

รายการใบรับรองสอบเทียบ/ทวนสอบ เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์ สำหรับตรวจวัดคุณภาพสิ่งแวดล้อม

| No.                                  | Instrument/Equipment                        | Parameter  | Manufacturer    | Model/Serial No.                 | Calibrator   | Certification No. | Date of Calibration | Due date of Calibration* | Remark |
|--------------------------------------|---|--|-----------------|----------------------------------|--|-------------------|---------------------|--------------------------|--------|
| เครื่องมือหลักสำหรับตรวจสอบคุณภาพน้ำ |   |  |                 |                                  |  |                   |                     |                          |        |
| 1                                    | BOD Incubator                               | BOD  | Arco            | UC4-1320 /<br>(UAE.WAO.015/2561) | Technology Promotion Association<br>(Thailand-Japan)       | 22TM90            | 17 Feb 22           | 16 Feb 23                | -      |
| 2                                    | BOD Incubator                               |  | Arco            | UC4-1320 /<br>(UAE.WAO.018/2559) | Technology Promotion Association<br>(Thailand-Japan)       | 21TM1406          | 17 Aug 21           | 16 Aug 22                | -      |
| 3                                    | Analytical Balance<br>(Readability 0.01 mg) | Total Dissolved Solids<br>Suspended solids         | Mettler-Toledo  | XSR205DU /<br>C009071872         | Technology Promotion Association<br>(Thailand-Japan)       | 22MM210           | 26 Apr 22           | 25 Apr 23                | -      |
| 4                                    | Hot Air Oven                                |  | Memmert         | UF55 /<br>B216.1666              | Technology Promotion Association<br>(Thailand-Japan)       | 21TM1876          | 29 Oct 21           | 28 Oct 22                | -      |
| 5                                    | Digester Unit                               | TKN  | FOSS<br>TECATOR | 2520auto /<br>91794469           | National Food Institute,<br>Ministry of Industry, Thailand | 2202361-001-01    | 4 Apr 22            | 3 Apr 23                 | -      |
| 6                                    | Distillation Unit<br>(Kjeldahl Method)      |  | FOSS<br>TECATOR | KT200 /<br>91790524              | FOSS South East Asia                                       | 5874              | 30 Nov 21           | 29 Nov 22                | -      |
| 7                                    | Analytical Balance<br>(Readability 0.1 mg)  | Fat, Oil & Grease                                  | Mettler-Toledo  | AB-204S/FACT /<br>1129361010     | National Food Institute,<br>Ministry of Industry, Thailand | 2103270-001-01    | 11 Jun 21           | 10 Jun 22                | -      |
| 8                                    | UV-VIS Spectrophotometer                    | Ammonia, Cyanuric Acid<br>Nitrate, Total Nitrogen  | Hitachi         | U-1900 /<br>2021-064             | DQE Services Co.,Ltd.                                      | SP22-007          | 20 Jan 22           | 19 Jan 23                | -      |
| 9                                    | UV-VIS Spectrophotometer                    |  | Hitachi         | U-2900 /<br>21E22-009            | DQE Services Co.,Ltd.                                      | SP22-008          | 20 Jan 22           | 19 Jan 23                | -      |
| 10                                   | Incubator                                   | Total Coliform Bacteria<br>Fecal Coliform Bacteria | Memmert         | IPP 260 /<br>V616.0066           | Technology Promotion Association<br>(Thailand-Japan)       | 21TM1874          | 28 Oct 21           | 27 Oct 22                | -      |
| 11                                   | Incubator                                   |  | Memmert         | IPP 260 /<br>V615.0187           | Technology Promotion Association<br>(Thailand-Japan)       | 22TM563           | 07 Apr 22           | 06 Apr 23                | -      |
| 12                                   | Incubator                                   | Pseudomonas aeruginosa<br>Clodtridium perfringens  | Memmert         | IN 75 /<br>D317.0307             | Technology Promotion Association<br>(Thailand-Japan)       | 22TM335           | 17 Feb 22           | 16 Feb 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 |                      |  |                |                         |  |                          |                     |                          |        |
| 13                                   | Incubator            | Total Coliform Bacteria<br>Fecal Coliform Bacteria | Memmert        | BE400 /<br>e402.1032    | Technology Promotion Association<br>(Thailand-Japan) | 21TM1358                 | 15 Jul 21           | 14 Jul 22                | -      |
| 14                                   | Water Bath           | Escherichia coli<br>Staphylococcus aureus          | Memmert        | WNE 14 /<br>L416.0612   | Technology Promotion Association<br>(Thailand-Japan) | 22TM334                  | 17 Feb 22           | 16 Feb 23                | -      |
| 15                                   | Water Bath           | Pseudomonas aeruginosa<br>Clodtridium perfringens  | Memmert        | WNE 14 /<br>L414.1407   | Technology Promotion Association<br>(Thailand-Japan) | 22TM565                  | 7 Apr 22            | 6 Apr 23                 | -      |
| 16                                   | Analytical Balance   |  | Mettler-Toledo | MS603S /<br>B0070110311 | Mettler-Toledo (Thailand) Ltd.                       | TH2058-096-040722-ACC-TH | 7 Apr 22            | 6 Apr 23                 | -      |
| 17                                   | Auto Clave           |  | ALP            | CL-40L /<br>802664      | Technology Promotion Association<br>(Thailand-Japan) | 22TM89                   | 17 Feb 22           | 16 Feb 23                | -      |

