114 | 0.0117 | 0.012 | 0.0006 | 4.81 |
| | 0.30 | 0.0588 | 0.0582 | 0.0584 | 0.0593 | 0.0582 | 0.0584 | 0.0596 | 0.0602 | 0.0581 | 0.0577 | 0.059 | 0.0008 | 1.33 |
| | 0.70 | 0.1320 | 0.1318 | 0.1313 | 0.1306 | 0.1324 | 0.1314 | 0.1320 | 0.1308 | 0.1303 | 0.1305 | 0.131 | 0.0007 | 0.56 |
| Ni | 0.10 | 0.0107 | 0.0110 | 0.0102 | 0.0098 | 0.0101 | 0.0106 | 0.0096 | 0.0108 | 0.0100 | 0.0102 | 0.010 | 0.0005 | 4.44 |
| | 0.50 | 0.0452 | 0.0454 | 0.0441 | 0.0449 | 0.0452 | 0.0450 | 0.0453 | 0.0452 | 0.0454 | 0.0455 | 0.045 | 0.0004 | 0.89 |
| | 1.00 | 0.0848 | 0.0875 | 0.0856 | 0.0853 | 0.0866 | 0.0866 | 0.0866 | 0.0865 | 0.0857 | 0.0859 | 0.086 | 0.0008 | 0.92 |
| Zn | 0.05 | 0.0367 | 0.0370 | 0.0372 | 0.0362 | 0.0369 | 0.0367 | 0.0363 | 0.0367 | 0.0365 | 0.0360 | 0.037 | 0.0004 | 1.02 |
| | 0.30 | 0.2022 | 0.2009 | 0.2022 | 0.2017 | 0.2022 | 0.2009 | 0.2001 | 0.2016 | 0.2022 | 0.2023 | 0.202 | 0.0008 | 0.38 |
| | 0.70 | 0.4118 | 0.4123 | 0.4107 | 0.4132 | 0.4142 | 0.4157 | 0.4086 | 0.4098 | 0.4101 | 0.4079 | 0.411 | 0.0025 | 0.60 |

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Request No. 25-68 / 0320

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MTC. ACL. No. 372 / 68

3. Trueness

3.1 Reading on wavelength- Cadmium(Cd) at 228.8 nm.

| Element | Standard Value of RM (mg/l) | Reading (mg/l) | Error of Measurement (mg/l) | Error of Measurement (%) | Uncertainty (mg/l) |
|---------|--------------------------------|-------------------|--------------------------------|-----------------------------|-----------------------|
| Cd | 0.020 | 0.020 | 0.000 | 1.23 | ± 0.005 |
| | 0.300 | 0.300 | 0.000 | 0.11 | ± 0.005 |
| | 0.700 | 0.688 | -0.012 | 1.67 | ± 0.008 |

3.2 Reading on wavelength- Chromium (Cr) at 357.9 nm.

| Element | Standard Value of RM (mg/l) | Reading (mg/l) | Error of Measurement (mg/l) | Error of Measurement (%) | Uncertainty (mg/l) |
|---------|--------------------------------|-------------------|--------------------------------|-----------------------------|-----------------------|
| Cr | 0.1000 | 0.109 | 0.009 | 9.39 | ± 0.009 |
| | 0.3000 | 0.306 | 0.006 | 1.98 | ± 0.012 |
| | 0.7000 | 0.657 | -0.043 | 6.20 | ± 0.023 |

3.3 Reading on wavelength- Copper (Cu) at 324.7 nm.

| Element | Standard Value of RM (mg/l) | Reading (mg/l) | Error of Measurement (mg/l) | Error of Measurement (%) | Uncertainty (mg/l) |
|---------|--------------------------------|-------------------|--------------------------------|-----------------------------|-----------------------|
| Cu | 0.050 | 0.050 | 0.000 | 0.68 | ± 0.003 |
| | 0.300 | 0.292 | -0.008 | 2.70 | ± 0.009 |
| | 0.700 | 0.684 | -0.016 | 2.31 | ± 0.020 |

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Request No. 25-68 / 0320

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MTC. ACL. No. 372 / 68

3.4 Reading on wavelength- Iron (Fe) at 248.3 nm.

| Element | Standard Value of RM (mg/l) | Reading (mg/l) | Error of Measurement (mg/l) | Error of Measurement (%) | Uncertainty (mg/l) |
|---------|-----------------------------|----------------|-----------------------------|--------------------------|--------------------|
| Fe | 0.100 | 0.107 | 0.007 | 7.06 | ± 0.014 |
| | 0.500 | 0.522 | 0.022 | 4.49 | ± 0.016 |
| | 1.000 | 0.990 | -0.010 | 1.02 | ± 0.029 |

3.5 Reading on wavelength- Lead (Pb) at 217.0 nm.

| Element | Standard Value of RM (mg/l) | Reading (mg/l) | Error of Measurement (mg/l) | Error of Measurement (%) | Uncertainty (mg/l) |
|---------|-----------------------------|----------------|-----------------------------|--------------------------|--------------------|
| Pb | 0.200 | 0.200 | 0.000 | 0.15 | ± 0.014 |
| | 0.700 | 0.701 | 0.001 | 0.10 | ± 0.030 |
| | 1.500 | 1.480 | -0.020 | 1.32 | ± 0.061 |

3.6 Reading on wavelength- Manganese (Mn) at 279.5 nm.

| Element | Standard Value of RM (mg/l) | Reading (mg/l) | Error of Measurement (mg/l) | Error of Measurement (%) | Uncertainty (mg/l) |
|---------|-----------------------------|----------------|-----------------------------|--------------------------|--------------------|
| Mn | 0.050 | 0.051 | 0.001 | 2.41 | ± 0.005 |
| | 0.300 | 0.291 | -0.009 | 2.92 | ± 0.007 |
| | 0.700 | 0.665 | -0.035 | 4.95 | ± 0.014 |

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Request No. 25-68 / 0320

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MTC. ACL. No. 372 / 68

3.7 Reading on wavelength- Nickel (Ni) at 232.0 nm.

| Element | Standard Value of RM (mg/l) | Reading (mg/l) | Error of Measurement (mg/l) | Error of Measurement (%) | Uncertainty (mg/l) |
|---------|-----------------------------|----------------|-----------------------------|--------------------------|--------------------|
| Ni | 0.100 | 0.098 | -0.002 | 1.60 | ± 0.013 |
| | 0.500 | 0.490 | -0.010 | 2.00 | ± 0.018 |
| | 1.000 | 0.951 | -0.049 | 4.90 | ± 0.032 |

3.8 Reading on wavelength- Zinc (Zn) at 213.9 nm.

| Element | Standard Value of RM (mg/l) | Reading (mg/l) | Error of Measurement (mg/l) | Error of Measurement (%) | Uncertainty (mg/l) |
|---------|-----------------------------|----------------|-----------------------------|--------------------------|--------------------|
| Zn | 0.050 | 0.048 | -0.002 | 3.37 | ± 0.013 |
| | 0.300 | 0.325 | 0.025 | 8.32 | ± 0.013 |
| | 0.700 | 0.677 | -0.023 | 3.33 | ± 0.019 |

Remark : The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2.0 (k=2).

which gives a coverage factor of approximately 95%

Calibrated by

Approved

(D

Director

Issued Date : 7 March 2025

INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

End of Certificate

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PinAAcle 900F Preventive Maintenance Report

Company Name: UAE Consultant Co., LTD.

Instrument Location: 41 Sukumvit Rd.,

Phra Khanong, Bangkok 10260

Instrument Serial No.: PFBS20031902

Date: 29-Apr-2025

PinAAcle 900F Preventive Maintenance (PM)

| | | | |
|---------------------------------------|---|--------------------------------|-------------|
| Company Name: | United Analyst and Engineering Consultant Co., LTD. | | |
| Address | 41 Sukumvit Rd., Phra Khanong, Bangkok 10260 | | |
| (Instrument Location): | | | |
| Serial Number: | PFBS20031902 | PM Number: | 1 of 2 |
| Customer Name (if applicable): | K. Yinda | Telephone Number: | 095-5580049 |
| Customer Support Engineer Name: | K. Chayanon | Service Order Number: | WO-03126047 |
| Date PM Performed: (DD-MM-YYYY) | 29-Apr-2025 | Next PM Due Date: (DD-MM-YYYY) | 29-Oct-2025 |
| Standard Labor Hours to Complete PM : | | 5 hours | |

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

Scope

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

The customer should save their method before the PM begins.

General Instructions:

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

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

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

Update the PM sticker and instrument logbook as required.

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Component List

| Component / Specific Model | Serial # | Configuration Notes |
|----------------------------|--------------|-----------------------|
| PinAAcle900F | PF8520031902 | Syngistix V4.0.1.1935 |
| FIAS100 | 100524040501 | |
| | | |
| | | |

Parts Lists

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

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

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

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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.
- ☒ Check the condition of the end cap, burner head, and nebulizer O-rings. Replace if necessary.
- ☒ Check the drain system for signs of wear. Replace worn or damaged parts.
- ☒ Visually check for proper flame conditions when igniting the Air-C2H2 and N2O-C2H2 flames (if applicable).

4. Electrical:

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

5. Optics:

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

6. Gases:

- ☒ Verify that the Gases 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.

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Additional Tools Required for PM

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

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7. Flame Interlock Check:

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

| Parameter | Specification | Test Results | Pass/Fail |
|---|--|--------------|-----------|
| Flame Sensor | Air/C ₂ H ₂ Flame correctly shuts down | Active | Passed |
| Drain Sensor | Air/C ₂ H ₂ Flame correctly shuts down | Active | Passed |
| Nebulizer Sensor | Air/C ₂ H ₂ Flame correctly shuts down | Active | Passed |
| C ₂ H ₂ Pressure Sensor | Air/C ₂ H ₂ Flame correctly shuts down | Active | Passed |
| Air Pressure Sensor | Air/C ₂ H 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. | 0.9668 | 0.9878 | Passed |
| 0.2 A ND Filter | ± 5% from Cert. | 0.1953 | 0.1876 | Passed |

8.2 Baseline Noise at 1.0 Absorbance with Barium

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

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

8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

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

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8.4 D₂ Background Compensation with Copper

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

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

8.5 AA-BG Baseline Noise with Copper

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

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

8.6 AA-BG Baseline Noise with Arsenic

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

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

8.7 Flame Sensitivity

Description: Instrument Sensitivity checked against Copper standard.

