

เอกสารแนบ จ
ใบรับรองการสอบเทียบเครื่องมือ



รายการใบรับรองสอบเทียบ/ทวนสอบ เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์ สำหรับตรวจวัดคุณภาพสิ่งแวดล้อม

| No. | Instrument/Equipment | Parameter | Manufacturer | Model/Serial No. | Calibrator | Certification No. | Date of Calibration | Due date of Calibration* | Remark |
|-------------------------------------------------------|---------------------------------------------|--------------------------------------------|-------------------------|----------------------------------|-------------------------------------------------------------|--------------------------|---------------------|--------------------------|--------|
| เครื่องมือหลักสำหรับตรวจสอบคุณภาพน้ำ น้ำทิ้ง น้ำประปา | | | | | | | | | |
| 1 | pH Meter | pH Temperature | Mettler-Toledo | Seven Easy S20 / 1231155210 | National Food Institute, Ministry of Industry, Thailand | 2103189_002_01 | 14 Jun 21 | 13 Jun 22 | - |
| 2 | pH Meter | | Hanna Instrument | HI2211 / 8165345 | National Food Institute, Ministry of Industry, Thailand | 2103272_001_02 | 14 Jun 21 | 13 Jun 22 | - |
| 3 | BOD Incubator | BOD | Arco | UC4-1320 / (UAE.LAB.015/2561) | Technology Promotion Association (Thailand-Japan) | 21TM1405 | 17 Aug 21 | 16 Aug 22 | - |
| 4 | BOD Incubator | | Arco | UR-1320 / (UAE.LAB.018/2551) | Technology Promotion Association (Thailand-Japan) | 21TM1406 | 17 Aug 21 | 16 Aug 22 | - |
| 5 | Analytical Balance (Readability 0.01 mg) | Total Dissolved Solids Suspended solids | Mettler-Toledo | XPE205 / B748058497 | Calibration Laboratory Mettler-Toledo (Thailand) Limited | 2200706-001-01 | 24 Nov 21 | 23 Nov 22 | - |
| 6 | Hot Air Oven | | Memmert | UF55 / B216.1666 | Technology Promotion Association (Thailand-Japan) | 21TM1876 | 29 Oct 21 | 28 Oct 22 | - |
| 7 | Digester Unit | TKN | FOSS TECATOR | 2520auto / 91794469 | Foss south east asia | 5872 | 11 Sep 21 | 10 Sep 22 | - |
| 8 | Distillation Unit (Kjeldahl Method) | | FOSS TECATOR | KT200 / 91790524 | Foss south east asia | 30 Jan 16 | 30 Nov 21 | 29 Nov 22 | - |
| 9 | Analytical Balance (Readability 0.1 mg) | Fat, Oil & Grease | Mettler-Toledo | XSR204 / C117635043 | National Food Institute, Ministry of Industry, Thailand | TH2060-065-052721-ACC-TH | 27 May 21 | 26 May 22 | - |
| 10 | UV-VIS Spectrophotometer | Ammonia, Nitrate | Agilent Technologies | Cary60 G6860A / MY15410009 | DQE Services Co.,Ltd. | SP21-015 | 29 May 21 | 28 May 22 | - |
| 11 | UV-VIS Spectrophotometer | | Hitachi | U-1900 / 2021-064 | DQE Services Co.,Ltd. | SP22-007 | 20 Jan 22 | 19 Jan 23 | - |

รายการใบรับรองสอบเทียบ/ทวนสอบ เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์ สำหรับตรวจวัดคุณภาพสิ่งแวดล้อม

| No. | Instrument/Equipment | Parameter | Manufacturer | Model/Serial No. | Calibrator | Certification No. | Date of Calibration | Due date of Calibration* | Remark |
|-------------------------------------------------------|----------------------|----------------------------------------------------|----------------|-------------------------|------------------------------------------------------|-------------------|---------------------|--------------------------|--------|
| เครื่องมือหลักสำหรับตรวจสอบคุณภาพน้ำ น้ำทิ้ง น้ำประปา | | | | | | | | | |
| 12 | Incubator | Total Coliform Bacteria E.col Coliform Bacteria | Memmert | IF 75 / D317.0305 | Technology Promotion Association (Thailand-Japan) | 21TM832 | 7 May 21 | 6 May 22 | - |
| 13 | Incubator | Escherichia coli Staphylococcus aureus | Memmert | IPP 260 / V615.0187 | Technology Promotion Association (Thailand-Japan) | 21TM1875 | 28 Oct 21 | 27 Oct 22 | - |
| 14 | Incubator | Pseudomonas aeruginosa | Memmert | INB 400 / E411.1325 | Technology Promotion Association (Thailand-Japan) | 21TM1357 | 14 Jul 21 | 13 Jul 22 | - |
| 15 | Water Bath | | Memmert | WB14 / I401.0569 | Technology Promotion Association (Thailand-Japan) | 21TM1355_1 | 14 Jul 21 | 13 Jul 22 | - |
| 16 | Water Bath | | Memmert | WNB14 / L407.0756 | Technology Promotion Association (Thailand-Japan) | 21TM1356 | 14 Jul 21 | 13 Jul 22 | - |
| 17 | Analytical Balance | | Mettler-Toledo | AX105DR / 1122100406 | Technology Promotion Association (Thailand-Japan) | 2200708-001-01 | 24 Nov 21 | 23 Nov 22 | - |
| 18 | Auto Clave | | ALP | CL-40L / 807298 | Technology Promotion Association (Thailand-Japan) | 21TM831 | 7 May 21 | 6 May 22 | - |
| 19 | Auto Clave | | ALP | CL-40L / 808763 | Technology Promotion Association (Thailand-Japan) | 2103271_001_01 | 6 Nov 21 | 5 Nov 22 | - |

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



National Food Institute, Ministry of Industry, Thailand

2008 Soi 36, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10700, Thailand.
Tel : +66 (0) 2422 8568 Fax : +66 (0) 2422 8545 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Certificate

Certificate No.: 2103189-002-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Sol Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhong, Bangkok 10260

Page 1 of 5

Equipment: pH Meter
Manufacturer: METTLER TOLEDO
Model: SevenEasy pH
Serial No.: 1231155210
ID No.: UAE.WAT.010/2553
Order No.: 2103189
Operation No.: 2103189-002
Date of Receipt: 9 June 2021
Date of Calibration: 14 June 2021

Calibrated by Mr.Manas Somsak Expert
Approved by (Mr.Pheraphat Tuanjit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 15 June 2021

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national 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: 00 Date: 14-12-61

เอกสารไม่ควบคุม



National Food Institute, Ministry of Industry, Thailand

2008 Soi 36, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10700, Thailand.
Tel : +66 (0) 2422 8568 Fax : +66 (0) 2422 8545 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Report

Certificate No.: 2103189-002-01
Equipment: pH Meter
Resolution: 0.01 pH : 1 mV
Manufacturer: METTLER TOLEDO
Model: SevenEasy pH
Serial No.: 1231155210
Type: Bench top
ID No.: UAE.WAT.010/2553

Page 3 of 5

Date of Calibration: 14 June 2021
Calibration Results: (Manual Temperature Compensation at 25 °C)

| Nominal pH | DC Voltage Standard (mV) | Average Indicator Reading | | Uncertainty (± mV) | Coverage Factor (#) |
|------------|----------------------------|---------------------------|-------|----------------------|-----------------------|
| | | mV | pH | | |
| 6.00 | 414.118 | 414 | 6.00 | 0.58 | 2.00 |
| 3.00 | 295.811 | 296 | 3.00 | 0.58 | 2.00 |
| 4.00 | 177.461 | 178 | 4.00 | 0.58 | 2.00 |
| 6.00 | 59.160 | 59 | 6.00 | 0.58 | 2.00 |
| 7.00 | 0.000 | 0 | 7.00 | 0.58 | 2.00 |
| 8.00 | -55.158 | -59 | 8.00 | 0.58 | 2.00 |
| 10.00 | -177.461 | -177 | 10.00 | 0.58 | 2.00 |
| 12.00 | -295.812 | -296 | 12.00 | 0.58 | 2.00 |
| 14.00 | -414.118 | -414 | 14.00 | 0.58 | 2.00 |

2. Calibration of pH Meter with Electrode (Manual Temperature Compensation at 25 °C)

Equipment: pH Electrode
Type: Combined Electrode
Manufacturer: METTLER TOLEDO
Model: InLab Solids
Serial No.: 115882
ID.No. N/A

Performance of Electrode system (Three-Point Calibration at pH4, pH7 and pH10)

| Certified Value @25 °C (pH) | Average Indicator Reading | | Relative Slope (%) | Uncertainty (± pH) | Coverage Factor (#) |
|-----------------------------|---------------------------|------|--------------------|----------------------|-----------------------|
| | pH | mV | | | |
| 4.008 | 4.01 | 185 | 99.9 | 0.0071 | 2.00 |
| 6.866 | 6.87 | 16 | 98.0 | 0.0075 | 2.00 |
| 6.866 | 6.87 | 16 | | 0.0075 | 2.00 |
| 10.008 | 10.01 | -166 | | 0.0093 | 2.00 |
| 6.985 | 6.99 | 9 | - | 0.0093 | 2.00 |

F-CS-012 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม



National Food Institute, Ministry of Industry, Thailand

2008 Soi 36, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10700, Thailand.
Tel : +66 (0) 2422 8568 Fax : +66 (0) 2422 8545 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Report

Certificate No.: 2103189-002-01
Equipment: pH Meter
Resolution: 0.01 pH : 1 mV
Manufacturer: METTLER TOLEDO
Model: SevenEasy pH
Serial No.: 1231155210
Type: Bench top
ID No.: UAE.WAT.010/2553

Date of Calibration: 14 June 2021
Page 2 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature: (23.7 ± 1.5) °C
Condition of Equipment: Good Condition
Relative Humidity: (53.5 ± 5) %

Condition of this Results of Calibration
1. Calibration Method In house method - W-CO-002 based on direct measurement by using standard voltage calibrator and certified reference material (CRM)
2. Reference Standards / Certified Reference Material

| Instruments | Serial / ID No. | Manufacturer | Certificate No. | Due Date |
|---------------------------|-----------------|--------------|-----------------|-------------------|
| 2.1 DC Voltage Calibrator | 2709007 | Fluke | SCL-20F-0682 | 17 June 2021 |
| 2.2 Digital Thermometer | 2709007 | Fluke | CC 630609-01 | 30 October 2021 |
| 2.3 Thermo-Hygro Meter | NFI.BTH00317 | PCNPE | QR20-1578 | 21 September 2021 |

| Certified Reference Material | Lot. No. | Manufacturer | Ref N | Expires Date |
|--------------------------------------------------|----------|--------------|----------|----------------|
| 2.4 pH buffer 4.008 (Primary pH buffer Solution) | 710048 | CPAchem | PH216.L5 | 2 October 2022 |
| 2.5 pH buffer 6.865 (Primary pH buffer Solution) | 710048 | CPAchem | PH217.L5 | 2 October 2022 |
| 2.6 pH buffer 10.01 (Primary pH buffer Solution) | 710050 | CPAchem | PH220.L5 | 2 October 2021 |
| 2.7 pH buffer 7.00 (Standard pH buffer Solution) | 710051 | CPAchem | PH107.L5 | 2 October 2021 |

3. This certification is traceable to The International System of Unit (SI Unit)
3.1 Instruments No.2.1 through NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0075
3.2 Instruments No.2.2 through NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0061
3.3 Instruments No.2.3 through NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0292
3.4 Certified Reference Material No. 2.4 to 2.6 traceable to Primary measurement method- Hammett cell using calibrated thermometer, barometer, and nanovoltmeter. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025
3.5 Certified Reference Material No. 2.7 traceable to BIM RefN H-7 LotN 30.04.2020; BIM RefN H-9 LotN 28.05.2020; BIM RefN H-8 LotN 30.04.2020; BIM RefN H-10 LotN 28.05.2020. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025

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.