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



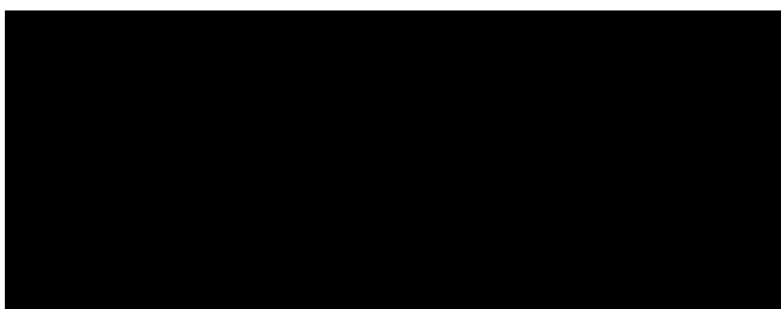
TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert.No.: 22MM210  
Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Electronic Balance  
**Manufacturer :** Mettler Toledo  
**Model :** XSR205  
**Serial No. :** C009071872  
**ID No. :** UAE.WAO.012/2563  
**Submitted by :** United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phakhanong,  
Bangkok 10260  
**Location :** Balance Room  
**Received order :** 26 April 2022  
**Calibration Date :** 26 April 2022  
**Ambient Temperature :** 15 °C to 40 °C  
**Relative Humidity :** 30 % to 90 %



**Issue Date :** 29 April 2022

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Electronic Balance  
Condition As-Received : Used Item  
Reference : 2204-0542OC-1

Cert.No.: 22MM210  
Page: 2 of 3

**Procedure used :-**

Calibration were conducted using in-house calibration procedure CP-OB01 according to direct measurement method against standard weight.

**Condition of this result of calibration**

**1. Reference standard instruments:-**

| <u>Instruments</u>          | <u>Model</u> | <u>Serial No.</u> | <u>ID No.</u> | <u>Test report No.</u> | <u>Due date</u> |
|-----------------------------|--------------|-------------------|---------------|------------------------|-----------------|
| 1) Standard Weight Set (E2) | 15884        | -                 | 70RC138       | MM-0009-21             | 3 Feb 2023      |

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This result of calibration was made on requested at the point specified by customer.
4. This certificate is not certified for any commercial transaction.
5. This certification is traceable to the International System of Unit.