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

10. Review:

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

Additional Comments

Additional Comments Regarding the PM

Review

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

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

Review of Preventive Maintenance:

| | |
|--------------|------------------------------------|
| Authorized P | Date: 29 Apr 2025 (DD-MMM-YYYY) |
| Authorized C | Date: 29 Apr 2025 (DD-MMM-YYYY) |

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http://www.perkinelmer.com

Service Report

| Work Order Number | Activity Code | Billing Type | Requested Start Date | Model | Serial Number |
|------------------------------|---------------------|--------------|--------------------------------|----------------|---------------|
| WO-03129047 | Planned Maintenance | Contract | 10/1/2568 11:06 s. | AAAS200051 | PFBS20031902 |
| Service Representative Name | Contract Number | Expiry Date | Equipment ID | System ID | |
| Kanan, Chayanon | SC-0035564109 | 31/10/2025 | N/A | N/A | |
| UGB Number | | | | | |
| N/A | | | | | |
| Equipment Location | | | Bill To Name | | |
| บริษัท อู่เรือไทย จำกัด | | | บริษัท อู่เรือไทย จำกัด | | |
| อาคารพาณิชย์ ๑๑๑ ถนนสุขุมวิท | | | อาคารพาณิชย์ ๑๑๑ ถนนสุขุมวิท | | |
| กรุงเทพมหานคร ๑๐๑๑๐ | | | กรุงเทพมหานคร ๑๐๑๑๐ | | |
| Customer Contact | Phone Number | Fax Number | Email | Purchase Order | |
| K. อู่เรือไทย (อู่เรือไทย) | 095-5580049 | N/A | richakom.prasert1996@gmail.com | HPO-250100002 | |

Work Description

- PM 2/2 (AAurFlex/)
- Cleaning Cell, Chamber, Filter
- Wavelength Calibrate : Pass
- Wavelength Scan As.Cu.Ba.K.Ni : Pass
- Align cell with Hg : OK

| Start Date | End Date | Work Description |
|------------|-----------|------------------|
| 28/9/2025 | 29/9/2025 | |

Tools Used

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

Material Used

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

Labour Details

| Part Number | Part Description | Start Date | Quantity |
|-------------|--------------------------|------------|----------|
| SV000013 | Preventative maintenance | 28/9/2025 | 4 |

| Work Complete | Customer Signature | Technician Signature |
|---|--------------------|----------------------|
| Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> | | |
| PMOQ/PIV Left with Customer | | |
| Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> | | |

Terms & Conditions

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Customer Acknowledgment of receipt of the above repair / replacement.

Special Terms and Conditions: This is not an invoice.

Taxes will be applied to your invoice if applicable.

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

| Part Number | Release | Publication Date |  |
|-------------|---------|------------------|---|
| 09370005 | C | January 2013 | |

Scope

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

General Instructions:

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

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Component List

| Component / Specific Model | Serial # | Firmware Version | Configuration Notes |
|----------------------------|--------------|------------------|-----------------------|
| FIAS100 | 100S24040501 | 2.20 | Syngistix V4.0.1.1935 |
| | | | |
| | | | |
| | | | |

Parts Lists

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

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

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

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Procedure Checklist

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

1. General:

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

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

- ☐ Visual Damage (if yes, describe)

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

2. Instrument components

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

3. Mixing/Separation Assembly & Pump Tubing:

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

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4. Cell, Cell Windows, Transfer Line:

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

5. Operational Tests:

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

6. Review:

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

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Additional Comments

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

Review

The preventive maintenance checks and if applicable performance tests for FIAS 100/400 have been completed.

This FIAS 100/400 Passes ☒ Fails ☐ the preventive maintenance.

Review of Preventive Maintenance:

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

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Document History

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

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http://www.perkinelmer.com

Service Report

| Work Order Number | Activity Code | Billing Type | Requested Start Date | Model | Serial Number |
|--|------------------------|--------------|--|----------------|---------------|
| WO-03051971 | Preventive Maintenance | Contract | 10/03/2568 23:08 น. | 80508570 | 150524040501 |
| Service Representative Name | Contract Number | Expiry Date | Equipment ID | System ID | |
| Kanan, Chayanan | SC-0038650090 | 24/05/2025 | N/A | N/A | |
| UDI Number | | | | | |
| N/A | | | | | |
| Equipment Location | | | Bill To Name | | |
| บริษัท อู่เรือไทย จำกัด อาคารอู่เรือ, ถนนพหลโยธิน กรุงเทพมหานคร 10260 TH | | | บริษัท อู่เรือไทย จำกัด อาคารอู่เรือ, ถนนพหลโยธิน กรุงเทพมหานคร 10260 TH | | |
| Customer Contact | Phone Number | Fax Number | Email | Purchase Order | |
| K. Nithakorn Sarnyai | 095-5580249 | N/A | perkin@nitha@gmail.com | HPO-340400211 | |

| Work Description | |
|--|--|
| - PM 22 Warranty - Cleaning Port Valve, Manifold, Tuning - Run In test, Pass Start Date: 29/04/2025 End Date: 29/04/2025 Work Description: | |

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

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

| Labour Details | | | |
|----------------|--------------------------|------------|----------|
| Part Number | Part Description | Start Date | Quantity |
| SV000013 | Preventative maintenance | 29/04/2025 | 3 |
| SV000002 | Service Travel | 29/04/2025 | 1 |

| Work Complete | Customer Signature | Technician Signature |
|--|--------------------|-------------------------|
| Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> PM/OQ/PTV Left with Customer Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> | | |
| | | 95/2568 Kanan, Chayanan |

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

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

Agilent CrossLab Start Up Services

 Agilent 5100 5110 ICP-OES
Preventive Maintenance

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides what you need to reduce unplanned downtime and keep your systems operating at their peak performance.

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.

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952568 WO-03126049

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เอกสารควบคุม, 6

Agilent 5100, 5110 Preventive Maintenance Checklist



Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative.
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.
- For customers using HF applications, the instrument should be returned to its standard sample introduction system.

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Agilent 5100, 5110 Preventive Maintenance Checklist



Important Customer Web Links

- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
 - Sample Prep and Containment
 - Chemical Standards
 - Analysis
 - Service and Support
 - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- Need to place a service call?** Flexible Repair Options | Agilent

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น.6/32

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Service not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page.
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Completion section.
- Ask the customer to sign the Service Verification section including the customer's and your signature.

Instrument Maintenance

System Information

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

| | |
|-------------------------------------|------------------|
| Instrument System Name and ID | 5110 VDV ICP-OES |
| Instrument System Site and Location | UAE Consultant |

| List System Component Product Numbers | List the Serial Numbers of each Component |
|---------------------------------------|---|
| 1. G 8015 A | MY 18030001 |
| 2. | |
| 3. | |
| 4. | |
| 5. | |
| 6. | |
| 7. | |
| 8. | |
| 9. | |

| ICP-OES Configuration Table | Circle the type or write in the type if other |
|-----------------------------|--|
| Nebulizer Type | SeaSpray OneNeb Conikal Other |
| Spray Chamber | Cyclonic Single Pass Cyclonic Double Pass Other |
| Torch | Radial Dual View Other |
| Torch Type | One Piece Semi Demountable Fully Demountable Other |
| Injector Diameter | 2.4mm 1.8mm 1.4mm 0.8mm Other |
| Injector Material | Quartz Ceramic Other |

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and implementation of Service Notes.
- ☒ Check for required firmware/software updates and verify with customers if they would like them installed.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it. n/a
- ☒ Ask the customer to remove any samples from the ICP-OES sample introduction area, auto sampler or around the ICP-OES.

Preventive Maintenance Procedures

Record Pre-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table - Pre-PM.

Clean and inspect ICP-OES system

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☐ Replace high capacity air inlet dust filter element if installed. n/a
- ☒ Remove and clean instrument water inlet filter.

Agilent Water Recirculator

- ☐ Service not applicable
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter if present.
- ☒ Re fill with Agilent Cool Clear cooling fluid.
- ☒ Clean the cooling system Air filter and the condenser.

SPS 3 Auto Sampler

- ☒ Service not applicable
- ☐ Power cycle the autosampler and verify successful initialization.
- ☐ Inspect X and Z axis belts for wear. Replace is necessary.
- ☐ Clean X and Z axis slide shafts.
- ☐ Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and rinse port, ensure that the probe is approximately centered in the vial.

SPS 4 Auto sampler

- ☒ Service not applicable
- ☐ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☐ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner.
- ☐ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☐ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☐ Pump Tubing Replacement. Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles
- ☐ Test using customer's tray and move the sample probe to the sample vial 1, wash vial and rinse port and ensure that the probe is centered in the vial. If not use calibration wizard and calibrate the position.

AVS 4, 6, 7 Advanced Valve System

- ☒ Service not applicable
- ☐ Replace valve rotor seal
- ☐ Check fittings for signs of leaks
- ☐ Check tubing including autosampler tubing for kinks or excessive wear
- ☐ Check high flow pump for signs of leaks

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ICP-OES adjustment

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.

Record Post-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above, run the following Instrument tests

- ☒ Subsystem Communications Test
- ☒ Air Flow
- ☒ Water Flow
- ☒ Gas Flows
- ☒ RF Generator
- ☒ Camera Test
- ☒ Optics Test
- ☒ Nebulizer Test

- ☒ Record the result in the Instrument Test Results Table

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Restore Instrument

- ☐ For HF applications, ask the customer to reinstall their sample introduction system. N/A
- ☒ Leave system in an idle state: on and purging.
- ☒ Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☒ Complete the Signature Page with both Service Engineer and Customer signatures.

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Test Results

Instrument Performance Test Results Table

Note: These measurements do not form part of any specification and are for reference only.

| | Pre PM Sensitivity Check | | Post PM Sensitivity Check | |
|--------------------|--------------------------|---------|---------------------------|---------|
| | Radial | Axial * | Radial | Axial* |
| Zn 213.857 nm SRBR | 1783.8 | 2579.2 | 2210.8 | 3562.9 |
| Mn 257.610 nm SRBR | 9670.5 | 19614.9 | 10983.0 | 17894.4 |
| Al 396.152 nm SBR | 5.2 | 8.0 | 7.0 | 7.4 |
| K 766.491 nm SBR | 3.0 | 14.6 | 3.4 | 5.7 |

* Axial result is not applicable for G8016AA, G8012AA Radial View instruments.