F-CS-012 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม



National Food Institute, Ministry of Industry, Thailand

2008 Soi 36, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10700, Thailand.
Tel : +66 (0) 2422 8568 Fax : +66 (0) 2422 8545 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Report

Certificate No.: 2103189-002-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C
Model: SevenEasy pH
Serial No.: 1231155210
ID No.: UAE.WAT.010/2553
Manufacturer: METTLER TOLEDO

Page 4 of 5

Date of Calibration: 14 June 2021
Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature 24 °C ± 1 °C
Relative Humidity 54 % ± 2 %

Condition of this results of Calibration:

- Calibration Method :
 - In house method - W-TE-025 by comparison with standard thermometer.
 - The Calibration is determined by comparing with a known temperature from a standard resistance thermometer.
 - The temperature scale in use at this laboratory is the International Temperature scale of 1990 (ITS-90).

2. Reference Standard Instrument :

| Instrument | Model | Serial No. | Certificate No. | Due Date | Through |
|---------------------------------------|-------|------------|-----------------|-----------|-------------------------|
| HANDHELD THERMOMETER | 1521 | AB5997 | TE 640028-01 | 12-Dec-21 | NATIONAL FOOD INSTITUTE |
| Platinum Resistance Thermometer (PRT) | 385 | 509201 | | | |

Support Equipment : Low Temperature Bath (ISOAL-6), Model: Europa-6 Plus Basic, SN: 3415922

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

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

F-CS-012 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม



National Food Institute, Ministry of Industry, Thailand

2008 Soi 35, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel : +66 (0) 2422 8668 Fax : +66 (0) 2422 8545 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Report

Certificate No.: 2103189-002-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: SevenEasy pH
Serial No.: 1231105210 ID No.: UAE.WAT.0102553
Manufacturer: METTLER TOLEDO
Date of Calibration: 14 June 2021 Page 5 of 5

Calibration point: 15.0, 25.0 and 35.0 °C

Calibration result:

- The probe was immersed in liquid bath or dry bath to a minimum depth of 25 mm.

- Description of probe, model: InLab Solids S/N: 115882

Dimension of probe: Diameter 6 mm, Length 25 mm.

Sheath material: Glass

| UUC* Reading (°C) | Standard Temperature (°C) | Correction Value (°C) | Uncertainty ± (°C) |
|-------------------|---------------------------|-----------------------|--------------------|
| 15.1 | 15.001 | -0.1 | 0.13 |
| 25.1 | 24.999 | -0.1 | 0.13 |
| 35.1 | 34.999 | -0.1 | 0.13 |

Note

- UUC*: Unit Under Calibration

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: 00 Date: 14-12-61

เอกสารไม่ควบคุม



National Food Institute, Ministry of Industry, Thailand

2008 Soi 35, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel : +66 (0) 2422 8668 Fax : +66 (0) 2422 8558 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Report

Certificate No.: 2103272-001-02
Equipment: pH Meter Resolution: 0.01 pH : 0.1 mV
Manufacturer: HANNA INSTRUMENTS Model: HI2020-02
Serial No.: C0051107 Type: Bench top
ID No.: UAE.WAO.0052557

Date of Calibration: 14 June 2021 Page 2 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature: (23.7 ± 1.5) °C Relative Humidity: (53.5 ± 5) %
Condition of Equipment: Good Condition

Condition of this Results of Calibration

1. Calibration Method In house method : W-CO-002 based on direct measurement by using standard voltage calibrator and certified reference material (CRM)

2. Reference Standards / Certified Reference Material

| Instruments | Serial / ID No. | Manufacturer | Certificate No. | Due Date |
|--------------------------------------------------|-----------------|--------------|-----------------|-------------------|
| 2.1 DC Voltage Calibrator | 2705007 | Fluke | SCL-20F-0682 | 17 June 2021 |
| 2.2 Digital Thermometer | 2705007 | Fluke | CC 630609-01 | 30 October 2021 |
| 2.3 Thermo-Hygro Meter | NFI.BTH00317 | PONPE | QR20-1578 | 21 September 2021 |
| | | | | |
| Certified Reference Material | Lot No. | Manufacturer | Ref N | Expire Date |
| 2.4 pH buffer 4.008 (Primary pH buffer Solution) | 710048 | CPAchem | PH216.L5 | 2 October 2022 |
| 2.5 pH buffer 6.865 (Primary pH buffer Solution) | 710048 | CPAchem | PH217.L5 | 2 October 2022 |
| 2.6 pH buffer 10.01 (Primary pH buffer Solution) | 710050 | CPAchem | PH220.L5 | 2 October 2021 |
| 2.7 pH buffer 7.00 (Standard pH buffer Solution) | 710051 | CPAchem | PH107.L5 | 2 October 2021 |

3. This certification is traceable to The International System of Unit (SI Unit)

| | | |
|-------------------------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.1 Instruments No 2.1 | through | NSC-TS1-TS17025 Laboratory Accreditation of Calibration No.0075 |
| 3.2 Instruments No 2.2 | through | NSC-TS1-TS17025 Laboratory Accreditation of Calibration No.0061 |
| 3.3 Instruments No 2.3 | through | NSC-TS1-TS17025 Laboratory Accreditation of Calibration No.0292 |
| 3.4 Certified Reference Material No. 2.4 to 2.6 | traceable to | Primary measurement method: Harned cell using calibrated thermometer, barometer, and nanovoltmeter. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025 |
| 3.5 Certified Reference Material No. 2.7 | traceable to | BIM RefN HI-7 LoN 30.04.2020; BIM RefN HI-8 LoN 28.05.2020; BIM RefN HI-8 LoN 30.04.2020; BIM RefN HI-10 LoN 28.05.2020. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025 |

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.

F-CS-012 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม



National Food Institute, Ministry of Industry, Thailand

2008 Soi 35, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel : +66 (0) 2422 8668 Fax : +66 (0) 2422 8558 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Certificate

Substitute for Certificate No.: 2103272-001-01
Certificate No.: 2103272-001-02
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road, Bangchack, Prakhonong, Bangkok 10260

Page 1 of 5

Equipment: pH Meter

Manufacturer: HANNA INSTRUMENTS

Model: HI2020-02

Serial No.: C0051107

ID No.: UAE.WAO.005/2557

Order No.: 2103272

Operation No.: 2103272-001

Date of Receipt: 11 June 2021

Date of Calibration: 14 June 2021

Calibrated by Mr.Manas Somsak Expert
Approved by (Mr.Pheraphat Tuanjit)
Manager, Division of Calibration Laboratory
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 international 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-011 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม



National Food Institute, Ministry of Industry, Thailand

2008 Soi 35, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel : +66 (0) 2422 8668 Fax : +66 (0) 2422 8558 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Report

Certificate No.: 2103272-001-02
Equipment: pH Meter Resolution: 0.01 pH : 0.1 mV
Manufacturer: HANNA INSTRUMENTS Model: HI2020-02
Serial No.: C0051107 Type: Bench top
ID No.: UAE.WAO.005/2557

Date of Calibration: 14 June 2021 Page 3 of 5

Calibration Results: 1. Calibration of pH Meter (Manual Temperature Compensation at 25 °C)

| Nominal pH | DC Voltage Standard (mV) | Average Indicator Reading | | Uncertainty (±mV) | Coverage Factor (k) |
|------------|--------------------------|---------------------------|-------|-------------------|---------------------|
| | | mV | pH | | |
| 0.00 | 414.118 | 415.7 | 0.00 | 0.063 | 2.00 |
| 2.00 | 295.811 | 297.3 | 2.00 | 0.063 | 2.00 |
| 4.00 | 177.461 | 178.0 | 4.00 | 0.063 | 2.00 |
| 6.00 | 59.160 | 60.7 | 6.00 | 0.063 | 2.00 |
| 7.00 | 0.000 | 1.5 | 7.00 | 0.063 | 2.00 |
| 8.00 | -58.158 | -57.7 | 8.00 | 0.063 | 2.00 |
| 10.00 | -177.461 | -176.6 | 10.00 | 0.063 | 2.00 |
| 12.00 | -295.812 | -294.4 | 12.00 | 0.063 | 2.00 |
| 14.00 | -414.118 | -412.4 | 14.00 | 0.063 | 2.00 |

2. Calibration of pH Meter with Electrode (Manual Temperature Compensation at 25 °C)

Equipment: pH Electrode Type: Combined Electrode
Manufacturer: HANNA INSTRUMENTS Model: HI11310
Serial No.: 076743 ID.No. N/A

Performance of Electrode system (Three-Point Calibration at pH4, pH7 and pH10)

| Certified Value @25 °C (pH) | Average Indicator Reading | | Relative Slope (%) | Uncertainty (± pH) | Coverage Factor (k) |
|-----------------------------|---------------------------|--------|--------------------|--------------------|---------------------|
| | pH | mV | | | |
| 4.008 | 4.01 | 162.7 | 99.1 | 0.0071 | 2.00 |
| 6.866 | 6.87 | -4.9 | | 0.0075 | 2.00 |
| 6.866 | 6.87 | -4.9 | 99.0 | 0.0075 | 2.00 |
| 12.008 | 12.01 | -181.3 | | 0.0093 | 2.00 |
| 6.985 | 7.00 | -13.6 | - | 0.0093 | 2.00 |

F-CS-012 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม



National Food Institute, Ministry of Industry, Thailand

2008 Soi 35, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel : +66 (0) 2432 8688 Fax : +66 (0) 2432 8558 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Report

Certificate No.: 2103272-001-02
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: SevenEasy pH
Serial No.: C0051107 ID No.: UAE.WAO.005/2557
Manufacturer: HANNA INSTRUMENTS
Date of Calibration: 14 June 2021 Page 4 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature 24 °C ± 1 °C
Relative Humidity 54 % ± 2 %

Condition of this results of Calibration:

1. Calibration Method :
 - In house method: W-TE-025 by comparison with standard thermometer.
 - The Calibration is determined by comparing with a known temperature from a standard resistance thermometer.
 - The temperature scale in use at this laboratory is the International Temperature scale of 1990 (ITS-90).

2. Reference Standard Instrument :

| Instrument | Model | Serial No. | Certificate No. | Due Date | Through |
|---------------------------------------|-------|------------|-----------------|-----------|-------------------------|
| HANDHELD THERMOMETER | 1521 | A85997 | TE 640028-01 | 12-Dec-21 | NATIONAL FOOD INSTITUTE |
| Platinum Resistance Thermometer (PRT) | 385 | 509201 | | | |

Support Equipment : - Low Temperature Bath (ISOCAL-6), Model: Europa-6 Plus Basic, S/N: 341592/2

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

F-CS-012 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL: 0-2717-3000-27 FAX: 0-2719-9484



Certificate of Calibration

Cert. No.: 21TM1405
Page.: 1 of 3

Equipment : BOD Incubator
Manufacturer : Arco
Model : UC4-1320
Serial No. : -
ID No. : UAE.WAO.002/2550
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Lab Floor 2
Received Order : 17 August 2021
Calibration Date : 17 August 2021
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Khit Ruttanaprapachai

Approved by :
Approved Signatory

- () Ponthippa Tameyakul
(/) Malee Butkruea
() Suwit Imjai

Issue Date : 1 September 2021

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม

A 0031567



National Food Institute, Ministry of Industry, Thailand

2008 Soi 35, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel : +66 (0) 2432 8688 Fax : +66 (0) 2432 8558 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Report

Certificate No.: 2103272-001-02
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: SevenEasy pH
Serial No.: C0051107 ID No.: UAE.WAO.005/2557
Manufacturer: HANNA INSTRUMENTS
Date of Calibration: 14 June 2021 Page 5 of 5

Calibration point: 15.0, 25.0 and 35.0 °C **
Calibration result:

- The probe was immersed in liquid bath or dry bath to a minimum depth of 100 mm.
- Description of probe, model: HI1310 S/N: 078743
- Dimension of probe : Diameter 4 mm, Length 118 mm.
- Sheath material : Stainless Steel

| UUC* Reading (°C) | Standard Temperature (°C) | Correction Value (°C) | Uncertainty ± (°C) |
|-------------------|---------------------------|-----------------------|--------------------|
| 15.1 | 15.001 | -0.1 | 0.13 |
| 25.1 | 24.999 | -0.1 | 0.13 |
| 35.2 | 34.999 | -0.2 | 0.13 |

Remark: Edited Model from edge to HI2020-02.