**Result of calibration** ( ) Without Adjustment ( \* ) After Adjustment by Internal Calibration

|                         |               |                   |           |
|-------------------------|---------------|-------------------|-----------|
| <b>Range capacity :</b> | 0 g to 81 g   | <b>Resolution</b> | 0.00001 g |
|                         | 81 g to 220 g | <b>Resolution</b> | 0.0001 g  |

**Before Adjustment :**

| <u>Applied Weight</u> | <u>Balance Reading</u> | <u>Correction</u> | <u>Measurement Uncertainty</u> | <u>Coverage Factor</u> |
|-----------------------|------------------------|-------------------|--------------------------------|------------------------|
| ( g )                 | ( g )                  | ( g )             | ( $\pm$ mg )                   | ( k )                  |
| 80                    | 80.00004               | -0.00004          | 0.15                           | 2.00                   |
| 200                   | 199.9999               | +0.0001           | 0.35                           | 2.00                   |

**After Adjustment :**

**1. Determination of the standard deviation of weighing machine** ( n = 10 )

| <u>Applied Weight</u> | <u>Standard Deviation of Reading ( g )</u> |
|-----------------------|--|
| ( g )                 |  |
| 80                    | 0.000008                                   |
| 200                   | 0.00005                                    |





Equipment : Electronic Balance  
Condition As-Received : Used Item  
Reference : 2204-0542OC-1

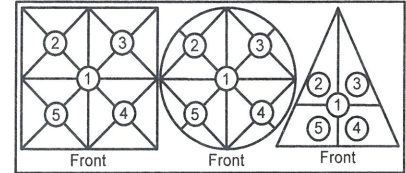
Cert.No.: 22MM210

Page: 3 of 3

## Result of calibration

### 2. Effect of off center loading

A mass of 100 g was placed to various position on the pan.  
The weighing machine reading error obtained is given in the table



Maximum difference between  
off-center and central loading  
( g )  
0.0002

| Position 1<br>( g ) | Position 2<br>( g ) | Position 3<br>( g ) | Position 4<br>( g ) | Position 5<br>( g ) |
|---------------------|---------------------|---------------------|---------------------|---------------------|
| -0.0002             | -0.0001             | 0.0000              | -0.0002             | -0.0002             |

### 3. Departure from nominal value

| Applied Weight<br>( g ) | Balance<br>Reading<br>( g ) | Correction<br>( g ) | Measurement<br>Uncertainty<br>( ± mg ) | Coverage<br>Factor<br>( k ) |
|-------------------------|-----------------------------|---------------------|--|-----------------------------|
| Unload                  | 0.00000                     | 0.00000             | 0.016                                  | 2.13                        |
| 0.05                    | 0.05001                     | -0.00001            | 0.016                                  | 2.13                        |
| 0.1                     | 0.10001                     | -0.00001            | 0.017                                  | 2.11                        |
| 1                       | 1.00002                     | -0.00002            | 0.019                                  | 2.05                        |
| 5                       | 5.00003                     | -0.00003            | 0.026                                  | 2.00                        |
| 20                      | 20.00008                    | -0.00008            | 0.049                                  | 2.00                        |
| 50                      | 50.00010                    | -0.00010            | 0.080                                  | 2.00                        |
| 80                      | 80.00014                    | -0.00014            | 0.15                                   | 2.00                        |
| 100                     | 100.0001                    | -0.0001             | 0.21                                   | 2.00                        |
| 150                     | 150.0001                    | -0.0001             | 0.29                                   | 2.00                        |
| 200                     | 200.0001                    | -0.0001             | 0.35                                   | 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 %.

-o0o-

## Calibration Certificate

**Certificate No.:** 2203120-001-01  
**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:** AB204-S/FACT  
**Serial No.:** 1129361010  
**ID No.:** UAE.WAS.002/2552  
**Order No.:** 2203120  
**Operation No.:** 2203120-001  
**Date of Receipt:** 1 June 2022  
**Date of Calibration:** 1 June 2022

The uncertainties are for a confidence probability of approximately 95%

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

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



# Calibration Report

**Certificate No.:** 2203120-001-01

**Equipment:**

Electronic Balance

**Manufacturer:** METTLER TOLEDO

**Model:** AB204-S/FACT

**Resolution:** 0.0001 g

**Serial No.:** 1129361010

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

**Capacity:** 220 g

**Date of Calibration:** 1 June 2022

Page 2 of 3

**Environment Condition:** Ambient Temperature: 19.9 ± 0.3 °C Relative Humidity: 45 ± 1.5 %

**Place of Calibration:** 108, 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   | B308068554     | TCS            | M2201020S       | 6 January 2023   |
| Standard Weight Class E2 | 1-500g    | B308068128     | TCS            | M2201021S       | 6 January 2023   |
| Instrument               | Model     | Serial No.     | Calibrated By  | Certificate No. | Due Date         |
| Thermo-Hygro Meter       | PONPE 490 | NFI.BTH 010/18 | Quality Reborn | QR22-0350       | 18 February 2023 |