Instrument Test Results Table

Note: The Instrument Test results are for systems using ICP Expert version 7.3 and above only.

| Instrument Test | Result |
|-------------------------------|--------|
| Subsystem Communications Test | Pass |
| Air Flow | Pass |
| Water Flow | Pass |
| Gas Flows | Pass |
| RF Generator | Pass |
| Camera Test | Pass |
| Optics Test | Pass |
| Nebulizer test | Pass |

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ICP-OES Status Results Table

Note: These measurements do not form part of any specification and are for reference only.

| Measurement | Standby Mode | Plasma On |
|------------------------------|----------------|-------------|
| Mains Voltage | 231.288 VAC | 226.380 VAC |
| Mains Current | 0.083 A | 0.106 A |
| Instrument Temperature | 21.1 °C | 21.6 °C |
| RF Air Flow (sensor speed) | 44.0 Hz | 41.1 Hz |
| Plasma Exhaust Temperature | No measurement | 47.1 °C |
| Water Flow Oscillator | No measurement | 1.14 L/min |
| Water Flow Detector | 0.92 L/min | 0.90 L/min |
| Water Inlet Temperature | 19.5 °C | 18.5 °C |
| Polychromator Temperature | 35.4 °C | 35.4 °C |
| CCD Temperature | -40.1 °C | -39.9 °C |
| Thermal Stabilizer | 35.0 °C | 35.0 °C |
| Argon Supply Pressure | 634.43 kPa | 583.77 kPa |
| Purge Gas Supply Pressure*1 | 631.28 kPa | 604.02 kPa |
| Option Gas Supply Pressure*1 | - kPa | - kPa |
| Nebulizer Flow | No measurement | 0.70 L/min |
| Nebulizer Back Pressure | No measurement | 233.61 kPa |
| Plasma Gas Flow | No measurement | 1196 L/min |
| Auxiliary Gas Flow | No measurement | 1.00 L/min |
| RF Power | No measurement | 1200.4 W |
| RF Supply Current | No measurement | 8.228 A |
| RF Supply Voltage | No measurement | 194.529 V |

*1 If option installed

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Consumed PM Parts

| Part Description | Part Number | Product or Model# where used | Quantity consumed |
|---|-------------|-------------------------------|-------------------|
| Axial Pre-Optic Window | G8010-68014 | G8010A, G8011A, G8014A/G8015A | 1 |
| Radial Pre-Optic Window | G8010-68015 | All | 1 |
| Agilent Cool Clear Coolant Fluid | 5799-0037 | Agilent Water Recirculator | 1 |
| Purge Gas Filter | G8010-60136 | All | 1 |
| Air inlet filter | G8000-68002 | All | 1 |
| High Capacity Air Filter | G8010-60189 | Optional | 1 |
| Rotor seal for 6-7 port valve for AVS6/7 | G8494-60002 | G8494A/G8495 | 1 |
| Rotor seal for 4 port valve for AVS4 | G8493-60002 | G8493A | 1 |
| Rinse solution to rinse station 2.5mm id x 1m | G8410-80123 | SPS 4 | 1 |
| Barb connector 2.5mm-1.5mm ID | G8410-80124 | SPS 4 | 1 |
| PVC waste tubing, 8mm od x 5mm id, 2m | G8410-80122 | SPS 4 | 1 |
| Additional Parts may be required from engineer's stock: | | | |
| X axis drive belt | 5410047500 | SPS 3 | 1 |
| Z axis drive belt | 5410047400 | SPS 3 | 1 |
| Peristaltic pump tubing, PVC SolvaFlex, 3 bridged, | 3710049000 | SPS 4 | 1 |

Consumed Parts Reference
(Purchased by customer, not included as part of PM)☒ Section Not Applicable

| Part Description | Part Number | Product or Model# where used | Quantity consumed |
|------------------|-------------|------------------------------|-------------------|
|------------------|-------------|------------------------------|-------------------|

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Signature Page

Service Engineer Comments (optional)

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

Service Verification

Date Service Completed:
3 Nov 2025
Customer Name:Total number of pages in this document:
14Revision: A.02, Issued: 21 January 2022
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Report Summary

| | |
|--------------------------|-------------------------------|
| Instrument Model | Agilent 5100/5110 VDV ICP-OES |
| Instrument ID | G8011A/G8015A |
| Instrument Serial Number | MY18030001 |
| Software Version | 7.3.1.9507 |
| Firmware Version | 3442 |
| Tested By | Burin 5nd test final |
| Test Completed On | 11/19/2025 2:14:28 PM |

Result Summary

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

| Resolution Test | | | Pass |
|--------------------|---------------|-------|------|
| Element Wavelength | Specification | Width | |
| N (174.213 nm) | ≤ 9.40 | 6.66 | |
| As (188.980 nm) | ≤ 8.20 | 6.00 | |
| C (193.027 nm) | ≤ 11.50 | 7.94 | |
| Mo (202.032 nm) | ≤ 8.20 | 6.15 | |
| Cr (206.158 nm) | ≤ 13.40 | 8.80 | |
| Zn (213.857 nm) | ≤ 8.70 | 6.60 | |
| Pb (220.353 nm) | ≤ 9.50 | 7.07 | |
| Co (228.615 nm) | ≤ 17.20 | 10.73 | |
| Ba (230.424 nm) | ≤ 9.40 | 6.85 | |
| Mn (257.610 nm) | ≤ 13.30 | 9.20 | |
| Mn (260.568 nm) | ≤ 20.30 | 13.82 | |
| Cr (267.716 nm) | ≤ 11.00 | 7.99 | |
| Cu (324.754 nm) | ≤ 25.00 | 17.85 | |
| Cu (327.395 nm) | ≤ 14.20 | 11.44 | |
| Sr (338.071 nm) | ≤ 33.50 | 24.20 | |
| Ba (455.403 nm) | ≤ 44.00 | 33.83 | |
| Sr (460.793 nm) | ≤ 36.00 | 18.28 | |
| Ba (493.408 nm) | ≤ 36.00 | 24.97 | |
| Ba (614.171 nm) | ≤ 42.00 | 29.36 | |
| Ar (675.283 nm) | ≤ 74.00 | 57.75 | |
| K (766.491 nm) | ≤ 80.00 | 73.92 | |

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| Sensitivity Test | | | | | | Pass |
|--------------------|---------------|--------|---------|------------|---------|------|
| Radial | | | | | | |
| Element Wavelength | Specification | Method | Ratio | Standard | Blank | |
| As (188.980 nm) | ≥ 46.0 | SRBR | 96.4 | 735.7 | 50.5 | |
| Se (196.026 nm) | ≥ 41.0 | SRBR | 79.6 | 779.2 | 77.7 | |
| Zn (213.857 nm) | ≥ 1421.0 | SRBR | 2270.3 | 24005.6 | 110.8 | |
| Pb (220.353 nm) | ≥ 46.0 | SRBR | 129.5 | 1701.5 | 144.5 | |
| Mn (257.610 nm) | ≥ 3518.0 | SRBR | 9810.6 | 233072.5 | 561.7 | |
| Al (396.152 nm) | ≥ 3.4 | SBR | 6.5 | 36392.0 | 4836.0 | |
| Ba (493.408 nm) | ≥ 34.0 | SBR | 93.1 | 1586633.9 | 16860.6 | |
| K (766.491 nm) | ≥ 1.8 | SBR | 1.9 | 54511.9 | 19124.8 | |
| Axial | | | | | | |
| Element Wavelength | Specification | Method | Ratio | Standard | Blank | |
| As (188.980 nm) | ≥ 208.0 | SRBR | 245.0 | 3080.3 | 143.7 | |
| Se (196.026 nm) | ≥ 159.0 | SRBR | 211.9 | 3471.4 | 233.5 | |
| Zn (206.200 nm) | ≥ 234.0 | SRBR | 771.1 | 8797.9 | 126.5 | |
| Zn (213.857 nm) | ≥ 1743.0 | SRBR | 6307.2 | 120003.6 | 359.8 | |
| Cd (214.439 nm) | ≥ 4227.0 | SRBR | 6012.4 | 96451.0 | 256.0 | |
| Pb (220.353 nm) | ≥ 320.0 | SRBR | 571.2 | 12760.9 | 463.5 | |
| Mn (257.610 nm) | ≥ 10625.0 | SRBR | 39386.8 | 1701779.7 | 1862.7 | |
| Cr (267.716 nm) | ≥ 1048.0 | SRBR | 5192.7 | 206938.5 | 1564.3 | |
| Cu (324.754 nm) | ≥ 19.0 | SBR | 49.4 | 261983.3 | 5202.7 | |
| Al (396.152 nm) | ≥ 6.0 | SBR | 20.3 | 318135.9 | 14932.2 | |
| Ba (493.408 nm) | ≥ 60.0 | SBR | 255.9 | 13403057.9 | 52173.2 | |
| K (766.491 nm) | ≥ 24.0 | SBR | 38.7 | 1918325.2 | 48283.1 | |

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| Precision Test | | | Pass |
|--------------------|---------------|----------------------|------|
| Radial | | | |
| Element Wavelength | Specification | Measured Value % RSD | |
| As (188.980 nm) | ≤ 2.60 | 1.32 | |
| Se (196.026 nm) | ≤ 2.60 | 0.81 | |
| Zn (213.857 nm) | ≤ 1.50 | 0.25 | |
| Pb (220.353 nm) | ≤ 2.60 | 0.78 | |
| Mn (257.610 nm) | ≤ 1.50 | 0.28 | |
| Al (396.152 nm) | ≤ 1.50 | 0.31 | |
| Ba (493.408 nm) | ≤ 1.50 | 0.28 | |
| K (766.491 nm) | ≤ 1.50 | 0.19 | |
| Axial | | | |
| Element Wavelength | Specification | Measured Value % RSD | |
| As (188.980 nm) | ≤ 1.50 | 0.61 | |
| Se (196.026 nm) | ≤ 1.50 | 0.72 | |
| Zn (206.200 nm) | ≤ 1.50 | 0.37 | |
| Zn (213.857 nm) | ≤ 1.50 | 0.32 | |
| Cd (214.439 nm) | ≤ 1.50 | 0.31 | |
| Pb (220.353 nm) | ≤ 1.50 | 0.37 | |
| Mn (257.610 nm) | ≤ 1.50 | 0.69 | |
| Cr (267.716 nm) | ≤ 1.50 | 0.35 | |
| Cu (324.754 nm) | ≤ 1.50 | 0.49 | |
| Al (396.152 nm) | ≤ 1.50 | 0.49 | |
| Ba (493.408 nm) | ≤ 1.50 | 0.73 | |
| K (766.491 nm) | ≤ 1.50 | 0.31 | |