Note

- UUC* : Unit Under Calibration
- NFI Laboratory is not accredited ISO/IEC 17025 for calibration. In the scope marked with **

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: 00 Date: 14-12-61

เอกสารไม่ควบคุม



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2108-0364OC-1

Cert. No.: 21TM1405
Page.: 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90.

Condition of this result of calibration

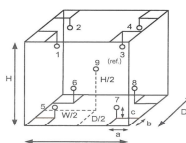
1. Reference standard instrument-

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|----------------------|--------|------------|-----------|-------------|
| 1) Data Acquisition | 34970A | MY41021843 | 21LM2 | 18 Feb 2022 |
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available



Probe Installation Details :

a = 10 cm
b = 10 cm
c = 10 cm

Dimension of Chamber :

D = 0.53 m
W = 1.2 m
H = 1.2 m
Capacity = 0.76 m³

| Environment during calibration | | |
|--------------------------------|-----------|----------|
| | Beginning | Finished |
| Temp. (°C) | 28 | 29 |
| REL.Humid. (%) | 52 | 55 |
| AC Supply (Volt) | 220 | 221 |

| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1 | 18-04RTD-01 |
| 2 | 18-04RTD-02 |
| 3 | 18-04RTD-03 |
| 4 | 18-04RTD-04 |
| 5 | 18-04RTD-05 |
| 6 | 18-04RTD-06 |
| 7 | 18-04RTD-07 |
| 8 | 18-04RTD-08 |
| 9 (ref.) | 18-04RTD-09 |

เอกสารไม่ควบคุม

a 1069646



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2108-0364OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 21TM1405
Page.: 3 of 3

| Calibration Point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Temperature stability (± °C) | Temperature uniformity (°C) | Overall Variation (°C) | Uncertainty (±°C) | Coverage Factor k |
|------------------------|-------------------|-------------------|------------------------------|-----------------------------|------------------------|-------------------|-------------------|
| 20.0 | 19.5 | 19.3 | 0.46 | 0.45 | 1.0 | 0.78 | 2 |

| Calibration Point (°C) | Measured Temperature (°C) | | | | | | | | |
|------------------------|---------------------------|--------|--------|--------|--------|--------|--------|--------|----------|
| | Position | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 (ref.) |
| 20.0 | 20.018 | 20.137 | 20.137 | 20.086 | 19.942 | 20.157 | 20.093 | 19.968 | 20.048 |

Average* : The average of 30 values in each position.
Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was included stability and excluded uniformity .
The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95 %.

-o0o-

เอกสารไม่ควบคุม
a 1069645



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2108-0364OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 21TM1406
Page.: 2 of 3

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

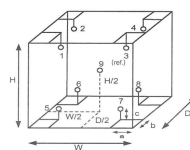
| Instrument | Model | Serial No. | Cert. No. | Due Date |
|----------------------|--------|------------|-----------|-------------|
| 1.) Data Acquisition | 34970A | MY41021843 | 21LM2 | 18 Feb 2022 |

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available



Probe Installation Details :
a = 10 cm
b = 10 cm
c = 10 cm
Dimension of Chamber :
D = 0.53 m
W = 1.2 m
H = 1.2 m
Capacity = 0.76 m³

| Environment during calibration | | |
|--------------------------------|-----------|----------|
| | Beginning | Finished |
| Temp. (°C) | 26 | 29 |
| REL.Humid. (%) | 52 | 55 |
| AC Supply (Volt) | 220 | 221 |

| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1 | 21-04RTD-11 |
| 2 | 21-04RTD-12 |
| 3 | 21-04RTD-13 |
| 4 | 21-04RTD-14 |
| 5 | 21-04RTD-15 |
| 6 | 21-04RTD-16 |
| 7 | 21-04RTD-17 |
| 8 | 21-04RTD-18 |
| 9 (ref.) | 21-04RTD-19 |

เอกสารไม่ควบคุม
a 1069645



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 16, SUANLIANG, SUANLIANG BANGKOK 10250
TEL: 0-2717-3000-27 FAX: 0-2719-9484



Cert. No.: 21TM1406
Page.: 1 of 3

Certificate of Calibration

Equipment : BOD Incubator
Manufacturer : Arco
Model : UC4-1320
Serial No. : -
ID No. : UAE.WAO.018/2559
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udumuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Lab Floor 2
Received Order : 17 August 2021
Calibration Date : 17 August 2021
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %

Calibrated by : Khit Rutanaprapachai

Approved by :
() Pormthippa Tameyakul
(/) Malee Butkruea
() Suwit Imjai

Issue Date : 1 September 2021

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม
A 0031566



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2108-0364OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 21TM1406
Page.: 3 of 3

| Calibration Point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Temperature stability (± °C) | Temperature uniformity (°C) | Overall Variation (°C) | Uncertainty (±°C) | Coverage Factor k |
|------------------------|-------------------|-------------------|------------------------------|-----------------------------|------------------------|-------------------|-------------------|
| 20.0 | 19.8 | 19.7 | 0.37 | 0.50 | 1.1 | 0.62 | 2 |

| Calibration Point (°C) | Measured Temperature (°C) | | | | | | | | |
|------------------------|---------------------------|--------|--------|--------|--------|--------|--------|--------|----------|
| | Position | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 (ref.) |
| 20.0 | 20.040 | 19.742 | 20.203 | 19.762 | 19.784 | 19.819 | 19.764 | 19.797 | 19.787 |

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.
UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

-o0o-

เอกสารไม่ควบคุม
a 1069645



National Food Institute, Ministry of Industry, Thailand

2008 Soi 36, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10700, Thailand.
Tel : +66 (0) 2422 8668 Fax : +66 (0) 2422 8558 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Certificate

Certificate No.: 2200706-001-01
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: Electronic Balance

Manufacturer: METTLER TOLEDO

Model: XPE205

Serial No.: B748058497

ID No.: UAE.CAL.004/2561

Order No.: 2200706

Operation No.: 2200706-001

Date of Receipt: 24 November 2021

Date of Calibration: 24 November 2021

Calibrated by: Mr.Jumporn Pimsri
Scientist

Approved by:
(Mr.Pheraphat Tuanjit)
Manager, Division of Calibration Laboratory
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: 00 Date: 14-12-61

เอกสารไม่ควบคุม



National Food Institute, Ministry of Industry, Thailand

2008 Soi 36, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10700, Thailand.
Tel : +66 (0) 2422 8668 Fax : +66 (0) 2422 8558 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Report

Certificate No.: 2200706-001-01
Equipment: Electronic Balance
Model: XPE205
Serial No.: B748058497
Capacity: 220 g
Manufacturer: METTLER TOLEDO
Resolution: 0.0001 g
ID No.: UAE.CAL.004/2561

Date of Calibration: 24 November 2021

Page 3 of 3

Calibration Results: (Continued)

Calibration Range: 0-200 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 k |
|------------------------|-------------------------|--------------------------|---------------------|------------------------|----------------------|
| Unload | 0.00000 | 0.0000 | 0.0000 | 0.000089 | 2.00 |
| 0.001 | 0.00100 | 0.0010 | 0.0000 | 0.000089 | 2.00 |
| 0.01 | 0.01000 | 0.0100 | 0.0000 | 0.000089 | 2.00 |
| 0.1 | 0.10000 | 0.1000 | 0.0000 | 0.000089 | 2.00 |
| 10 | 9.99998 | 10.0000 | 0.0000 | 0.000093 | 2.00 |
| 20 | 19.99999 | 19.9999 | 0.0001 | 0.000095 | 2.00 |
| 40 | 39.99998 | 40.0000 | 0.0000 | 0.00011 | 2.00 |
| 50 | 49.99990 | 49.9998 | 0.0001 | 0.00013 | 2.00 |
| 70 | 69.99989 | 69.9997 | 0.0002 | 0.00014 | 2.00 |
| 90 | 89.99988 | 89.9999 | 0.0000 | 0.00016 | 2.00 |
| 100 | 100.00000 | 100.0000 | 0.0000 | 0.00017 | 2.00 |
| 110 | 109.99998 | 110.0000 | 0.0000 | 0.00018 | 2.00 |
| 120 | 119.99999 | 119.9999 | 0.0001 | 0.00019 | 2.00 |
| 150 | 149.99990 | 150.0000 | -0.0001 | 0.00023 | 2.00 |
| 170 | 169.99989 | 170.0000 | -0.0001 | 0.00025 | 2.00 |
| 200 | 200.00009 | 199.9997 | 0.0004 | 0.00030 | 2.00 |

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

F-CS-012 Revision: 00 Date: 14-12-61

----- End -----

เอกสารไม่ควบคุม



National Food Institute, Ministry of Industry, Thailand

2008 Soi 36, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10700, Thailand.
Tel : +66 (0) 2422 8668 Fax : +66 (0) 2422 8558 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Report

Certificate No.: 2200706-001-01
Equipment: Electronic Balance
Model: XPE205
Serial No.: B748058497
Capacity: 220 g
Manufacturer: METTLER TOLEDO
Resolution: 0.0001 g
ID No.: UAE.CAL.004/2561

Page 2 of 3

Environment Condition: Ambient Temperature: 24.1 ± 0.6 °C Relative Humidity: 48 ± 2.5 %

Place of Calibration: 306 Balance Room, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-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 1-500mg 830806854 TCS M21010975 12 January 2022

Standard Weight Class E2 1-500g 8308068128 TCS M21010985 13 January 2022

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

Thermo-Hygro Meter PONPE 490 NFI.BTH 001/17 Quality Reborn QR21-0299 15 February 2022

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) |
|---------------------|-------------------------------------|
| 100 | 0.000053 |
| 200 | 0.000074 |

2. Off-Center Error:

A mass of 50 g was placed and moved to various position on pan.

The balance reading obtained is given in the table.

| | | |
|----------------------|---------|---------|
| | | |
| 1 | 2 | 3 |
| (g) | (g) | (g) |
| 49.9999 | 49.9999 | 49.9998 |
| 4 | 5 | 6 |
| (g) | (g) | (g) |
| 49.9998 | 49.9999 | 49.9999 |
| (Maximum Difference) | | |
| 0.0001 | | |

F-CS-012 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
3344 PATTANAKARN ROAD SOI 18, SUANLIANG, SUANLIANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 21TM1876
Page: 1 of 3

Certificate of Calibration

Equipment: Hot Air Oven
Manufacturer: Memmert
Model: UF 55
Serial No.: B216.1666
ID No.: UAE.WAO.027/2559
Submitted by: United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location: Lab Floor 2
Received Order: 29 October 2021
Calibration Date: 29 October 2021
Ambient Temperature: (26 ± 10) °C
Relative Humidity: (50 ± 30) %
Calibrated by: Kunchit Promprat

Approved by:
Approved Signatory

() Pormthippa Tameyakul
() Malee Buikrua
() Suwit Imjai

Issue Date: 4 November 2021

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2110-0701OC-1
Cert. No.: 21TM1876
Page.: 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument Model Serial No. Cert. No. Due Date
1) Data Acquisition 34970A MY44067817 21LM10 20 Jul 2022

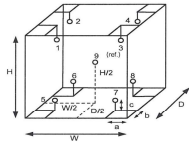
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



Probe Installation Details :
a = 5.0 cm
b = 5.0 cm
c = 5.0 cm
Dimension of Chamber :
D = 0.33 m
W = 0.40 m
H = 0.40 m
Capacity = 0.053 m³

| Environment during calibration | | |
|--------------------------------|-----------|----------|
| | Beginning | Finished |
| Temp. (°C) | 28 | 28 |
| REL Humid. (%) | 56 | 55 |
| AC Supply (Volt) | 230 | 230 |

| Ref. Std. ID No. : @ Calibration Point | | |
|----------------------------------------|-----------------|------------|
| Position : | (140, 180) °C | (104) °C |
| 1 | 21-15TC-01 | 15RTD2/11 |
| 2 | 21-15TC-02 | 15RTD2/12 |
| 3 | 21-15TC-03 | 15RTD2/13 |
| 4 | 21-15TC-04 | 15RTD2/14 |
| 5 | 21-15TC-05 | 15RTD2/15 |
| 6 | 21-15TC-06 | 15RTD2/20 |
| 7 | 21-15TC-07 | 15RTD2/17 |
| 8 | 21-15TC-08 | 15RTD2/18 |
| 9 (ref.) | 21-15TC-09 | 15RTD2/19 |

Melu.