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:

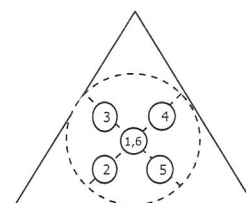
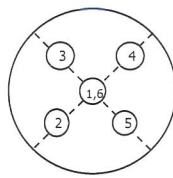
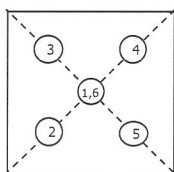
### 1. Repeatability of Reading:

| Nominal Value ( g ) | Standard Deviation of Reading ( g ) |
|---------------------|-------------------------------------|
| 100                 | 0.000048                            |
| 200                 | 0.000052                            |

### 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<br>( g ) | 2<br>( g ) | 3<br>( g ) | 4<br>( g ) | 5<br>( g ) | 6<br>( g ) | (Maximum Difference)<br>( g ) |
|------------|------------|------------|------------|------------|------------|-------------------------------|
| 49.9999    | 49.9998    | 49.9998    | 49.9999    | 49.9998    | 49.9998    | 0.0001                        |

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

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# Calibration Report

**Certificate No.:** 2203120-001-01

**Equipment:**

Electronic Balance

**Model:** AB204-S/FACT

**Serial No.:** 1129361010

**Capacity:** 220 g

**Manufacturer:** METTLER TOLEDO

**Resolution:** 0.0001 g

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

**Date of Calibration:** 1 June 2022

Page 3 of 3

**Calibration Results:** (Continued)

**Calibration Range:** 0 - 200 g

**Calibration Adjustment:** Internal Calibration

## 3. Departure from Nominal Value:

| Nominal Value<br>( g ) | Standard Value<br>( g ) | Average Reading<br>( g ) | Correction<br>( g ) | Uncertainty<br>( ± g ) | Coverage Factor<br><i>k</i> |
|------------------------|-------------------------|--------------------------|---------------------|------------------------|-----------------------------|
| Unload                 | 0.00000                 | 0.0000                   | 0.0000              | 0.000088               | 2.00                        |
| 0.01                   | 0.01000                 | 0.0100                   | 0.0000              | 0.000088               | 2.00                        |
| 0.05                   | 0.05000                 | 0.0499                   | 0.0001              | 0.000088               | 2.00                        |
| 0.1                    | 0.10000                 | 0.1000                   | 0.0000              | 0.000088               | 2.00                        |
| 0.2                    | 0.20000                 | 0.2000                   | 0.0000              | 0.000088               | 2.00                        |
| 0.5                    | 0.50000                 | 0.5000                   | 0.0000              | 0.000088               | 2.00                        |
| 1                      | 1.00000                 | 0.9999                   | 0.0001              | 0.000088               | 2.00                        |
| 2                      | 2.00000                 | 1.9999                   | 0.0001              | 0.000089               | 2.00                        |
| 5                      | 5.00000                 | 5.0000                   | 0.0000              | 0.000089               | 2.00                        |
| 10                     | 9.99998                 | 9.9999                   | 0.0001              | 0.000092               | 2.00                        |
| 20                     | 19.99999                | 19.9999                  | 0.0001              | 0.000094               | 2.00                        |
| 50                     | 49.99990                | 49.9999                  | 0.0000              | 0.00012                | 2.00                        |
| 70                     | 69.99989                | 69.9998                  | 0.0001              | 0.00014                | 2.00                        |
| 100                    | 100.00001               | 99.9999                  | 0.0001              | 0.00017                | 2.00                        |
| 150                    | 149.99991               | 149.9997                 | 0.0002              | 0.00022                | 2.00                        |
| 200                    | 200.00007               | 199.9998                 | 0.0003              | 0.00030                | 2.00                        |