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Milestone DMA-80 Service Protocol

SITHIPORN
associates

DMA-80 DIRECT MERCURY ANALYZER System



SITHIPORN ASSOCIATES CO.,LTD.
451-451/1 Sirinthorn Road, Bangbunru, Bangplud, Bangkok 10700 Thailand
Tel. (662) 433-8331, 434-9191 fax: (662) 433-1679, 434-9510

DMA-80 Direct Mercury Analyzer

SERVICE PROTOCOL REPORT

To be filled in before service visit (1st page)

Customer information:

| | |
|-------------------|---|
| Company: | บ.ยูไนเต็ด แอนนาลิซิส จก. (สนง.ใหญ่) |
| Department: | LAB |
| Person in charge: | คุณ ภูษงค์ พานิชย์เลิศอำไพ |
| Address: | ซอยอุดมสุข 41 ถนนสุขุมวิท กรุงเทพมหานคร 10260 |
| Tel.: | +66 (86) 3191292 |
| E-mail: | bhuchonk@uaeconsultant.co.th |

Technical data:

| | | | |
|--|----------------------|------------|----------------------|
| Unit Serial Number: | 24114043 | | |
| Terminal type or USB-640 Gateway: | Termianl-660 | SN | 24107843 |
| Software, type and revision: | Easy Control | Rev. | 03-F-SP1(2023-09-20) |
| Air Compressor (if present) | 95100 | SN | 12236761 |
| Gas system pump (if present) | - | SN | - |
| Installation and last maintenance dates: | Inst. on: 31/01/2025 | Maint. on: | |

NOTE: after achievement of the following protocol a filled and signed copy of this report has to be sent to Milestone srl at: service@milestonesrl.com

For the best result of the test below we recommended to use the Milestone DMA-80 Service Kit (PN DMA-SKIT).

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4. AUTOSAMPLER SYSTEM

| | OK | Not OK | Re-Adjusted |
|----------------------------------|----|--------|-------------|
| Calibration of autosampler motor | ✓ | | |
| Cylinders alignment | ✓ | | |

| | Fast | Slow | Normal |
|------------------------------|------|------|--------|
| Speed of pneumatic cylinders | | | ✓ |

Using the maintenance grease, periodically lightly lubricate all exposed steel rods of the horizontal and vertical cylinders.

5. COMPONENTS CHECK

Conditions of the different parts used/installed on DMA unit:

| | OK | Not OK | Replaced | Cleaned |
|---------------------|----|--------|----------|---------|
| Catalyst tube | | | ✓ | |
| Amalgamator | ✓ | | | |
| Quartz boats | ✓ | | | |
| Nickel boats | - | | | |
| Autosampler plate | ✓ | | | |
| Gas kit accessories | - | | | |

6. TEMPERATURES

| | | Correct value | Actual value | Final value (Pass) |
|-------------------------------|----------------------------------|---------------|--------------|--------------------|
| Drying/ Decomposition furnace | If controlled by Infrared sensor | 850°C ± 10°C | - | - |
| | If controlled by thermocouple | 650°C ± 10°C | 650 | Pass |
| Catalyst furnace | Type 1 | 515°C ± 5°C | - | - |
| | Type 2,3 | 565°C ± 10°C | 565°C | Pass |

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1. VISUAL INSPECTION

| | Good | Damaged | Corroded/Dirty |
|------------------|------|---------|----------------|
| External chassis | ✓ | | |
| Inside | ✓ | | |
| Electric parts | ✓ | | |
| Screws | ✓ | | |

2. ELECTRICAL SAFETY TEST

Using a suitable testing device check the below reported parameters and take note of the results.

| Parameter | Result | OK | Not OK |
|----------------------------|------------------------|----|--------|
| Voltage : 230 VAC (±10%) | Actual value : 223 VAC | ✓ | |
| Ground : ≤ 2 | Actual value: 0.8 VAC | ✓ | |

3. PRESSURE CHECK

| | Oxygen (purity O ₂ >99,95%) | Milestone air compressor |
|-------------|--|--------------------------|
| Gas carrier | Purity: - | ✓ |

The pressure at the supply source manometer should be approx. 4.0bar
The flow rate depends by type of cuvette installed on the DMA-80 unit.


| | Correct value | Actual value | Final value | Correct value | Actual value | Final value | Correct value | Actual value | Final value |
|----------------|---------------|--------------|-------------|---------------|--------------|-------------|---------------|--------------|-------------|
| Inlet pressure | 3.1 bar | - | - | 3.1 bar | - | - | 3.1 bar | 3.1 bar | Pass |
| Flow rate | 10-12 l/h | - | - | 8-10 l/h | - | - | 6-8 l/h | 8 l/h | Pass |

Check all possible leakage points and their conditions:

| | Good | Damaged | Corroded |
|-------------------------|------|---------|----------|
| Tubing | ✓ | | |
| Silicon joints | ✓ | | |
| O-rings | ✓ | | |
| Cuvette sealing O-rings | ✓ | | |
| Gas connections | ✓ | | |
| Valves | ✓ | | |
| Sample boat carrier | ✓ | | |
| Catalyst flange | ✓ | | |

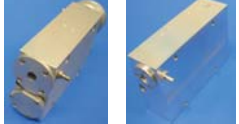

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| | | | | |
|----------------------------------|---|--------------|-------|------|
| |  | | | |
| Amalgamator stand by temperature | If controlled by Infrared sensor | 170°C ± 10°C | 170°C | Pass |
| | If IR sensor is not present | 145°C ± 25°C | - | - |
| Amalgamator heating temperature | 850°C ± 10°C | 850°C | Pass | |
| Cuvette | 125°C ± 5°C | 125°C | Pass | |

7. SPECTROMETER

The spectrometer can be equipped with a single beam system (ducon lamp) or with a dual beam system (tricon lamp)

| | Old cuvette type | | | | | | Actual cuvette type | | | | | |
|-----------------------------------|--|--------------|-------------|---------------------|--------------|-------------|---|--------------|-------------|---------------------|---------------------|-------------|
| |  | | | | | |  | | | | | |
| | Gain | | | Offset | | | Gain | | | Offset | | |
| | Correct value | Actual value | Final value | Correct value | Actual value | Final value | Correct value | Actual value | Final value | Correct value | Actual value | Final value |
| Dualcell system Tricon system* | 3.6VDC | - | - | 0.015VDC ± 0.005VDC | - | - | 3.93VDC | 3.9V | Pass | 0.015VDC ± 0.005VDC | 0.015VDC ± 0.005VDC | Pass |
| | - | - | - | - | - | - | 3.96VDC | - | - | - | - | - |

(*)The recommended Hg lamp operating signal should be around 3,96VDC (for detector 2) and 3,93VDC (for detector 1).

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| | OK | Not OK |
|--|----|--------|
| Conditions of the spectrometer system | ✓ | |
| Alignment between lamp, cuvette and detector | ✓ | |
| Cuvette cleaning (glass windows, sealing O-rings...) | ✓ | |
| Lamp intensity | ✓ | |
| Operation of the mechanical shutter (if present) | ✓ | |

8. MILESTONE AIR COMPRESSOR

| Maintenance | OK | Date last service |
|---|----|-------------------|
| Drain (compressor) | ✓ | |
| Replacing air filters (air purification module) | ✓ | |
| Check sealing connections | ✓ | |

9. PARTS TO BE REPLACED

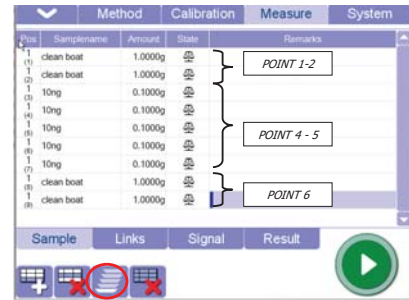
| PN | DESCRIPTION | Replaced | Not Replaced |
|-----------|--|----------|--------------|
| DMA8133 | Catalyst tube: 6 months if the unit runs daily, 1 year if the unit is used rarely. <i>In case of analysis of sample with high organic concentration the lifetime of the catalyst can be less than 6 months.</i> | | ✓ |
| DMA8134 | Amalgamator: 6 months if the unit runs daily, 1 year if the unit is used rarely | | ✓ |
| DMA8195A | Hg lamp tri-cell (model 2011): 5 years | | ✓ |
| DMA8137 | Hg lamp dual-cell: 5 years | - | - |
| 70200 | Hg trap 1 year | | ✓ |
| DMA8058/B | Amalgamator coil 6 months/1 year or as soon as the heating is not more homogeneous | | ✓ |
| DMA8142 | Nickel sample boats (set of 40pcs) 2 years if strongly used, replace after 1 year | - | - |
| DMA8347 | Quartz sample boats (set of 10pcs) 2/3 years | | ✓ |
| DMA8335 | Metal sample boat carrier 2 years | | ✓ |
| SL0108 | PU-tube diam. 6/4 mm for internal O ₂ /air supply 2 years | | ✓ |
| SO0376D | Heating coil for drying/decomposition 2 years | | ✓ |

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10. TESTING PROCEDURE

It consists to run some measurements for the evaluation of the analytical performance of the unit, like: absorbance, peaks shape, temperatures, lamp signal and verify the proper working of whole system.

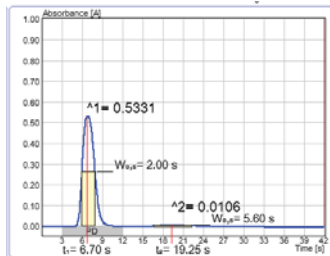
- Run minimum 2 blanks on the same sample boat (quartz if possible) in manner to clean it
- Run blanks until absorbance value (Height) decrease under 0.0030 in cell 1
- Set a **fresh and stabilized** 100µg/L Hg standard according to the prescriptions reported on the DMA80 User Manual. The quality of the used standard is fundamental for the success of the entire procedure
- Weight approximately 100µg of the fresh 100µg/L – Standard (10ng) and start the analysis as a single measurement mode
- Repeat five times the test
- Run again two blanks measurements



Now, it is possible to evaluate:

- Peaks

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- The shape of the peak must be regular.
- The distance between Peak Cell 1 and Peak Cell 2 must be between 11 to 15 seconds.