เอกสารไม่ควบคุม



Customer Service Report

FOSS South East Asia
3388 Sirinrat Building, 25th - 26th Floor, Unit No. 3388/90,
Rama IV Road, Klongton, Klongtoey, Bangkok, Thailand 10110

Report No: 5872

Date: 29/11/21
Customer: UAE
Instrument: Digestor 2520A/B
Address: 417 ม. 9 อ. บางพลี จ. สมุทรปราการ 10260
Serial: 91799469
Hours Start: 08:00, Finish: 10:00
Travel To Customer: 1, Labour: 3, Travel From Customer: 3

| Application | | Special | | Standard | |
|-----------------|-------------------------------------|----------------|-------------------------------------|--------------|-------------------------------------|
| Normal | <input checked="" type="checkbox"/> | Courtesy Visit | <input checked="" type="checkbox"/> | Installation | <input checked="" type="checkbox"/> |
| Distributor | <input checked="" type="checkbox"/> | PMA Onboarding | <input checked="" type="checkbox"/> | Quote | <input checked="" type="checkbox"/> |
| Internal | <input checked="" type="checkbox"/> | Warranty | <input checked="" type="checkbox"/> | Repair | <input checked="" type="checkbox"/> |
| Digital Service | <input checked="" type="checkbox"/> | Sales Support | <input checked="" type="checkbox"/> | Remote | <input checked="" type="checkbox"/> |
| | | | | PM | <input checked="" type="checkbox"/> |
| | | | | Other | <input checked="" type="checkbox"/> |

PQ/Quote Number: If applicable

PMA Type: FossCare Pro Contract No. FossCare

| Details of Work / Test | Condition / Status |
|---------------------------------|--------------------|
| - Check Instrument, Cable Brand | Not OK |
| - Replace cable kit digestor | Pass |
| - Check Temperature cut-off | Pass |
| - Clean & Lubricant | Pass |
| - Check temperature set 170°C | Set 170°C |
| - NO function | OK |

Instrument Ready for Use ☒ OK ☐ Not OK Instrument Ready for Use

| Part No. | Batch | Description | Qty |
|----------|----------|---------------------|-----|
| 1007852 | 04.02.21 | Cable kit digestor | 1 |
| 1007554 | 19.04.21 | Temperature cut-off | 1 |

I confirm this report is accurate and complete
Signed FOSS: Melu, Signed Customer: 91799469
Name: Name: Email: Email:
Would you be willing to participate in a brief survey in order to tell us how we performed? ☐ Yes ☐ No

เอกสารไม่ควบคุม



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2110-0701OC-1
Cert. No.: 21TM1876
Page.: 3 of 3

Result of Calibration :-

(*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

| Calibration Point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Temperature stability (± °C) | Temperature uniformity (°C) | Overall Variation (°C) | Uncertainty (± °C) | Coverage Factor k |
|--------------------------|---------------------|---------------------|--------------------------------|-------------------------------|--------------------------|----------------------|-------------------|
| 104.0 | 104.0 | 104.0 | 0.11 | 0.52 | 0.72 | 0.42 | 2 |
| 140.0 | 140.0 | 140.0 | 0.25 | 1.1 | 1.4 | 1.1 | 2 |
| 180.0 | 180.0 | 180.0 | 0.18 | 0.87 | 1.2 | 1.1 | 2 |

| Measured Temperature (°C) | | | | | | | | |
|-----------------------------|----------|---------|---------|---------|---------|---------|---------|---------|
| Calibration Point (°C) | Position | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 104.0 | 103.852 | 103.978 | 104.382 | 104.323 | 103.776 | 104.015 | 104.312 | 104.196 |
| 140.0 | 140.309 | 140.730 | 140.426 | 140.270 | 139.531 | 139.666 | 140.067 | 139.895 |
| 180.0 | 180.598 | 180.339 | 180.755 | 180.619 | 179.716 | 179.829 | 180.204 | 180.365 |

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

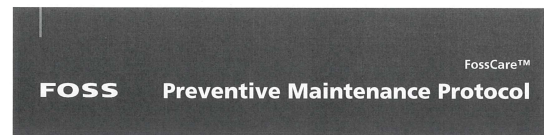
Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

-000-

Melu.

เอกสารไม่ควบคุม



Tecator™ Digestor 2508/2520 or Labtec™ DT208/220 Digestor

Customer : UAE

| | |
|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| PM Interval: 12 Months | No. of samples analysed: - |
| PM kit (P/N): S/N 91794469 / S/N 91796178 60079730 PM.KIT, Digestor 8/20 pos. 60079731 PM.KIT, Digestor 8/20 pos. incl. Scrubber | PM time: 130 min for 60079730 180 min for 60079731 |

Introduction

A maintenance protocol provides a systematic and functional means of maintaining a specific instrument type. The certified performed PM interval depends on the operational conditions, and is based on our extensive experience and knowledge of manufacturing and maintaining analytical instruments.

Apart from sample throughput, the environmental conditions also need to be taken into account. Demanding environments, such as high ambient temperature, humidity, dirtiness etc. can measurably shorten component lifetime and also the maintenance and component replacement intervals.

Dedicated Analytical Solutions

FOSS Analytical AS
Fos Alle 1
DK-3400 Hillerød
Denmark
Tel +45 7010 3370
Fax +45 7010 3371
E-mail info@foss.dk
Web www.foss.dk

FOSS Analytical Co., Ltd.
6 Louyang Road, Building 1
215121, Suzhou
P.R. China
Tel +86 512 6292 0100
Fax +86 512 6280 5630
E-mail info@foss.cn
Web www.foss.cn

Customer Support, 6007 8817 Rev. 1

102)

เอกสารไม่ควบคุม

Maintenance Procedure

Parts / Modules to be Exchanged (Note: Only for Scrubber if available)

| OK | Part / Module | Action | Qty | P/N | Time [Min] |
|--------------------------|-----------------------|---------|-------|-----------|------------|
| <input type="checkbox"/> | O-seal 30x3.0mm | Replace | 1 | 6002 6964 | 10 |
| <input type="checkbox"/> | Seal VA-120 FPM | Replace | 2 | 1542 0159 | 10 |
| <input type="checkbox"/> | Flask seal | Replace | 2 | 1542 0088 | 10 |
| <input type="checkbox"/> | Tubing Viton D 8/12mm | Replace | 3.3 m | 1582 0162 | 10 |
| <input type="checkbox"/> | Tubing PVC 9/13mm | Replace | 1.5 m | 5582 0060 | 10 |

Check and Adjustment

| OK | Action | Time [Min] |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------|
| <input checked="" type="checkbox"/> | General cleaning according to User Manual section 5 Maintenance | 15 |
| <input checked="" type="checkbox"/> | Clean digester holes with 60079729 Grind head (mount the head to an electrical drill) to remove difficult residue, if necessary | 100 |
| <input checked="" type="checkbox"/> | Check cables and electrical connections | 5 |
| <input checked="" type="checkbox"/> | Check the function | 10 |

Note: The total time is an approximate time and depending on e.g. the current status and the accessibility of the instrument this time might vary.

| Total Time [Min] |
|------------------|
| 130 or 180 |

| | |
|----------------------------------------------|-------------------------------|
| Customer representative: | Signature: |
| FOSS representative: <u>WATTANA CHUNBANG</u> | Signature: <u>[Signature]</u> |

Customer Support, 6007 8817 / Rev. 1

2(2)

เอกสารไม่ควบคุม

FOSS Preventive Maintenance Protocol

FossCare™

Customer: UAE

| | | |
|-----------------------------------------------------------------------------------------------|-----------------------------|------------------------------------------|
| Instrument | Kjeltec™ 2100 = Kjeltec 200 | |
| Recommended PM interval (whichever occurs first between interval and no. of samples analysed) | 12 months | No. of samples analysed (if applicable): |
| Preventive maintenance kit (P/N) | 10009965 | <u>5/N 91790524</u> |

Introduction

A maintenance protocol provides systematic and functional means of maintaining a specific instrument type. The recommended PM interval depends on the operational conditions and is based on our extensive experience and knowledge of manufacturing and maintaining analytical instruments.

Apart from sample throughput, the environmental conditions also need to be considered. A demanding environment, such as high ambient temperature, humidity, dirtiness etc can measurably shorten component lifetime and also the maintenance and component replacement intervals.

NOTE!

The content of this protocol is subject to change over time. In order to safeguard that you obtain the correct parts, please make sure to indicate serial no and date of installation when contacting your FOSS representative.

Dedicated Analytical Solutions

FOSS Analytical A/S
69 Slangerupgade
DK-3400 Hillerød
Denmark

Tel +45 7010 3370
Fax +45 7010 3371
E-mail support@foss.dk
Web www.foss.dk

FOSS Analytical AB
Box 70
SE-283 21 Högås
Sweden

Tel +46 42 361500
Fax +46 42 340349
E-mail support@foss.dk
Web www.foss.dk

Customer Support, 1001 4572 / Rev. 3

1(2)

เอกสารไม่ควบคุม

FOSS

Customer Service Report

| | |
|-------------|-----------------|
| Date: | <u>30/11/21</u> |
| Customer: | <u>UAE</u> |
| Instrument: | <u>KT 200</u> |

FOSS South East Asia
3388 Sirinrat Building, 25th – 26th Floor, Unit No. 3388/90,
Rama IV Road, Klongtoey, Klongtoey, Bangkok, Thailand 10110

| | |
|------------|-------------|
| Report No: | 5874 |
|------------|-------------|

| | |
|----------|-------------------------------------------------|
| Address: | <u>91 ถนนพหลโยธิน เขตจตุจักร กรุงเทพฯ 10110</u> |
| Serial: | <u>91790524</u> |

| | | | |
|--------|--------------------|--------------|----------------------|
| Hours | Travel To Customer | Labour | Travel From Customer |
| Start | <u>8.00</u> | <u>9.00</u> | <u>12.00</u> |
| Finish | <u>1.00</u> | <u>12.00</u> | <u>1.00</u> |

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

PO/Quote Number: 5874

| | | | |
|----------|------------------------|--------------|-------------|
| PMA Type | <u>Foss Care - PMA</u> | Contract No. | <u>5874</u> |
|----------|------------------------|--------------|-------------|

| Details of Work / Test | Condition / Status |
|-----------------------------------------|------------------------------------------------------------------------|
| - Check Instrument | OK |
| - Wash PM kit for KT 200 | Pass |
| - Wash Safety Valve | Pass |
| - Wash Rubber Gasket | Pass |
| - Wash Seal | Pass |
| - Wash Heating element | Pass |
| - Wash New panel PCB | Pass |
| - Wash Safety door | Pass |
| - Clean & Lubricate | Pass |
| - Check LeakGuard | Pass |
| - Check Volume Alkali set 30ml for 20ml | Pass |
| Instrument Ready for Use | <input checked="" type="checkbox"/> OK <input type="checkbox"/> Not OK |

| Part No. | Batch | Description | Qty |
|----------|----------|-----------------------------------|-----|
| 10009965 | 11235983 | Foss PM kit KT 200 | 1 |
| 15750024 | 29-07-21 | Safety Valve | 2 |
| 15750024 | 29-07-21 | Rubber Gasket for Heating Element | 2 |
| 10009965 | 07-08-21 | Heating Element | 1 |
| 10009965 | 16-11-20 | Seal | 1 |
| 10009965 | 16-11-20 | KT 200 new panel PCB | 1 |
| 10009965 | 22-04-21 | Safety door complete | 1 |

| | |
|------------------------------------------------|-----------------|
| I confirm this report is accurate and complete | |
| Signed FOSS | Signed Customer |
| Name | Name |

Would you be willing to participate in a brief survey in order to tell us how we performed? ☐ Yes ☐ No