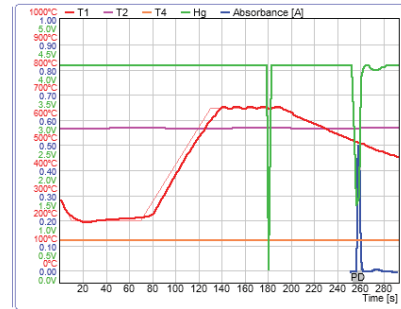
- Results

| Pos | Sample name | Amount | State | Height | Hg [ng] | [µg/kg] | GC# | Σ |
|------|----------------|---------|-------|--------|---------|---------|--------|---|
| - | Stability 10ng | | M | | 100.280 | 1.0000 | | |
| (7) | Stability 10ng | 0.1000g | ✓ | 0.4931 | 9.9095 | 99.0951 | 1.0000 | Σ |
| (8) | Stability 10ng | 0.1000g | ✓ | 0.4965 | 9.9934 | 99.9335 | 1.0000 | Σ |
| 2 | Stability 10ng | 0.1000g | ✓ | 0.4991 | 10.059 | 100.597 | 1.0000 | Σ |
| 3 | Stability 10ng | 0.1000g | ✓ | 0.4976 | 10.022 | 100.221 | 1.0000 | Σ |
| (10) | Stability 10ng | 0.1000g | ✓ | 0.5031 | 10.160 | 101.602 | 1.0000 | Σ |
| 5 | Stability 10ng | 0.1000g | ✓ | | | | | |
| (11) | | | | | | | | |
| 12 | | | | | | | | |

- The obtained absorbance (height) must be > 0.42 in cell 1 for each 100ppb analysis (0.22 with cuvette installed until December 2005, DMA s/n 05120292.)
- The relative standard deviation (rsd) is < 3 %.
- After two blanks (after 10ng measurements), the absorbance is < 0.0030 in cell 1(*).

(*) This condition is valid only in case the unit has: catalyst and amalgamator new, conditioned and never use before, sample boat carrier new and/or perfectly cleaned, catalyst flange new and/or perfectly cleaned, cuvette new and/or perfectly cleaned, tubes, silicon joints and o-rings replaced. Otherwise other blanks (more than 2) might be necessary.

- Temperatures & signal profiles



- The Hg lamp signal must be between 3.8 and 4.5V and stable. A few minutes after the start of the analysis the lamp does switch off because of the zero detection but then it instantly returns to the original condition. In case of Tricell configuration two green colour graphics are reported. After the zero shuttering the time necessary to return to full signal is longer on Tricell compare to Ducon lamp.
- During the run the catalyst oven temperature must be stable around to 565°C or 515°C.
- The drying and ashing furnace must follow the set temperature method.
- During the run the Amalgamator furnace temperature must be stable at the stand by temperature (170°C or 145°C). Then at the release step it must raise up to 850/900°C.
- The Cuvette temperature must be stable at approximately 125°C.
- The Hg absorbance peaks must be correctly detected and reported.

11. FINAL REPORT

| | |
|---|---|
| All screws inserted and tightened | ✓ |
| All tubing sealing connections checked, cleaned or replaced and tightened | ✓ |
| All heating elements are working | ✓ |
| Sensors installed, checked and tightened | ✓ |
| Safety devices (thermo switch) fully checked | ✓ |
| All cooling fans are functioning | ✓ |
| Testing procedure successfully passed | ✓ |
| Necessary tools available at customer's site | ✓ |
| Last revision of User Manual available at customer's site | ✓ |
| Advised customer about care and maintenance instructions | ✓ |

เอกสารควบคุม, ่ว

เอกสารควบคุม, ่ว

| |
|----------|
| Remarks: |
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| |

| | |
|-----------------------------------|--|
| Working hours of Service Engineer | |
|-----------------------------------|--|

| | | |
|-----------------------|-----------|------------|
| Service Engineer Name | Signature | Date |
| | | 31-01-2025 |

| | |
|---|--|
| Laboratory Manager / Operator acceptance signature: | |
|---|--|

Page 10

เอกสารคุณไม่, ่ว

Verification Certificate

Certificate No.: 2501440-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangchack, Prakhnong, Bangkok 10260

Page 1 of 4

Equipment: Digestion Unit (Heating Block)
Manufacturer: FOSS
Model: Tecator Digester 2520
Serial No.: 91905060
ID No.: UAE.WAS.030/2566
Order No.: 2501440
Operation No.: 2501440-001
Date of Receipt: 27 January 2025
Date of Calibration: 27 January 2025

Calibrated by Mr.Worapob Sookthong
 Scientist
Date of Issue: 29 January 2025

Approved by [Signature]
 Manager
 Responsible

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

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

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

เอกสารคุณไม่, ่ว

Verification Report

Certificate No.: 2501440-001-01
Equipment: Digestion Unit (Heating Block)
 Model: Tecator Digester 2520 Serial Ng.: 91905060
 Resolution: 1 °C ID No : UAE.WAS.030/2566
 Manufacturer: FOSS
Date of Calibration: 27 January 2025
Location: Dry Laboratory (312), UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (29 ± 1) °C
 Relative Humidity (58 ± 2) %
 Line Voltage (224 ± 1) Volt

Page 2 of 4

Condition of this results of Calibration:

- This instrument was calibrated by insert standard thermocouples type R into its Digestion blocks and Calibration according to NFI Method W-TE-026 based on BS 4309 : 1968
- The temperature scale used was based on ITS - 90 .
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

| Instrument | Model | Serial No. | Certificate No. | Due Date | Through |
|---------------------------------------|--------|---------------------|-----------------|------------|----------------------------------|
| Digital Thermometer with Thermocouple | 3497DA | MY449555/9M4119453 | TC24/0063 | 5-Jun-2025 | N.M. Technical Center Laboratory |
| | Type R | S/CH1, R/CH2, R/CH3 | | | |

3. This certificate is traceable to International System of Units (SI Units).

4. This certificate was certified only for the instrument used.

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

6. Condition of Calibrated item : Good

UUC* Description

Time of Record 1 Hour 6 Minute At 380 °C

7. Result of Calibration : ☒ Without adjustment ☐ After adjustment

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

Verification Report

Certificate No.: 2501440-001-01
Equipment: Digestion Unit (Heating Block)
 Model: Tecator Digester 2520 Serial Ng.: 91905060
 Resolution: 1 °C ID No : UAE.WAS.030/2566
 Manufacturer: FOSS
Date of Calibration: 27 January 2025
Calibration point: 380 °C

Page 3 of 4

Table 1 : Reporting of Temperature

| Block No. | UUC* Setting (°C) | UUC* Reading (°C) | Stability (±°C) | Standard Thermometer (°C) | Uncertainty (±°C) |
|-----------|-------------------|-------------------|-----------------|---------------------------|-------------------|
| 1 | 380 | 380 | 0.22 | 377.84 | 2.0 |
| 2 | 380 | 380 | 0.19 | 378.68 | 2.0 |
| 3 | 380 | 380 | 0.13 | 378.70 | 2.0 |
| 4 | 380 | 380 | 0.12 | 379.82 | 2.0 |
| 5 | 380 | 380 | 0.20 | 381.01 | 2.0 |
| 6 | 380 | 380 | 0.16 | 380.48 | 2.0 |
| 7 | 380 | 380 | 0.16 | 378.22 | 2.0 |
| 8 | 380 | 380 | 0.19 | 377.99 | 2.0 |
| 9 | 380 | 380 | 0.09 | 378.48 | 2.0 |
| 10 | 380 | 380 | 0.15 | 378.17 | 2.0 |
| 11 | 380 | 380 | 0.18 | 377.64 | 2.0 |
| 12 | 380 | 380 | 0.11 | 379.27 | 2.0 |
| 13 | 380 | 380 | 0.13 | 378.14 | 2.0 |
| 14 | 380 | 380 | 0.25 | 379.11 | 2.0 |
| 15 | 380 | 380 | 0.15 | 379.83 | 2.0 |
| 16 | 380 | 380 | 0.18 | 378.05 | 2.0 |
| 17 | 380 | 380 | 0.31 | 378.44 | 2.0 |
| 18 | 380 | 380 | 0.18 | 378.29 | 2.0 |
| 19 | 380 | 380 | 0.17 | 378.41 | 2.0 |
| 20 | 380 | 380 | 0.13 | 379.24 | 2.0 |

Note:

- UUC* = Unit Under Calibration
- Immersion depth of standard thermometer in tube level high of sand is equal heater plate of UUC.
- Stability = One-half of the greatest maximum difference of measured temperatures at one sensors, for at least half an hour after reaching steady state.

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

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

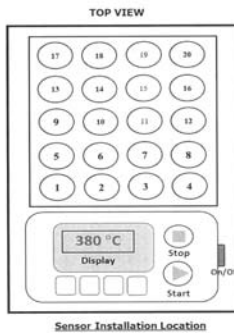
เอกสารคุณไม่, ่ว

11/07/59

Verification Report

Certificate No.: 2501440-001-01
Equipment: Digestion Unit (Heating Block)
Model: Tecator Digester ; Serial No.: 91905060
Resolution: 1 °C ID No.: UAE.WAS.030/2566
Manufacturer: FOSS
Date of Calibration: 27 January 2025
Calibration point: 380 °C
Calibration result: Continued

Figure 1. Location of Reference Standard and Block Diagram of Digestion Unit



----- End -----

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

3388 Sirinrat Building, 25th - 26th Floor, Unit No. 3388/90,
Rama IV Road, Klongton, Klongtoey, Bangkok, Thailand 10110
Tel: +66(0) 2422 8660 Fax: +66(0) 2422 8545

Customer Service Report

Date: 25 February 2025
Job No.: 11732
Instrument: KTO Distillator
Report No.: 13851
Customer: VAE
Address: Ban Nok
Serial: 91905373

Start Finish: 09:00 - 12:00
Labour (Hrs): 3:00 - 10:00
Travel From Customer (Hrs): 1:00

| Application | Special | Standard |
|-----------------|----------------|--------------------|
| Distributor | Courtesy Visit | Installation |
| Digital Service | PMA Onboarding | Quote |
| Internal | Warranty | Repair |
| Investigate | Sales Support | Remote |
| | | Health Check Visit |

| | | | | | | |
|----------|-------------------|---|---------------|---|----------|---|
| PMA Type | Smartcare | x | Smartcare Pro | x | Fosscore | x |
| | | | | | | |
| | Smartcare Advance | x | Fosscore Pro | x | N/A | x |

| Details of Work / Test | | | | |
|--|----|-------------------------------------|---------|--|
| # pm kit 12 MD | | | | |
| - test before pm | | | | |
| - cleaning kit, steamers | | | | |
| - flushing Alkali pump | | | | |
| - replace pm kit 12 MD | | | | |
| - test operation | | | | |
| - distillation 80 = 95 ml Cal to 80 ml | | | | |
| - distillation 5 min 150-170 ml | | | | |
| - Alkali 80 = 80 ml | | | | |
| * Receiver not visc !! | | | | |
| - all good | | | | |
| Instrument Ready for Use | OK | <input checked="" type="checkbox"/> | Not OK* | |

| Part No. | Batch | Description | Qty |
|----------|------------|------------------------------|-----|
| 60100106 | 09.12.2024 | pm kit kjeltec 9 Distillator | 1 |

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

*Remark: [Remark]
Please scan QR code

Calibration Certificate

Certificate No.: 2502229-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakanong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturer: MEMMERT
Model: IPP 260
Serial No.: V615.0187
ID No.: UAE.MIC.003/2559
Order No.: 2502229
Operation No.: 2502229-001
Date of Receipt: 19 March 2025
Date of Calibration: 19 March 2025

Calibrated by: [Signature]
Approved by: [Signature]
Date of Issue: [Date]

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

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

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

Calibration Report

Certificate No.: 2502229-001-01
Equipment: CHAMBER (Incubator)
Model: IPP 260 Serial No.: V615.0187
Resolution: 0.1 °C ID No.: UAE.MIC.003/2559
Manufacturer: MEMMERT
Date of Calibration: 19 March 2025

Page 2 of 3

Location: LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (16.2 ± 1) °C
Relative Humidity (32 ± 4) %
Line Voltage (223 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

Reference Standard Instrument :

| Instrument | Model | Serial No./ID No. | Certificate No. | Due Date | Through |
|---------------------------------|--------|------------------------|-----------------|------------|-------------------------|
| Digital Thermometer with sensor | 34972A | MY49016851 | TE 670477-01 | 4 May 2025 | NATIONAL FOOD INSTITUTE |
| | RTD | CH#101-109/RTD#101-109 | | | |

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good

UUC Description :

Time of Record: 1 Hour 9 Minute At 35.0 °C
Fresh air Damper: - Open Position -
- X Close Fan -
- Not Available

- Result of Calibration : [X] Without adjustment [] After adjustment

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

Calibration Report

Certificate No.: 2502229-001-01
Equipment: CHAMBER (Incubator)
Model: IPP 260 Serial No.: V615.0187
Resolution: 0.1 °C ID No.: UAE.MIC.003/2559
Manufacturer: MEMMERT

Date of Calibration: 19 March 2025
Calibration point: 35.0 °C

| Calibration Condition | Temperature (°C) | Relative Humidity (%) | Line Voltage (Volt) |
|-----------------------|------------------|-----------------------|---------------------|
| MIN | 15.5 | 28 | 220.0 |
| MAX | 17.1 | 35 | 225.0 |

Table1 : Reporting of Temperature

| Calibration point (°C) | Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF) | | | | | | | | | Uncertainty ± (°C) |
|------------------------|---|-------|-------|-------|-------|-------|-------|-------|-------|--------------------|
| | # 1 | # 2 | # 3 | # 4 | # 5 | # 6 | # 7 | # 8 | # 9 | |
| 35.0 | 34.94 | 34.95 | 34.91 | 34.93 | 35.15 | 35.01 | 34.98 | 35.05 | 35.12 | 0.29 |

Table 2 : Reporting of Characterization Result

| UUC* Setting (°C) | UUC* Reading (°C) | | | Stability ± (°C) | Uniformity (°C) | Overall Variation (°C) |
|-------------------|-------------------|------|---------|------------------|-----------------|------------------------|
| | MIN | MAX | Average | | | |
| 35.0 | 35.0 | 35.0 | 35.0 | 0.10 | 0.21 | 0.35 |

Note: The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

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.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

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

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

2008 ถนนสุขุมวิท 36 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110
2008 Soi 36, Aun Anom Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel: +66(0) 2-262 8688 Fax: +66(0) 2-262 8545

Calibration Certificate

Certificate No.: 2502229-003-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road, Bangchack, Prakanong, Bangkok 10260

Equipment: CHAMBER (Incubator)

Manufacturer: MEMMERT

Model: IPP260

Serial No.: V618.0033

ID No.: UAE.MIC.021/2561

Order No.: 2502229

Operation No.: 2502229-003

Date of Receipt: 19 March 2025

Date of Calibration: 19 March 2025

Calibrated by

Approved by

Date of Issue: 25 March 2025

Responsible for the Technical Management Team

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

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

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

2008 ถนนสุขุมวิท 36 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110
2008 Soi 36, Aun Anom Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel: +66(0) 2-262 8688 Fax: +66(0) 2-262 8545

Calibration Report

Certificate No.: 2502229-003-01
Equipment: CHAMBER (Incubator)
Model: IPP260 Serial No.: V618.0033
Resolution: 0.1 °C ID No.: UAE.MIC.021/2561
Manufacturer: MEMMERT

Date of Calibration: 19 March 2025

Location: 302, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (23.0 ± 1) °C
Relative Humidity (59 ± 1) %
Line Voltage (223 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

| Instrument | Model | Serial No./ID No. | Certificate No. | Due Date | Through |
|---------------------------------|--------|-------------------|-----------------|-------------|-------------------------|
| Digital Thermometer with sensor | 34972A | MY57003188 | TE 670486-01 | 8 June 2025 | NATIONAL FOOD INSTITUTE |

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good

UUC Description :
Time of Record 1 Hour 9 Minute At 22.0 and 25.0 °C
Fresh air Damper - Open Position -
- Close Fan -
- Not Available

7. Result of Calibration : ☒ Without adjustment ☐ After adjustment

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

2008 ถนนสุขุมวิท 36 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110
2008 Soi 36, Aun Anom Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel: +66(0) 2-262 8688 Fax: +66(0) 2-262 8545

Calibration Report

Certificate No.: 2502229-003-01
Equipment: CHAMBER (Incubator)
Model: IPP260 Serial No.: V618.0033
Resolution: 0.1 °C ID No.: UAE.MIC.021/2561
Manufacturer: MEMMERT

Date of Calibration: 19 March 2025

Calibration point: 22.0 and 25.0 °C

| Calibration Condition | Temperature (°C) | Relative Humidity (%) | Line Voltage (Volt) |
|-----------------------|------------------|-----------------------|---------------------|
| MIN | 22.7 | 58 | 220.0 |
| MAX | 23.3 | 60 | 225.0 |

Table1 : Reporting of Temperature

| Calibration point (°C) | Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF) | | | | | | | | | Uncertainty ± (°C) |
|------------------------|---|-------|-------|-------|-------|-------|-------|-------|-------|--------------------|
| | # 1 | # 2 | # 3 | # 4 | # 5 | # 6 | # 7 | # 8 | # 9 | |
| 22.0 | 22.18 | 22.18 | 22.16 | 22.19 | 21.94 | 21.95 | 21.96 | 21.98 | 22.08 | 0.27 |
| 25.0 | 25.51 | 25.32 | 25.29 | 25.34 | 25.05 | 25.02 | 25.04 | 25.09 | 25.15 | 0.27 |

Table 2 : Reporting of Characterization Result

| UUC* Setting (°C) | UUC* Reading (°C) | | | Stability ± (°C) | Uniformity (°C) | Overall Variation (°C) |
|-------------------|-------------------|------|---------|------------------|-----------------|------------------------|
| | MIN | MAX | Average | | | |
| 22.0 | 22.0 | 22.0 | 22.0 | 0.026 | 0.14 | 0.29 |
| 25.0 | 25.0 | 25.0 | 25.0 | 0.035 | 0.36 | 0.55 |

Note: The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

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.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

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

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

2008 ถนนสุขุมวิท 36 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110
2008 Soi 36, Aun Anom Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel: +66(0) 2-262 8688 Fax: +66(0) 2-262 8545

Calibration Certificate

Certificate No.: 2501624-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: Water Bath
Manufacturer: MEMMERT
Model: WNE14
Serial No.: L416.0606
ID No.: UAE.MIC.002/2560
Order No.: 2501624
Operation No.: 2501624-001
Date of Receipt: 10 February 2025
Date of Calibration: 10 February 2025

Calibrated by [Redacted] Approved by [Redacted]
Date of Issue: 19 February 2025
Responsible for the Technical Management Team

The uncertainties are for a confidence probability of approximately 95 %.
This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

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

2008 ๒๕๕๑-๒๕๕๒ ๓๕ หมู่ ๓ ตำบลบ้านใหม่ อำเภอเมือง จังหวัดนนทบุรี 11000 เอกสารไม่ควรร
2008 Soi 35, Anin Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel: +66(0) 2422 8668 Fax: +66(0) 2422 8545

Calibration Report

Certificate No.: 2501624-001-01
Equipment: Water Bath
Model: WNE14 Serial No.: L416.0606
Resolution: 0.1 °C ID No.: UAE.MIC.002/2560
Manufacturer: MEMMERT
Date of Calibration: 10 February 2025

Page 3 of 3

Calibration point: 44.5 °C

| Calibration Condition | Temperature (°C) | Relative Humidity (%) | Line Voltage (Volt) |
|-----------------------|------------------|-----------------------|---------------------|
| Min | 25.7 | 52 | 223.0 |
| Max | 26.3 | 65 | 225.0 |

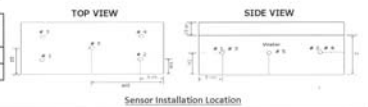


Table1 : Reporting of Temperature

| Calibration Point (°C) | Measured Temperature (°C) @ Sensor No. (Sensor No.5 is REF) | Uncertainty ± (°C) |
|------------------------|---|--------------------|
| 44.5 | 44.55, 44.46, 44.48, 44.47, 44.48 | 0.18 |

Table 2 : Reporting of Characterization Result

| UUC* Setting (°C) | MIN | MAX | Average | Stability ± (°C) | Uniformity (°C) | Overall Variation (°C) |
|-------------------|------|------|---------|------------------|-----------------|------------------------|
| 44.5 | 44.5 | 44.5 | 44.5 | 0.082 | 0.070 | 0.29 |

Note The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity)"

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

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.

Overall Variation = The difference of the maximum and minimum measured temperature throughout observation time.