เอกสารไม่ควบคุม

Maintenance Procedure

Exchange of Parts and Cleaning

| Step | Action | Part | P/N | OK |
|------|-------------------------------|------------------------------|-----------|--------------------------|
| 1 | Replace | Adapter for dig. tube 250 ml | 1000 0056 | <input type="checkbox"/> |
| 2 | Replace | Non return valve | 1000 3538 | <input type="checkbox"/> |
| 3 | Replace valves in alkali pump | Valve kit reagent/water pump | 1575 0093 | <input type="checkbox"/> |
| 4 | Replace steam tubing | Silicone tubing 8/12 mm | 1582 0006 | <input type="checkbox"/> |
| 5 | Replace alkali tubing | Tubing reinforced for alkali | 1582 0011 | <input type="checkbox"/> |
| 6 | Replace water tubing | Tubing PVC 8/11 mm | 1582 0004 | <input type="checkbox"/> |
| 7 | Cleaning | Steam generator | | <input type="checkbox"/> |
| 8 | Cleaning | Splash head | | <input type="checkbox"/> |

Check and Adjustments

| Step | Action | Module | Measured | Limits | OK |
|------|-----------------------------------------|-------------|--------------|--------------------|-------------------------------------|
| 1 | Check alkali volume, 10 ml/stroke | Alkali pump | <u>98</u> | At 50 ml - 0/+3 ml | <input checked="" type="checkbox"/> |
| 2 | Check distillation volume | | <u>120ml</u> | 100 – 150 ml/4 min | <input checked="" type="checkbox"/> |
| 3 | Check front panel switches | | | | <input checked="" type="checkbox"/> |
| 4 | Check cables and electrical connections | | | | <input checked="" type="checkbox"/> |
| 5 | Check level pins in steam generator | | | | <input checked="" type="checkbox"/> |
| 6 | Check safety door switch | | | | <input checked="" type="checkbox"/> |

Customer Support, 1001 4572 / Rev. 3

2(2)

เอกสารไม่ควบคุม

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Loeclia Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+66 2723 0382
MT-TH.ServiceSupport@mt.com



Accuracy Calibration Certificate

Customer

Company: United Analyst and Engineering Consultant Co., Ltd.
Address: 3 Soi Udom Suk 41, Sukhumvit Rd., Bang Chak
City: Phra Khanong Contact: Suwit Chotnok
Zip / Postal: 10260
State / Province: Bangkok
Order Number: 

Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument
Model: XSR204 Asset Number: N/A
Serial No.: C117635043 Terminal Model: N/A
Building: N/A Terminal Serial No.: N/A
Floor: 1 Terminal Asset No.: N/A
Room: Balance

| Range | Max. Capacity | Readability (d) |
|-------|---------------|-----------------|
| 1 | 220 g | 0.0001 g |

Procedure

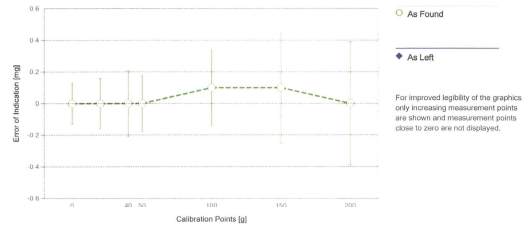
Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction: CPM002/20
This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.
The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.
In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

| | Temperature | Humidity |
|----------|-----------------------------|---------------------------|
| As Found | Start: 25.1 °C End: 24.9 °C | Start: 50.9 % End: 59.0 % |

As Found Calibration Date: 27-May-2021
As Left Calibration Date: N/A
Issue Date: 31-May-2021
Calibrator: Phitawat Kunavut
Approved Signatory: 
Kassakorn Tassanachaisakul
☐ Genshi Jirayom
☐ Surachet Sukkate

Error of Indication

| As Found | Reference Value | Indication | Error of Indication | Expanded Uncertainty | k |
|----------|-----------------|------------|---------------------|----------------------|---|
| 1 | 0.0000 g | 0.0000 g | 0.0000 g | 0.13 mg | 2 |
| 2 | 0.5000 g | 0.5000 g | 0.0000 g | 0.14 mg | 2 |
| 3 | 1.0000 g | 1.0000 g | 0.0000 g | 0.14 mg | 2 |
| 4 | 5.0000 g | 5.0000 g | 0.0000 g | 0.15 mg | 2 |
| 5 | 10.0000 g | 10.0000 g | 0.0000 g | 0.15 mg | 2 |
| 6 | 20.0000 g | 20.0000 g | 0.0000 g | 0.16 mg | 2 |
| 7 | 39.9999 g | 39.9999 g | 0.0000 g | 0.21 mg | 2 |
| 8 | 50.0000 g | 50.0000 g | 0.0000 g | 0.18 mg | 2 |
| 9 | 100.0000 g | 100.0001 g | 0.0001 g | 0.24 mg | 2 |
| 10 | 150.0000 g | 150.0001 g | 0.0001 g | 0.35 mg | 2 |
| 11 | 200.0000 g | 200.0000 g | 0.0000 g | 0.39 mg | 2 |



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.: WS38 Date of Issue: 17-Mar-2020
Certificate Number: 166237 Calibration Due Date: 09-Sep-2021

Thermo Hygrometer

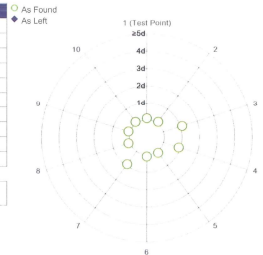
Equipment No.: IN256 Date of Issue: 06-Aug-2020
Certificate Number: 2041812 Calibration Due Date: 03-Aug-2021

Measurement Results

Repeatability

Test Load: 100 g

| | As Found | As Left |
|--------------------|------------|---------|
| 1 | 100.0001 g | N/A |
| 2 | 100.0001 g | N/A |
| 3 | 100.0002 g | N/A |
| 4 | 100.0000 g | N/A |
| 5 | 100.0001 g | N/A |
| 6 | 100.0001 g | N/A |
| 7 | 100.0000 g | N/A |
| 8 | 100.0001 g | N/A |
| 9 | 100.0001 g | N/A |
| 10 | 100.0001 g | N/A |
| Standard Deviation | 0.00006 g | N/A |

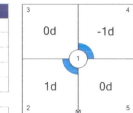


The "d" in the graph represents the readability of the range/interval in which the test was performed.
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

| Position | As Found | As Left |
|-------------------|------------|---------|
| 1 | 100.0001 g | N/A |
| 2 | 100.0002 g | N/A |
| 3 | 100.0001 g | N/A |
| 4 | 100.0000 g | N/A |
| 5 | 100.0001 g | N/A |
| Maximum Deviation | 0.0001 g | N/A |



The "d" in the graph represents the readability of the range/interval in which the test was performed.

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with $k=2$ in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $1.5 \cdot 10^{-6} / K$
Temperature range on site for the evaluation of the measurement uncertainty in use: $4 K$

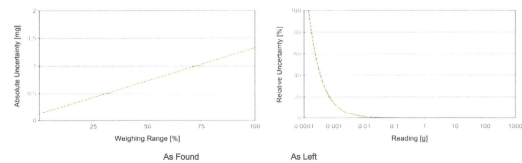
Linearization of Uncertainty Equation

| Range | d | Max | As Found | As Left |
|-------|----------|-------|--------------------------------------------------------|---------|
| 1 | 0.0001 g | 220 g | $U_1 = 0.14 \text{ mg} + 0.00541 \text{ mg/g} \cdot R$ | N/A |

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

| Net Indication | As Found | As Left |
|----------------|----------|----------|
| 0.0220 g | 0.14 mg | 0.64% |
| 0.2200 g | 0.14 mg | 0.064% |
| 2.2000 g | 0.15 mg | 0.0069% |
| 22.0000 g | 0.26 mg | 0.0012% |
| 220.0000 g | 1.3 mg | 0.00060% |



REPORT OF CALIBRATION

Certificate No. : SP21-015

Page 2 of 5

Environment Condition : Ambient Temperature $25 \pm 5 ^\circ C$

Relative humidity $50 \pm 15 \% RH$

Calibration method : In-house method CP-01 Calibration of UV-Vis Spectrophotometer Based on ASTM E275-08

Certified Reference Materials :

| Material | Serial No. | Certificate No. | Due date |
|-------------------------|------------|-----------------|-----------|
| Absorbance Standard set | 25760 | 80102 | 11/7/2021 |
| Absorbance Standard set | 25757 | 80105 | 11/7/2021 |
| Wavelength Standard set | 25806 | 80103 | 11/7/2021 |
| Wavelength Standard set | 25758 | 80104 | 11/7/2021 |

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 : 90 nm/min

Scan Interval of UUC : 0.15 nm .

Resolution of UUC : Photometric 0.0001 Abs.

Wavelength 0.1 nm .

CERTIFICATE OF CALIBRATION

Certificate No. : SP21-015

Page 1 of 5

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

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

Location of calibration : Laboratory 315

Equipment : Spectrophotometer

Manufacturer : Agilent Technologies

Model : Cary 60

Serial No. : MY15410009


ID No. : N/A

Received Date : 29 May 2021

Calibration Date : 29 May 2021

Issue Date : 30 May 2021

Condition of Instrument : Used

Calibrated by : 
(Mr. Tanawat Rittidach)

Approved by : 
(Miss Chonchicha Sangern)

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.


REPORT OF CALIBRATION

Certificate No. : SP21-015


Page 3 of 5

Wavelength Accuracy :

| CRMs Values (nm.) | UUC Reading (nm.) | Correction (nm.) | Uncertainty (nm.) | Coverage factor k |
|----------------------|----------------------|---------------------|----------------------|----------------------|
| 241.72 | 242.0 | -0.28 | 0.19 | 2.00 |
| 279.45 | 279.5 | -0.05 | 0.19 | 2.00 |
| 287.81 | 287.9 | -0.09 | 0.19 | 2.00 |
| 334.06 | 333.8 | 0.26 | 0.19 | 2.00 |
| 360.93 | 360.5 | 0.43 | 0.19 | 2.00 |
| 418.59 | 418.2 | 0.39 | 0.19 | 2.00 |
| 445.94 | 445.6 | 0.34 | 0.19 | 2.00 |
| 453.66 | 453.3 | 0.36 | 0.19 | 2.00 |
| 460.02 | 459.8 | 0.22 | 0.19 | 2.00 |
| 536.59 | 536.7 | -0.11 | 0.19 | 2.00 |
| 637.98 | 638.4 | -0.42 | 0.19 | 2.00 |
| 431.38 | 430.9 | 0.48 | 0.19 | 2.00 |
| 472.50 | 472.5 | 0.00 | 0.19 | 2.00 |
| 513.47 | 513.4 | 0.07 | 0.19 | 2.00 |
| 528.88 | 529.2 | -0.32 | 0.19 | 2.00 |
| 573.17 | 573.5 | -0.33 | 0.19 | 2.00 |
| 585.35 | 584.8 | 0.55 | 0.20 | 2.00 |
| 684.40 | 684.9 | -0.50 | 0.19 | 2.00 |
| 740.72 | 740.4 | 0.32 | 0.19 | 2.00 |
| 748.55 | 749.0 | -0.45 | 0.19 | 2.00 |
| 807.03 | 807.1 | -0.07 | 0.19 | 2.00 |
| 879.28 | 879.4 | -0.12 | 0.19 | 2.00 |