The report uncertainty of measurement was based on standard uncertainty multiplied by providing a level of confidence of approximately 95 %.

----- End -----

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

2008 ๒๕๕๑-๒๕๕๒ ๓๕ หมู่ ๓ ตำบลบ้านใหม่ อำเภอเมือง จังหวัดนนทบุรี 11000 เอกสารไม่ควรร
2008 Soi 35, Anin Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel: +66(0) 2422 8668 Fax: +66(0) 2422 8545

Calibration Report

Certificate No.: 2501624-001-01
Equipment: Water Bath
Model: WNE14 Serial No.: L416.0606
Resolution: 0.1 °C ID No.: UAE.MIC.002/2560
Manufacturer: MEMMERT
Date of Calibration: 10 February 2025

Page 2 of 3

Location: 302 Microbiology Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (26 ± 1) °C
Relative Humidity (59 ± 7) %
Line Voltage (224 ± 1) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 5 standard thermometer into its liquid bath and calibration according to W-TE-011 based on ASTM E715-80 (2022): Standard Specification for Gravity-Convection and Forced-Circulation Water Baths.
- The temperature scale used is ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

| Instrument | Model | Serial No./ID No. | Certificate No. | Due Date | Through |
|---------------------------------|--------|--------------------------|-----------------|----------|-------------------------|
| Digital Thermometer with sensor | 34972A | MY59002902 | TE 670478-01 | 4-May-25 | NATIONAL FOOD INSTITUTE |
| | RTD | RTD#301-305 / CH#301-305 | | | |

3. This certificate is traceable to International System of Units (SI Units).

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

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

6. Condition of Calibrated item : Good

UUC Description:

Time of Record 1 Hour 9 Minute At 44.5 °C
7. Result of Calibration : X Without adjustment
After adjustment

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

2008 ๒๕๕๑-๒๕๕๒ ๓๕ หมู่ ๓ ตำบลบ้านใหม่ อำเภอเมือง จังหวัดนนทบุรี 11000 เอกสารไม่ควรร
2008 Soi 35, Anin Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel: +66(0) 2422 8668 Fax: +66(0) 2422 8545

Calibration Certificate

Certificate No.: 2501624-002-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: Water Bath
Manufacturer: MEMMERT
Model: WNE14
Serial No.: L416.0612
ID No.: UAE.MIC.003/2560
Order No.: 2501624
Operation No.: 2501624-002
Date of Receipt: 10 February 2025
Date of Calibration: 10 February 2025

Calibrated by [Redacted] Approved by [Redacted]
Date of Issue: [Redacted] Responsible for the Technical Management Team

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

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

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

2008 ๒๕๕๑-๒๕๕๒ ๓๕ หมู่ ๓ ตำบลบ้านใหม่ อำเภอเมือง จังหวัดนนทบุรี 11000 เอกสารไม่ควรร
2008 Soi 35, Anin Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel: +66(0) 2422 8668 Fax: +66(0) 2422 8545

Calibration Report

Certificate No.: 2501624-002-01
Equipment: Water Bath
Model: WNE14 Serial No.: L416.0612
Resolution: 0.1 °C ID No.: UAE.MIC.003/2560
Manufacturer: MEMMERT
Date of Calibration: 10 February 2025 Page 3 of 3

Calibration point: 44.5 °C

| Calibration Condition | Temperature (°C) | Relative Humidity (%) | Line Voltage (Volt) |
|-----------------------|------------------|-----------------------|---------------------|
| Min | 23.0 | 52 | 223.0 |
| Max | 25.0 | 65 | 225.0 |



Table1 : Reporting of Temperature

| Calibration Point (°C) | Measured Temperature (°C) @ Sensor No. (Sensor No.5 is REF) | Uncertainty ± (°C) |
|------------------------|---|--------------------|
| 44.5 | 44.45 | 0.20 |

Table 2 : Reporting of Characterization Result

| UUC* Setting (°C) | MIN | MAX | Average | Stability ± (°C) | Uniformity (°C) | Overall Variation (°C) |
|-------------------|------|------|---------|------------------|-----------------|------------------------|
| 44.5 | 44.4 | 44.5 | 44.5 | 0.081 | 0.077 | 0.23 |

Note The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity)"
UUC* = Unit Under Calibration
Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.
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.
Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.
The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor providing a level of confidence of approximately 95 %.

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

2008 ซอย 36, ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10700, Thailand
Tel: +66(0) 2422 8668 Fax: +66(0) 2422 8545

Calibration Certificate

Certificate No.: 2502229-007-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road, Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: Autoclave
Manufacturer: ALP
Model: CL-40L
Serial No.: 808763
ID No.: UAE.MIC.026/2563
Order No.: 2502229
Operation No.: 2502229-007
Date of Receipt: 19 March 2025
Date of Calibration: 19 March 2025

Calibrated by: Approved by:

Date of Issue: 23 March 2025

The uncertainties are for a confidence probability of approximately 95 %.
This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

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

2008 ซอย 36, ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10700, Thailand
Tel: +66(0) 2422 8668 Fax: +66(0) 2422 8545

Calibration Report

Certificate No.: 2501624-002-01
Equipment: Water Bath
Model: WNE14 Serial No.: L416.0612
Resolution: 0.1 °C ID No.: UAE.MIC.003/2560
Manufacturer: MEMMERT
Date of Calibration: 10 February 2025 Page 2 of 3

Location: 302 Microbiology Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Environment Condition:
Ambient Temperature (24 ± 1) °C
Relative Humidity (59 ± 7) %
Line Voltage (224 ± 1) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 5 standard thermometer into its liquid bath and calibration according to W-TE-011 based on ASTM E715-80 (2022): Standard Specification for Gravity-Convection and Forced-Circulation Water Baths.
- The temperature scale used was ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

| Instrument | Model | Serial No./ID No. | Certificate No. | Due Date | Through |
|---------------------------------|--------|-------------------|-----------------|----------|-------------------------|
| Digital Thermometer with sensor | 34972A | MY59002902 | TE 670478-01 | 4-May-25 | NATIONAL FOOD INSTITUTE |

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good

UUC Description:
Time of Record 1 Hour 9 Minute At 44.5 °C
7. Result of Calibration : ☒ Without adjustment
☐ After adjustment

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

2008 ซอย 36, ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10700, Thailand
Tel: +66(0) 2422 8668 Fax: +66(0) 2422 8545

Calibration Report

Certificate No.: 2502229-007-01
Equipment: Autoclave
Model: CL-40L Serial No.: 808763
Resolution: 0.1 °C ID No.: UAE.MIC.026/2563
Manufacturer: ALP
Date of Calibration: 19 March 2025 Page 2 of 3

Location: LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Environment Condition:
Ambient Temperature (23 ± 1) °C
Relative Humidity (60 ± 5) %
Line Voltage (225 ± 1) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 3 standard Data loggers with RTD into its autoclave and calibration according to W-TE-018 based on BS 2646-1:2021, Autoclaves for sterilization in laboratories
Part 1: Design, construction, safety and performance - Specification.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

| Instrument | Model | Serial No. | Certificate No. | Due Date | Through |
|--|--------------|------------|-----------------|-----------|-------------------------|
| Digital Thermometer with RTD (Data Logger) | HiTemp140-PT | S35646 | TE 670370-01 | 23-Mar-25 | NATIONAL FOOD INSTITUTE |
| | HiTemp140-PT | S33753 | TE 670371-01 | 23-Mar-25 | NATIONAL FOOD INSTITUTE |
| | HiTemp140-PT | S29973 | TE 670372-01 | 23-Mar-25 | NATIONAL FOOD INSTITUTE |

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- This standard does not apply to sterilizers or disinfectors used for medical, dental, pharmaceutical.
- Condition of Calibrated item : Good

UUC Description: Setting program function sterilization : STERILIZE/NORMAL
Time of sterilization 15 Minute At 115.0 and 121.0 °C
8. Result of Calibration : ☒ Without adjustment
☐ After adjustment

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

2008 ซอย 36, ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10700, Thailand
Tel: +66(0) 2422 8668 Fax: +66(0) 2422 8545

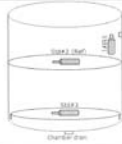
Calibration Report

Certificate No.: 2502229-007-01
Equipment: Autoclave
Model: CL-40L Serial No.: 808763
Resolution: 0.1 °C ID No.: UAE.MIC.026/2563
Manufacturer: ALP

Date of Calibration: 19 March 2025
Calibration point: 115.0 and 121.0 °C

Page 2 of 3

| Calibration Condition | Temperature (°C) | Relative Humidity (%) | Line Voltage (Volt) |
|-----------------------|------------------|-----------------------|---------------------|
| Min | 22.0 | 55 | 224 |
| Max | 24.0 | 65 | 226 |



Standard J.C. Position
STD1 = attached to the top temperature probe, within 20 mm.
STD2 = in the upper half of the chamber
STD3 = in the chamber drain, within 100 mm.

Table 1 : Reporting of Temperature

| Calibration Point (°C) | Measured Temperature (°C) @ Sensor No. (Sensor No.2 is REF) | | | Uncertainty ± (°C) |
|------------------------|---|----------------|----------|--------------------|
| | Std. # 1 | Std. # 2 (Ref) | Std. # 3 | |
| 115.0 | 115.32 | 115.46 | 115.22 | 0.64 |
| 121.0 | 121.31 | 121.53 | 121.31 | 0.64 |

Table 2 : Reporting of Characterization Result

| UUC* Setting (°C) | UUC* Reading | | | | Stability ± (°C) | Uniformity (°C) | Overall Variation (°C) |
|-------------------|--------------|----------|--------------|------|------------------|-----------------|------------------------|
| | Min (°C) | Max (°C) | Average (°C) | MPA | | | |
| 115.0 | 115.0 | 115.1 | 115.0 | 0.08 | 0.11 | 0.12 | 0.26 |
| 121.0 | 121.0 | 121.1 | 121.0 | 0.12 | 0.13 | 0.15 | 0.29 |

Note

The quoted uncertainty include " Stability " and " Loading effect (20% of Uniformity) "
UUC* = Unit Under Calibration
Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.
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.
Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.
The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k=2, providing a level of confidence of approximately 95 %.