DQE Services Co., Ltd.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com




REPORT OF CALIBRATION

Certificate No. : SP21-015 Page 4 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 | 0.0042 | 2.00 |
| | 0.5791 | 0.5767 | 0.0024 | 0.0042 | 2.00 |
| | 1.0488 | 1.0444 | 0.0044 | 0.0042 | 2.00 |
| | 2.1914 | 2.1841 | 0.0073 | 0.0092 | 2.00 |
| 440 | 0.0000 | 0.0001 | -0.0001 | 0.0042 | 2.00 |
| | 0.5618 | 0.5609 | 0.0009 | 0.0042 | 2.00 |
| | 1.0260 | 1.0244 | 0.0016 | 0.0042 | 2.00 |
| | 2.1259 | 2.1192 | 0.0067 | 0.0091 | 2.00 |
| 465 | 0.0000 | 0.0000 | 0.0000 | 0.0042 | 2.00 |
| | 0.5240 | 0.5212 | 0.0028 | 0.0042 | 2.00 |
| | 0.9639 | 0.9632 | 0.0007 | 0.0042 | 2.00 |
| | 1.9788 | 1.9717 | 0.0071 | 0.0091 | 2.00 |
| 546.1 | 0.0000 | -0.0001 | 0.0001 | 0.0042 | 2.00 |
| | 0.5194 | 0.5184 | 0.0010 | 0.0042 | 2.00 |
| | 0.9991 | 0.9991 | 0.0000 | 0.0042 | 2.00 |
| | 1.9970 | 1.9911 | 0.0059 | 0.0093 | 2.00 |
| 590 | 0.0000 | 0.0000 | 0.0000 | 0.0042 | 2.00 |
| | 0.5523 | 0.5517 | 0.0006 | 0.0042 | 2.00 |
| | 1.0810 | 1.0802 | 0.0008 | 0.0042 | 2.00 |
| | 2.0369 | 2.0293 | 0.0076 | 0.0092 | 2.00 |
| 635 | 0.0000 | -0.0001 | 0.0001 | 0.0042 | 2.00 |
| | 0.5596 | 0.5593 | 0.0003 | 0.0042 | 2.00 |
| | 1.0513 | 1.0505 | 0.0008 | 0.0042 | 2.00 |
| | 1.9268 | 1.9217 | 0.0051 | 0.0092 | 2.00 |



DQE Services Co., Ltd.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



CERTIFICATE OF CALIBRATION

Certificate No. : SP22-007 Page 1 of 5

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

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

Location of calibration : Laboratory 315

Equipment : UV-Vis Spectrophotometer

Manufacturer : Hitachi

Model : U-1900

Serial No. : 2021-064



ID No. : UAE.WAS.006/2552

Received Date : 20 January 2022

Calibration Date : 20 January 2022

Issue Date : 24 January 2022

Condition Instrument : Good

Calibrated by :  (Mr. Tanawat Rittidach) **Approved by :**  (Ms. Chonthicha Sangngern)

Technical Manager 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.

FM-510-02 R03 11/03/20


FM-708-02 R01 1/11/2021

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



DQE Services Co., Ltd.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



REPORT OF CALIBRATION

Certificate No. : SP21-015 Page 5 of 5

Photometric Accuracy :


| Wavelength (nm.) | CRMs Values (Abs) | UUC Reading (Abs) | Correction (Abs) | Uncertainty (Abs) | Coverage factor k |
|------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| 235 | 0.0000 | 0.0001 | -0.0001 | 0.0075 | 2.00 |
| | 0.7498 | 0.7438 | 0.0060 | 0.0075 | 2.00 |
| 257 | 0.0000 | 0.0000 | 0.0000 | 0.0075 | 2.00 |
| | 0.8712 | 0.8647 | 0.0065 | 0.0075 | 2.00 |
| 313 | 0.0000 | 0.0000 | 0.0000 | 0.0075 | 2.00 |
| | 0.2920 | 0.2900 | 0.0020 | 0.0075 | 2.00 |
| 350 | 0.0000 | 0.0000 | 0.0000 | 0.0075 | 2.00 |
| | 0.6459 | 0.6428 | 0.0031 | 0.0075 | 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 -



DQE Services Co., Ltd.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



REPORT OF CALIBRATION

Certificate No. : SP22-007 Page 2 of 5

Environment Condition : Ambient Temperature $25 \pm 5^\circ\text{C}$
Relative humidity $55 \pm 20\% \text{RH}$

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 | 95935 | 22 October 2023 |
| Absorbance Standard set | 25757 | 95929 | 22 October 2023 |
| Wavelength Standard set | 25806 | 95916 | 22 October 2023 |
| Wavelength Standard set | 25758 | 95915 | 22 October 2023 |

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 : 4.0 nm.

Scan Speed of UUC : 200 nm/min

Scan Interval of UUC : 0.1 nm.

Resolution of UUC : Photometric 0.001 Abs.
Wavelength 0.1 nm.

FM-510-02 R03 11/03/201

FM-708-02 R01 1/11/2021

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

DQE Services Co.,Ltd.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

REPORT OF CALIBRATION

Certificate No. : SP22-007 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 |
| | 0.5787 | 0.577 | 0.0017 | 0.0031 | 2.00 |
| | 1.0490 | 1.050 | -0.0010 | 0.0029 | 2.00 |
| | 2.1900 | 2.183 | 0.0070 | 0.0080 | 2.00 |
| 440 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5607 | 0.560 | 0.0007 | 0.0034 | 2.00 |
| | 1.0247 | 1.023 | 0.0017 | 0.0035 | 2.00 |
| | 2.1229 | 2.118 | 0.0049 | 0.0079 | 2.00 |
| 465 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5236 | 0.521 | 0.0026 | 0.0030 | 2.00 |
| | 0.9634 | 0.963 | 0.0004 | 0.0029 | 2.00 |
| | 1.9763 | 1.974 | 0.0023 | 0.0070 | 2.00 |
| 546.1 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5191 | 0.518 | 0.0011 | 0.0031 | 2.00 |
| | 1.0003 | 1.000 | 0.0003 | 0.0033 | 2.00 |
| | 1.9987 | 1.996 | 0.0027 | 0.0084 | 2.00 |
| 590 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5523 | 0.552 | 0.0003 | 0.0030 | 2.00 |
| | 1.0809 | 1.082 | -0.0011 | 0.0030 | 2.00 |
| | 2.0391 | 2.033 | 0.0061 | 0.0079 | 2.00 |
| 635 | 0.0000 | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5601 | 0.562 | -0.0019 | 0.0031 | 2.00 |
| | 1.0512 | 1.052 | -0.0008 | 0.0030 | 2.00 |
| | 1.9294 | 1.925 | 0.0044 | 0.0079 | 2.00 |

FM-708-02 R01 1/11/2021

เอกสารไม่ควบคุม

DQE Services Co.,Ltd.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

REPORT OF CALIBRATION

Certificate No. : SP22-007 Page 5 of 5

Wavelength Accuracy :

| CRMs Values (nm.) | UUC Reading (nm.) | Correction (nm.) | Uncertainty (nm.) | Coverage factor k |
|----------------------|----------------------|---------------------|----------------------|----------------------|
| 241.54 | 240.8 | 0.74 | 0.18 | 2.00 |
| 279.40 | 278.5 | 0.90 | 0.18 | 2.00 |
| 288.70 | 288.0 | 0.70 | 0.18 | 2.00 |
| 334.22 | 333.5 | 0.72 | 0.18 | 2.00 |
| 361.26 | 360.5 | 0.76 | 0.18 | 2.00 |
| 418.48 | 418.0 | 0.48 | 0.18 | 2.00 |
| 446.70 | 446.0 | 0.70 | 0.18 | 2.00 |
| 453.20 | 453.0 | 0.20 | 0.18 | 2.00 |
| 460.06 | 459.5 | 0.56 | 0.18 | 2.00 |
| 536.90 | 536.0 | 0.90 | 0.18 | 2.00 |
| 637.94 | 637.2 | 0.74 | 0.18 | 2.00 |
| 440.74 | 440.0 | 0.74 | 0.18 | 2.00 |
| 472.22 | 471.6 | 0.62 | 0.18 | 2.00 |
| 513.70 | 513.0 | 0.70 | 0.18 | 2.00 |
| 528.72 | 528.0 | 0.72 | 0.18 | 2.00 |
| 574.60 | 573.8 | 0.80 | 0.18 | 2.00 |
| 585.48 | 584.6 | 0.88 | 0.20 | 2.00 |
| 684.63 | 684.0 | 0.63 | 0.18 | 2.00 |
| 740.27 | 739.8 | 0.47 | 0.20 | 2.00 |
| 748.28 | 747.8 | 0.48 | 0.18 | 2.00 |
| 807.16 | 806.4 | 0.76 | 0.18 | 2.00 |
| 879.70 | 878.8 | 0.90 | 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%
- * Indicates non TISI accredited

- End of Certificate -

FM-708-02 R01 1/11/2021

เอกสารไม่ควบคุม

DQE Services Co.,Ltd.
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

REPORT OF CALIBRATION

Certificate No. : SP22-007 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 |
| | 0.7478 | 0.746 | 0.0018 | 0.0057 | 2.00 |
| 257 | 0.0000 | 0.000 | 0.0000 | 0.0050 | 2.00 |
| | 0.8686 | 0.861 | 0.0076 | 0.0059 | 2.00 |
| 313 | 0.0000 | 0.000 | 0.0000 | 0.0050 | 2.00 |
| | 0.2912 | 0.291 | 0.0002 | 0.0051 | 2.00 |
| 350 | 0.0000 | 0.000 | 0.0000 | 0.0050 | 2.00 |
| | 0.6448 | 0.638 | 0.0068 | 0.0055 | 2.00 |

FM-708-02 R01 1/11/2021

เอกสารไม่ควบคุม

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484

Certificate of Calibration

Cert. No.: 21TM832
Page: 1 of 3

Equipment : Incubator
Manufacturer : Memmert
Model : IF 75
Serial No. : D317.0305
ID No. : UAE.MIC.022/2561
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 7 May 2021
Calibration Date : 7 May 2021
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Khit Ruttanaprapachai
Approved by : 
Approved Signatory
() Ponthippa Tameyakul
() Malee Butkruea
() Suwit Imjai
Issue Date : 18 May 2021

The Uncertainties are for a confidence probability of approximately 95%
This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2105-0012OC-2
Procedure Used :-

Cert. No.: 21TM832
Page.: 2 of 3

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---------------------|--------|------------|-----------|-------------|
| 1) Data Acquisition | 34972A | MY57013711 | 20LM7 | 18 May 2021 |

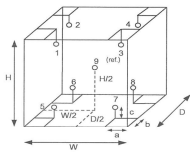
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



Probe Installation Details : Dimension of Chamber :
a = 5.0 cm D = 0.32 m
b = 5.0 cm W = 0.42 m
c = 5.0 cm H = 0.56 m
Capacity = 0.075 m³

| Environment during calibration | | |
|--------------------------------|-----------|----------|
| | Beginning | Finished |
| Temp. (°C) | 24 | 24 |
| REL.Humid. (%) | 59 | 62 |
| AC Supply (Volt) | 220 | 221 |

| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1 | 18-18RTD-01 |
| 2 | 18-18RTD-02 |
| 3 | 18-18RTD-03 |
| 4 | 18-18RTD-04 |
| 5 | 18-18RTD-05 |
| 6 | 18-18RTD-06 |
| 7 | 18-18RTD-07 |
| 8 | 18-18RTD-08 |
| 9 (ref.) | 18-18RTD-09 |

เอกสารไมควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL: 0-2717-3000-27 FAX: 0-2719-9484



Cert. No.: 21TM1875
Page.: 1 of 3

Certificate of Calibration

Equipment : Incubator

Manufacturer : Memmert

Model : IPP 260

Serial No. : V618.0033

ID No. : UAE.MIC.021/2561

Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260

Location : Microbiology Laboratory (302)

Received Order : 26 October 2021

Calibration Date : 28 - 29 October 2021

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Kunchit Promprat

Approved by :
Approved Signatory

() Pormthippa Tameyakul

() Malee Butkruea

() Suwit Imjai

Issue Date : 4 November 2021

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไมควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2105-0012OC-2
Procedure Used :-

Cert. No.: 21TM832
Page.: 3 of 3

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

| Calibration Point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Temperature stability (± °C) | Temperature uniformity (°C) | Overall Variation (°C) | Uncertainty (± °C) | Coverage Factor K |
|--------------------------|---------------------|---------------------|--------------------------------|-------------------------------|--------------------------|----------------------|-------------------|
| 44.0 | 44.0 | 44.0 | 0.041 | 0.31 | 0.37 | 0.30 | 2 |

| Measured Temperature (°C) | | | | | | | | |
|-----------------------------|----------|--------|--------|--------|--------|--------|--------|---------------|
| Calibration Point (°C) | Position | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 9 (ref.) |
| 44.0 | 43.921 | 44.045 | 44.053 | 43.982 | 43.968 | 43.856 | 43.798 | 43.993 44.093 |