----- End -----

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

2008 บางเขน กรุงเทพฯ 35 แขวงบางเขน กรุงเทพมหานคร เขตบางเขน กรุงเทพมหานคร 10700 เอกสารไม่ควบคุม
2008 Soi 36, Aun Amarn Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel +66(0) 2422 8568 Fax +66(0) 2422 8545

Calibration Certificate

Certificate No.: 2503287-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsak 41, Sukhumvit Road, Bangchack, Prakhnong, Bangkok 10260

Page 1 of 3

Equipment: Autoclave
Manufacturer: ALP
Model: CL-40L
Serial No.: 810010
ID No.: UAE.MIC.032/2565
Order No.: 2503287
Operation No.: 2503287-001
Date of Receipt: 5 June 2025
Date of Calibration: 5 June 2025

Calibrated by [Redacted] Approved by [Redacted]
Vice President Responsible for the Technical Management Team
Date of Issue: 11 June 2025

The uncertainties are for a confidence probability of approximately 95 %.
This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

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

2008 บางเขน กรุงเทพฯ 35 แขวงบางเขน กรุงเทพมหานคร เขตบางเขน กรุงเทพมหานคร 10700 เอกสารไม่ควบคุม
2008 Soi 36, Aun Amarn Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel +66(0) 2422 8568 Fax +66(0) 2422 8545

Calibration Report

Certificate No.: 2503287-001-01
Equipment: Autoclave
Model: CL-40L Serial No.: 810010
Resolution: 1 °C ID No.: UAE.MIC.032/2565
Manufacturer: ALP

Date of Calibration: 5 June 2025

Page 2 of 3

Location: Room 301 Media Preparation, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (26 ± 1) °C
Relative Humidity (55 ± 5) %
Line Voltage (230 ± 5) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 3 standard Data loggers with RTD into its autoclave and calibration according to W-TE-018 based on BS 2646-1:2021, Autoclaves for sterilization in laboratories
Part 1: Design, construction, safety and performance - Specification.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

| Instrument | Model | Serial No. | Certificate No. | Due Date | Through |
|--|------------------|------------|-----------------|-----------|-------------------------|
| Digital Thermometer with RTD (Data Logger) | HiTemp140-PT | T20627 | NC-25-03-18-181 | 11-Mar-26 | MADGETECH, INC. |
| | OM-CP-HITEMP-140 | R56916 | 2502081-002-01 | 11-Mar-26 | NATOPAC FOOD INSTITUTE |
| | PRTemp140 | R38546 | 2501835-001-01 | 22-Feb-26 | NATIONAL FOOD INSTITUTE |

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- This standard does not apply to sterilizers or disinfectors used for medical, dental, pharmaceutical.
- Condition of Calibrated item : Good

UUC Description : Setting program function sterilization : STERILIZE/NORMAL
Time of sterilization 20 Minute At 115 and 121 °C

8. Result of Calibration : ☒ Without adjustment
☐ After adjustment

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

2008 บางเขน กรุงเทพฯ 35 แขวงบางเขน กรุงเทพมหานคร เขตบางเขน กรุงเทพมหานคร 10700 เอกสารไม่ควบคุม
2008 Soi 36, Aun Amarn Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel +66(0) 2422 8568 Fax +66(0) 2422 8545

Calibration Report

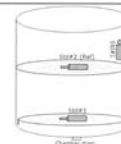
Certificate No.: 2503287-001-01
Equipment: Autoclave
Model: CL-40L Serial No.: 810010
Resolution: 1 °C ID No.: UAE.MIC.032/2565
Manufacturer: ALP

Date of Calibration: 5 June 2025

Page 3 of 3

Calibration point: 115 and 121 °C

| Calibration Condition | Temperature (°C) | Relative Humidity (%) | Line Voltage (Volt) |
|-----------------------|------------------|-----------------------|---------------------|
| Min | 25.8 | 50 | 225 |
| Max | 26.8 | 59 | 235 |



Standard J.C. Position
STD1 = attached to the top temperature probe, within 20 mm.
STD2 = in the upper half of the chamber
STD3 = in the chamber drain, within 100 mm.

Table 1 : Reporting of Temperature

| Calibration Point (°C) | Measured Temperature (°C) @ Sensor No. (Sensor No.2 is REF) | | | Uncertainty ± (°C) |
|------------------------|---|----------------|----------|--------------------|
| | Std. # 1 | Std. # 2 (Ref) | Std. # 3 | |
| 115 | 115.46 | 115.43 | 115.42 | 0.70 |
| 121 | 121.59 | 121.54 | 121.51 | 0.70 |

Table 2 : Reporting of Characterization Result

| UUC* Setting (°C) | UUC* Reading | | | | Stability ± (°C) | Uniformity (°C) | Overall Variation (°C) |
|-------------------|--------------|----------|--------------|------|------------------|-----------------|------------------------|
| | Min (°C) | Max (°C) | Average (°C) | MPA | | | |
| 115 | 115 | 115 | 115 | 0.08 | 0.24 | 0.17 | 0.50 |
| 121 | 121 | 121 | 121 | 0.12 | 0.24 | 0.19 | 0.52 |

Note

The quoted uncertainty include " Stability " and " Loading effect (20% of Uniformity) "
UUC* = Unit Under Calibration
Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.
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.
Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.
The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k=2, providing a level of confidence of approximately 95 %.

----- End -----

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

2008 บางเขน กรุงเทพฯ 35 แขวงบางเขน กรุงเทพมหานคร เขตบางเขน กรุงเทพมหานคร 10700 เอกสารไม่ควบคุม
2008 Soi 36, Aun Amarn Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel +66(0) 2422 8568 Fax +66(0) 2422 8545

Calibration Certificate

Certificate No.: 2502227-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: Electronic Balance

Manufacturer: OHAUS

Model: PX623

Serial No.: C236754745

ID No.: UAE.MIC.055/2565

Order No.: 2502227

Operation No.: 2502227-001

Date of Receipt: 19 March 2025

Date of Calibration: 19 March 2025

Calibrated by

Approved by

Manager
Responsible for the Technical Management Team

Date of Issue: 25 March 2025

The uncertainties are for a confidence probability of approximately 95%

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

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

2008 ตบวงเวียนที่ 36 มูลนิธิสถาบันพัฒนาอุตสาหกรรมอาหาร เลขที่ 10700
2008 Soi 36, Aun Amarn Road, Bang Yi Khan Subdistrict, Bang Phli District, Bangkok 10700
Tel: +66(0) 2422 8668 Fax: +66(0) 2422 8545



Calibration Report

Certificate No.: 2502227-001-01
Equipment: Electronic Balance
Manufacturer: OHAUS
Model: PX623
Resolution: 0.001
Serial No.: C236754745
ID No.: UAE.MIC.055/2565
Capacity: 620

Date of Calibration: 19 March 2025

Page 3 of 3

Calibration Results: (Continued)

Calibration Range: 0-600 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value:

| Nominal Value (g) | Standard Value (g) | Average Reading (g) | Correction (g) | Uncertainty (± g) | Coverage Factor # |
|------------------------|-------------------------|--------------------------|---------------------|------------------------|----------------------|
| Unload | 0.0000 | 0.000 | 0.000 | 0.00086 | 2.00 |
| 1 | 1.0000 | 1.000 | 0.000 | 0.00086 | 2.00 |
| 5 | 5.0000 | 4.999 | 0.001 | 0.00086 | 2.00 |
| 10 | 10.0000 | 10.000 | 0.000 | 0.00086 | 2.00 |
| 20 | 20.0000 | 20.000 | 0.000 | 0.00086 | 2.00 |
| 50 | 50.0000 | 50.000 | 0.000 | 0.00087 | 2.00 |
| 100 | 100.0001 | 100.000 | 0.000 | 0.00087 | 2.00 |
| 200 | 200.0001 | 200.001 | -0.001 | 0.00090 | 2.00 |
| 300 | 300.0002 | 300.001 | -0.001 | 0.00094 | 2.00 |
| 400 | 400.0003 | 399.999 | 0.001 | 0.0011 | 2.00 |
| 500 | 500.0003 | 499.999 | 0.001 | 0.0011 | 2.00 |
| 600 | 600.0004 | 600.000 | 0.000 | 0.0012 | 2.00 |

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

***** End *****

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

2008 ตบวงเวียนที่ 36 มูลนิธิสถาบันพัฒนาอุตสาหกรรมอาหาร เลขที่ 10700
2008 Soi 36, Aun Amarn Road, Bang Yi Khan Subdistrict, Bang Phli District, Bangkok 10700
Tel: +66(0) 2422 8668 Fax: +66(0) 2422 8545



Calibration Report

Certificate No.: 2502227-001-01
Equipment: Electronic Balance
Manufacturer: OHAUS
Model: PX623
Resolution: 0.001
Serial No.: C236754745
ID No.: UAE.MIC.055/2565
Capacity: 620

Date of Calibration: 19 March 2025

Page 2 of 3

Environment Condition: Ambient Temperature: 22.8 ± 0.3 °C Relative Humidity: 51 ± 0.95 %

Place of Calibration: 301, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

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

2. Reference Standards:

Reference Standard **Model** **Serial No.** **Calibrated By** **Certificate No.** **Due Date**

Standard Weight Class E2 1mg to 200g 8505567572 TCS M24041005 19 April 2025

Standard Weight Class E2 100g 8505567696 TCS M24041015 19 April 2025

Instrument **Model** **Serial No.** **Calibrated By** **Certificate No.** **Due Date**

Thermo-Hygro Meter 608-H1 NFI.BTH 01/7/23 Quality Reborn QR25-0542 10 February 2026

3. This certification is traceable to SI UNIT

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

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

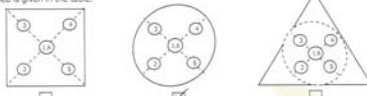
Calibration Results:

1. Repeatability of Reading:

| Nominal Value (g) | Standard Deviation of Reading (g) |
|------------------------|--|
| 300 | 0.00042 |
| 600 | 0.00048 |

2. Off-Center Error:

A mass of 200 g was placed and moved to various position on pan.
The balance reading obtained is given in the table.



| 1 | 2 | 3 | 4 | 5 | 6 | (Maximum Difference) |
|---------|---------|---------|---------|---------|---------|----------------------|
| (g) | (g) | (g) | (g) | (g) | (g) | (g) |
| 200.002 | 200.003 | 200.001 | 200.001 | 200.002 | 200.002 | 0.001 |

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

2008 ตบวงเวียนที่ 36 มูลนิธิสถาบันพัฒนาอุตสาหกรรมอาหาร เลขที่ 10700
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Tel: +66(0) 2422 8668 Fax: +66(0) 2422 8545