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

-000-

เอกสารไมควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2110-0698OC-2
Procedure Used :-

Cert. No.: 21TM1875
Page.: 2 of 3

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---------------------|--------|------------|-----------|-------------|
| 1) Data Acquisition | 34970A | MY44067817 | 21LM10 | 20 Jul 2022 |

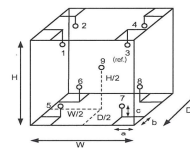
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available



Probe Installation Details : Dimension of Chamber :
a = 5.0 cm D = 0.50 m
b = 5.0 cm W = 0.64 m
c = 5.0 cm H = 0.80 m
Capacity = 0.26 m³

| Environment during calibration | | |
|--------------------------------|-----------|----------|
| | Beginning | Finished |
| Temp. (°C) | 22 | 22 |
| REL.Humid. (%) | 59 | 60 |
| AC Supply (Volt) | 226 | 226 |

| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1 | 19-15RTD-01 |
| 2 | 19-15RTD-02 |
| 3 | 19-15RTD-03 |
| 4 | 19-15RTD-04 |
| 5 | 19-15RTD-05 |
| 6 | 21-15RTD-06 |
| 7 | 19-15RTD-07 |
| 8 | 19-15RTD-08 |
| 9 (ref.) | 19-15RTD-09 |

เอกสารไมควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2110-0698OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 21TM1875
Page.: 3 of 3

| Calibration Point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Temperature stability (± °C) | Temperature uniformity (°C) | Overall Variation (°C) | Uncertainty (±°C) | Coverage Factor k |
|------------------------|-------------------|-------------------|------------------------------|-----------------------------|------------------------|-------------------|-------------------|
| 22.0 | 22.0 | 21.5 | 0.022 | 0.11 | 0.13 | 0.30 | 2 |
| 35.0 | 35.0 | 35.0 | 0.062 | 0.56 | 1.0 | 0.30 | 2 |

| Calibration Point (°C) | Measured Temperature (°C) | | | | | | | | |
|------------------------|---------------------------|--------|--------|--------|--------|--------|--------|--------|----------|
| | Position | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 (ref.) |
| 22.0 | 21.872 | 21.877 | 21.800 | 21.770 | 21.813 | 21.786 | 21.832 | 21.824 | 21.778 |
| 35.0 | 35.468 | 35.405 | 35.216 | 35.202 | 34.621 | 34.763 | 34.525 | 34.730 | 35.049 |

Average* : The average of 30 values in each position.
Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k , providing a level of confidence of approximately 95 %.

-000-

Malu

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2107-0318OC-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 21TM1357
Page.: 3 of 3

| Calibration Point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Temperature stability (± °C) | Temperature uniformity (°C) | Overall Variation (°C) | Uncertainty (±°C) | Coverage Factor k |
|------------------------|-------------------|-------------------|------------------------------|-----------------------------|------------------------|-------------------|-------------------|
| 36.0 | 35.0 | 35.0 | 0.052 | 0.49 | 0.90 | 0.30 | 2 |

| Calibration Point (°C) | Measured Temperature (°C) | | | | | | | | |
|------------------------|---------------------------|--------|--------|--------|--------|--------|--------|--------|----------|
| | Position | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 (ref.) |
| 36.0 | 36.328 | 36.158 | 36.107 | 36.151 | 35.718 | 35.876 | 35.494 | 35.852 | 35.882 |

Average* : The average of 30 values in each position.
Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k , providing a level of confidence of approximately 95 %.

-000-

Malu

เอกสารไม่ควบคุม
a 1064477



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 21TM1357
Page.: 1 of 3

Certificate of Calibration

Equipment : Incubator
Manufacturer : Memmert
Model : INB 400
Serial No. : E411.1325
ID No. : UAE.MIC.003/2555
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 14 July 2021
Calibration Date : 14 July 2021
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Preecha Hlahib

Approved by :
() Ponthippa Tameyakul
(/) Malee Butkruea
() Suwit Imjai

Issue Date : 20 July 2021

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม
A 0030500



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2107-0318OC-3

Cert. No.: 21TM1357
Page.: 2 of 3

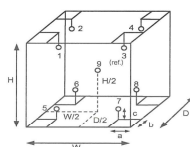
Procedure Used :-
Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-
Instrument Model Serial No. Cert. No. Due Date
1) Data Acquisition 34972A MY57013823 21LM3 26 Feb 2022
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Fresh air setting : Close



Probe Installation Details :
a = 5.0 cm
b = 5.0 cm
c = 5.0 cm
Dimension of Chamber :
D = 0.40 m
W = 0.33 m
H = 0.40 m
Capacity = 0.053 m³

| Environment during calibration | | |
|--------------------------------|-----------|----------|
| | Beginning | Finished |
| Temp. (°C) | 25 | 25 |
| REL.Humid. (%) | 54 | 60 |
| AC Supply (Volt) | 220 | 221 |

| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1 | 21-17RTD-01 |
| 2 | 21-17RTD-02 |
| 3 | 17RTD-03 |
| 4 | 17RTD-04 |
| 5 | 17RTD-05 |
| 6 | 17RTD-06 |
| 7 | 17RTD-07 |
| 8 | 17RTD-08 |
| 9 (ref.) | 17RTD-09 |

Malu

เอกสารไม่ควบคุม
a 1064478



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 21TM1355/1
Page: 1 of 3

Certificate of Calibration

This Certificate was issued to replace to the Certificate No. 21TM1355
Equipment : Water Bath

Manufacturer : Memmert

Model : WB 14

Serial No. : I401.0569

ID No. : UAE.MIC.004/2544

Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260

Location : Microbiology Laboratory


Received Order : 14 July 2021

Calibration Date : 14 July 2021

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Preecha Hlahib

Approved by :  Approved Signatory

() Pornthippa Tameyakul

(/) Malee Butkruea

() Suwit Imjai

Issue Date : 30 July 2021

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม
A 0030834



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2107-0318OC-5
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 21TM1355/1
Page: 3 of 3

| Calibration point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Average* Standard Reading (°C) | | | | |
|-----------------------------|---------------------------|---------------------------|----------------------------------|--------|--------|--------|----------|
| | | | Position | | | | |
| | | | 1 | 2 | 3 | 4 | 5 (ref.) |
| 41.5 | 41.2 | 41.2 | 41.418 | 41.379 | 41.374 | 41.447 | 41.420 |

| Calibration point (°C) | Uniformity (°C) | Stability (± °C) | Uncertainty (± °C) | Coverage Factor k |
|-----------------------------|----------------------|-----------------------|-------------------------|----------------------|
| 41.5 | 0.084 | 0.043 | 0.15 | 2 |

Average* : The average of 30 values in each position.

Uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

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

-o-o-

เอกสารไม่ควบคุม
a 1065655



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2107-0318OC-5

Cert. No.: 21TM1355/1
Page: 2 of 3

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT04 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|----------------------|--------|------------|-----------|-------------|
| 1) Data Acquisition | 34972A | MY57013823 | 21LM3 | 26 Feb 2022 |

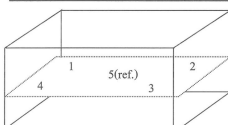
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

| | Environmental | | AC Voltage Supply |
|--------------------------|---------------|-----------|-------------------|
| | (°C) | (%R.H.) | (Volt) |
| Beginning of Calibration | 25 | 54 | 220 |
| Finished of Calibration | 25 | 57 | 222 |



Front

| Position : | Ref. Std. S/N.: |
|------------|--------------------|
| 1 | 4804639-008 |
| 2 | 4804539-007 |
| 3 | 4804539-008 |
| 4 | 4804539-009 |
| 5(ref.) | 4804539-010 |

เอกสารไม่ควบคุม
a 1065656



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 21TM1356
Page: 1 of 3

Certificate of Calibration

Equipment : Water Bath

Manufacturer : Memmert

Model : WNB 14

Serial No. : L407.0756

ID No. : UAE.MIC.024/2550

Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260

Location : Microbiology Laboratory

Received Order : 14 July 2021

Calibration Date : 14 July 2021

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Preecha Hlahib

Approved by :  Approved Signatory

() Pornthippa Tameyakul

(/) Malee Butkruea

() Suwit Imjai

Issue Date : 20 July 2021

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Water Bath
 Condition As-Received : Used Item
 Reference : 2107-0318OC-6
 Result of Calibration :- (*) Without Adjustment
 Function of UUC* : Temperature Source

Cert. No.: 21TM1356
 Page.: 3 of 3

| Calibration point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Average* Standard Reading (°C) | | | | |
|------------------------|-------------------|-------------------|--------------------------------|--------|--------|--------|----------|
| | | | 1 | 2 | 3 | 4 | 5 (ref.) |
| 44.5 | 45.0 | 45.0 | 44.480 | 44.502 | 44.490 | 44.486 | 44.483 |

| Calibration point (°C) | Uniformity (°C) | Stability (± °C) | Uncertainty (± °C) | Coverage Factor k |
|------------------------|-----------------|------------------|--------------------|-------------------|
| 44.5 | 0.072 | 0.053 | 0.15 | 2 |

Average* : The average of 30 values in each position.
Uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Stability : One-half of the greatest maximum difference of measured temperature at any one probe.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was included stability and excluded uniformity.
 The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95 %.

-000-

เอกสารไม่ควบคุม



National Food Institute, Ministry of Industry, Thailand
 2008 Soi 36, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phli District, Bangkok 10700, Thailand.
 Tel : +66 (0) 2422 8688 Fax : +66 (0) 2422 8558 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Certificate

Certificate No.: 2200708-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road, Bangchack, Prakanhong, Bangkok 10260

Page 1 of 4

Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: AX 105 DR
Serial No.: 1122100406
ID No.: UAE.WAO.004/2546
Order No.: 2200708
Operation No.: 2200708-001
Date of Receipt: 24 November 2021
Date of Calibration: 24 November 2021

Calibrated by Mr.Worapob Sooktong **Approved by** (Mr.Pheraphat Tuanjit)
 Scientist Manager, Division of Calibration Laboratory
 Responsible for the Technical Management Team
Date of Issue: 30 November 2021

The uncertainties are for a confidence probability of approximately 95%
 This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national 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: 00 Date: 14-12-61

เอกสารไม่ควบคุม



Equipment : Water Bath
 Condition As-Received : Used Item
 Reference : 2107-0318OC-6
 Procedure Used :-

Cert. No.: 21TM1356
 Page.: 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT04 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard Instrument:-

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|----------------------|--------|------------|-----------|-------------|
| 1) Data Acquisition | 34972A | MY57013823 | Z1LM3 | 26 Feb 2022 |

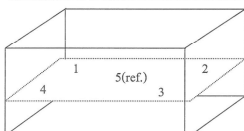
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

| | Environmental | | AC Voltage Supply |
|--------------------------|---------------|-----------|-------------------|
| | (°C) | (%R.H.) | |
| Beginning of Calibration | 25 | 54 | 220 |
| Finished of Calibration | 25 | 57 | 222 |



Front

| Position : | Ref. Std. S/N.: |
|------------|-----------------|
| 1 | 4804539-006 |
| 2 | 4804539-007 |
| 3 | 4804539-008 |
| 4 | 4804539-009 |
| 5(ref.) | 4804539-010 |

เอกสารไม่ควบคุม



National Food Institute, Ministry of Industry, Thailand
 2008 Soi 36, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phli District, Bangkok 10700, Thailand.
 Tel : +66 (0) 2422 8688 Fax : +66 (0) 2422 8558 Website : www.nfi.or.th E-mail : cal@nfi.or.th



Calibration Report

Certificate No.: 2200708-001-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: AX 105 DR
Serial No.: 1122100406
ID No.: UAE.WAO.004/2546
Capacity: 110 g

Page 2 of 4

Date of Calibration: 24 November 2021
Environment Condition: Ambient Temperature: 22.0 ± 0.5 °C Relative Humidity: 39 ± 1 %

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

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-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 | 1-500mg | 15880 | TCS | M2011955 | 28 November 2021 |
| Standard Weight Class E2 | 1-500g | 15882 | TCS | M2011965 | 28 November 2021 |

| Instrument | Model | Serial No. | Calibrated By | Certificate No. | Due Date |
|--------------------|-------|--------------------|----------------|-----------------|------------------|
| Thermo-Hygro Meter | 11A1 | www.jkl 8TH 003/55 | Quality Reborn | QR21-0297 | 15 February 2022 |

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) |
|---------------------|-------------------------------------|
| 15 | 0.000057 |
| 30 | 0.000084 |
| 50 | 0.000053 |
| 100 | 0.000048 |

2. Off-Center Error:

A mass of 50 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) |
| 50.0000 | 50.0000 | 49.9999 | 50.0000 | 49.9999 | 49.9999 | 0.0001 |

เอกสารไม่ควบคุม

F-CS-012 Revision: 00 Date: 14-12-61

Calibration Report

Certificate No.: 2200708-001-01
Equipment: Electronic Balance
Model: AX 105 DR
Serial No.: 1122100496
Capacity: 110 g
Manufacturer: METTLER TOLEDO
Resolution: 0.0001 g/0.0001 g
ID No.: UAE.WAO.004/2546

Date of Calibration: 24 November 2021 Page 3 of 4

Calibration Results: (Continued)

Calibration Range: 0-100 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 0 - 30 g; Resolution: 0.00001 g)

| Nominal Value (g) | Standard Value (g) | Average Reading (g) | Correction (g) | Uncertainty (±g) | Coverage Factor k |
|----------------------|-----------------------|------------------------|-------------------|---------------------|----------------------|
| Uncal | 0.000000 | 0.00000 | 0.00000 | 0.0000089 | 2.00 |
| 0.01 | 0.009998 | 0.01000 | 0.00000 | 0.000011 | 2.00 |
| 0.02 | 0.019997 | 0.02000 | 0.00000 | 0.000012 | 2.00 |
| 0.05 | 0.049991 | 0.05000 | 0.00000 | 0.000011 | 2.00 |
| 0.1 | 0.100002 | 0.10000 | 0.00000 | 0.000012 | 2.00 |
| 0.2 | 0.200004 | 0.20000 | 0.00000 | 0.000013 | 2.00 |
| 0.5 | 0.499994 | 0.50000 | -0.00001 | 0.000014 | 2.00 |
| 1 | 0.999986 | 1.00000 | -0.00001 | 0.000026 | 2.00 |
| 2 | 1.999989 | 1.99998 | 0.00001 | 0.000019 | 2.00 |
| 5 | 4.999979 | 4.99998 | 0.00000 | 0.000022 | 2.00 |
| 10 | 10.000026 | 9.99994 | 0.00009 | 0.000074 | 2.00 |
| 20 | 20.000037 | 19.99991 | 0.00013 | 0.000099 | 2.00 |
| 30 | 30.000063 | 30.00000 | 0.00006 | 0.00013 | 2.00 |

FC-S-012 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม




TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
 CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
 53/11 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10259
 TEL: 0-2717-3000-27 FAX: 0-2719-9484



Cert. No.: 21TM831
Page: 1 of 3

Certificate of Calibration

Equipment : Autoclave
Manufacturer : ALP
Model : CL-40L
Serial No. : 807298
ID No. : UAE.MIC.019/2560
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangkok, Phrakhanong,
 Bangkok 10260
 301 Room
Location :
Received Order : 7 May 2021
Calibration Date : 7 May 2021
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Khit Rutanaprapachai
Approved by : 
 Approved Signatory
 () Ponthippa Tameyakul
 (✓) Malee Bulkruea
 () Suwit Imjai
Issue Date : 18 May 2021

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2200708-001-01
Equipment: Electronic Balance
Model: AX 105 DR
Serial No.: 1122100496
Capacity: 110 g
Manufacturer: METTLER TOLEDO
Resolution: 0.00001 g/0.0001 g
ID No.: UAE.WAO.004/2546

Date of Calibration: 24 November 2021 Page 4 of 4

Calibration Results: (Continued)

Calibration Range: 0-100 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 31 - 100 g; Resolution: 0.0001 g)

| Nominal Value (g) | Standard Value (g) | Average Reading (g) | Correction (g) | Uncertainty (±g) | Coverage Factor k |
|----------------------|-----------------------|------------------------|-------------------|---------------------|----------------------|
| 40 | 40.00000 | 39.9999 | 0.0001 | 0.00014 | 2.00 |
| 45 | 44.99998 | 44.9999 | 0.0001 | 0.00015 | 2.00 |
| 50 | 49.99999 | 49.9999 | 0.0001 | 0.00016 | 2.00 |
| 55 | 54.99997 | 54.9998 | 0.0002 | 0.00016 | 2.00 |
| 60 | 60.00002 | 59.9999 | 0.0001 | 0.00018 | 2.00 |
| 65 | 65.00000 | 64.9999 | 0.0001 | 0.00018 | 2.00 |
| 70 | 70.00003 | 69.9999 | 0.0001 | 0.00019 | 2.00 |
| 75 | 75.00001 | 74.9999 | 0.0001 | 0.00020 | 2.00 |
| 80 | 80.00005 | 79.9998 | 0.0003 | 0.00021 | 2.00 |
| 85 | 85.00003 | 84.9998 | 0.0002 | 0.00022 | 2.00 |
| 90 | 89.99999 | 89.9998 | 0.0002 | 0.00021 | 2.00 |
| 100 | 99.99997 | 99.9998 | 0.0002 | 0.00020 | 2.00 |

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

***** End *****

เอกสารไม่ควบคุม

FC-S-012 Revision: 00 Date: 14-12-61



Equipment : Autoclave
Condition As-Received : Used Item
Reference : 2105-0012OC-1
Result of Calibration :- (°) Without Adjustment

Cert. No.: 21TM831
Page: 3 of 3

Operating parameter Set : Temperature = 116 °C
Sterilization period = 15 minute

| UUC* Setting (°C) | UUC* Reading (°C) | Position | Average* Standard Reading (°C) | Stability (± °C) | Pressure Reading (MPa) | Uncertainty (± °C) | Coverage Factor k |
|-------------------------|-------------------------|----------|--------------------------------------|---------------------|------------------------------|-----------------------|-------------------------|
| 116 | 116 | 1 | 116.744 | 0.12 | 0.08 | 0.90 | 2 |
| | | 2 | 116.549 | | | | |
| | | 3 | 116.515 | | | | |

Operating parameter Set : Temperature = 122 °C
Sterilization period = 30 minute

| UUC* Setting (°C) | UUC* Reading (°C) | Position | Average* Standard Reading (°C) | Stability (± °C) | Pressure Reading (MPa) | Uncertainty (± °C) | Coverage Factor k |
|-------------------------|-------------------------|----------|--------------------------------------|---------------------|------------------------------|-----------------------|-------------------------|
| 122 | 122 | 1 | 122.672 | 0.076 | 0.12 | 1.1 | 2 |
| | | 2 | 122.469 | | | | |
| | | 3 | 122.414 | | | | |

Average* : The average of 30 values in each position.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.


UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

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

-000-

เอกสารไม่ควบคุม

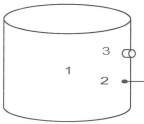


Equipment : Autoclave
Condition As-Received : Used Item
Reference : 2105-0012OC-1
Procedure Used :-
 Calibration were conducted using in-house calibration procedure CP-OT03 according to direct measurement method with Data Acquisition which connected with Thermocouple Type T
 The temperature scale used was based on ITS-90.
Condition of this result of calibration
 1. Reference standard instrument:-

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---------------------|--------|------------|-----------|-------------|
| 1) Data Acquisition | 34972A | MY57013711 | 20LM7 | 18 May 2021 |

Cert. No.: 21TM831
Page: 2 of 3


Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source



| | Environmental | | |
|--------------------------|---------------|-----------|----------|
| | (°C) | (%R.H.) | (Volt) |
| Beginning of Calibration | 24 | 62 | 222 |
| Finished of Calibration | 25 | 63 | 221 |

| Position | Description | Ref. Std. ID No.: |
|----------|--------------------|-------------------|
| 1 = | Center of chamber | 18-18TC-04 |
| 2 = | Temperature sensor | 18-18TC-05 |
| 3 = | Exhaust port | 18-18TC-06 |

เอกสารไม่ควบคุม



Equipment : Autoclave
Model: CL-40L
Resolution: 0.1 °C
Manufacturer: ALP

Certificate No.: 2103271-001-01
Serial No.: 808763
ID No.: UAE.MIC.026/2563

Date of Calibration: 11 June 2021
Page 2 of 3

Location: Washing Room, united analyst and engineering consultant co.,ltd.
Environment Condition:
 Ambient Temperature (23 ± 1) °C
 Relative Humidity (47 ± 2) %
 Line Voltage (226 ± 3) Volt

Condition of this results of Calibration:
 1. This instrument was calibrated by insert 3 standard temperature recorder with RTD into its autoclave and calibration according to W-TE-018 based on BS 2646, Part 5: Methods of test for function and performance
 - 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) | OM-CP-HITEMP-140 | Q82628 | TE 640333-01 | 23 February 2022 | NATIONAL FOOD INSTITUTE |
| | OM-CP-HITEMP-140 | Q84151 | TE 640334-01 | 23 February 2022 | NATIONAL FOOD INSTITUTE |
| | OM-CP-HITEMP-140 | Q85303 | TE 640335-01 | 23 February 2022 | NATIONAL FOOD INSTITUTE |

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. This standard does not apply to sterilizers or disinfectors used for medical, dental, pharmaceutical.
 7. Condition of Calibrated item : Good
 UUC Description :
 Time of sterilization 15 Minute At 115.0 and 121.0 °C
 8. Result of Calibration :
☒ Without adjustment
☐ After adjustment

เอกสารไม่ควบคุม




Certificate No.: 2103271-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road, Bangchack, Prakhonong, Bangkok 10260

Equipment: Autoclave
Manufacturer: ALP
Model: CL-40L
Serial No.: 808763
ID No.: UAE.MIC.026/2563
Order No.: 2103271
Operation No.: 2103271-001
Date of Receipt: 11 June 2021
Date of Calibration: 11 June 2021

Calibrated by Mr.Yothin Charoensuk Scientist
Approved by (Mr.Pheraphat Tuanjit)
 Manager, Division of Calibration Laboratory
 Responsible for the Technical Management Team
Date of Issue: 15 June 2021

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

เอกสารไม่ควบคุม



Certificate No.: 2103271-001-01
Equipment: Autoclave
Model: CL-40L
Resolution: 0.1 °C
Manufacturer: ALP

Certificate No.: 2103271-001-01
Serial No.: 808763
ID No.: UAE.MIC.026/2563

Date of Calibration: 11 June 2021
Page 3 of 3

Calibration point: 115.0 and 121.0 °C
Calibration result:

| Calibration Condition | Temperature (°C) | Relative Humidity (%) | Line Voltage (Volt) |
|-----------------------|------------------|-----------------------|---------------------|
| Min | 22.0 | 45 | 223 |
| Max | 24.0 | 48 | 228 |

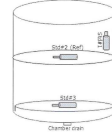


Table1 : Reporting of Temperature

| Calibration Point (°C) | Measured Temperature (°C) @ Sensor No. (Sensor No.2 is REF) | | | Uncertainty ± (°C) |
|------------------------|-------------------------------------------------------------|---------------|---------|--------------------|
| | Std.# 1 | Std.# 2 (Ref) | Std.# 3 | |
| 115.0 | 115.35 | 115.07 | 115.20 | 0.64 |
| 121.0 | 121.43 | 121.19 | 121.29 | 0.64 |

Table 2 : Reporting of Characterization Result

| UUC* Setting (°C) | MIN (°C) | MAX (°C) | Average (°C) | MPa | Stability ± (°C) | Uniformity (°C) | Overall Variation (°C) |
|-------------------|----------|----------|--------------|------|------------------|-----------------|------------------------|
| 115.0 | 114.9 | 115.1 | 115.0 | 0.08 | 0.09 | 0.33 | 0.46 |
| 121.0 | 120.9 | 121.1 | 121.0 | 0.12 | 0.13 | 0.29 | 0.49 |

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 %.

เอกสารไม่ควบคุม