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

----- End -----

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



เอกสารไม่ควบคุม

## Verification Certificate

**Certificate No.:** 2202361-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakanong, Bangkok 10260

Page 1 of 4

**Equipment:** HEATING BLOCK DIGESTION  
**Manufacturer:** FOSS  
**Model:** 2520  
**Serial No.:** 91794469  
**ID No.:** UAE.WAS.011/2560  
**Order No.:** 2202361  
**Operation No.:** 2202361-001  
**Date of Receipt:** 4 April 2022  
**Date of Calibration:** 4-6 April 2022

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

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

## Verification Report

**Certificate No.:** 2202361-001-01  
**Equipment:** HEATING BLOCK DIGESTION  
Model: 2520 Serial No.: 91794469  
Resolution: 1 °C ID No.: UAE.WAS.011/2560  
Manufacturer: FOSS  
**Date of Calibration:** 4-6 April 2022

Page 2 of 4

**Location:** Laboratory Room, NATIONAL FOOD INSTITUTE  
**Environment Condition:** Ambient Temperature ( 25 ± 3 ) °C  
Relative Humidity ( 55 ± 15 ) %  
Line Voltage ( 220 ± 10 ) Volt

### Condition of this results of Calibration:

- This instrument was calibrated by insert standard thermocouples type R into its heating block digestion and compared to temperature obtained from reference standards thermometer at calibrated point.
  - The temperature scale used was based on ITS - 90 .
  - All data show below were final values and the initial data may be obtained upon request.
- Reference Standard Instrument :

| Instrument                            | Model         | Serial No.              | Certificate No. | Due Date    | Through                          |
|---------------------------------------|---------------|-------------------------|-----------------|-------------|----------------------------------|
| Digital Thermometer with Thermocouple | 34970A/34901A | MY44045576/MY41194453   | TC21/0041       | 24-Apr-2022 | N.M. Technical Center Laboratory |
|                                       | Type R        | TC#101-103 / CH#101-103 |                 |             |                                  |

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

UUC\* Description

Time of Record - Hour 30 Minute At 380 °C

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

## Verification Report

**Certificate No.:** 2202361-001-01  
**Equipment:** HEATING BLOCK DIGESTION  
 Model: 2520 Serial No.: 91794469  
 Resolution: 1 °C ID No.: UAE.WAS.011/2560  
 Manufacturer: FOSS

**Date of Calibration:** 4-6 April 2022

Page 3 of 4

**Calibration point:** 380 °C

**Calibration result:**

**Reporting of Temperature**

| Block No. | UUC* Setting (°C) | UUC* Reading (°C) | Stability (±°C) | Standard Thermometer (°C) | Uncertainty (±°C) |
|-----------|-------------------|-------------------|-----------------|---------------------------|-------------------|
| 1         | 380               | 380               | 0.13            | 376.48                    | 1.5               |
| 2         | 380               | 380               | 0.12            | 376.58                    | 1.5               |
| 3         | 380               | 380               | 0.12            | 376.51                    | 1.5               |
| 4         | 380               | 380               | 0.14            | 376.70                    | 1.6               |
| 5         | 380               | 380               | 0.18            | 376.81                    | 1.6               |
| 6         | 380               | 380               | 0.12            | 377.23                    | 1.6               |
| 7         | 380               | 380               | 0.12            | 377.37                    | 1.5               |
| 8         | 380               | 380               | 0.13            | 376.68                    | 1.5               |
| 9         | 380               | 380               | 0.14            | 376.72                    | 1.5               |
| 10        | 380               | 380               | 0.18            | 378.97                    | 1.6               |
| 11        | 380               | 380               | 0.25            | 378.79                    | 1.6               |
| 12        | 380               | 380               | 0.11            | 377.14                    | 1.6               |
| 13        | 380               | 380               | 0.19            | 379.65                    | 1.6               |
| 14        | 380               | 380               | 0.16            | 379.61                    | 1.6               |
| 15        | 380               | 380               | 0.16            | 378.66                    | 1.6               |
| 16        | 380               | 380               | 0.15            | 379.18                    | 1.6               |
| 17        | 380               | 380               | 0.23            | 377.39                    | 1.6               |
| 18        | 380               | 380               | 0.11            | 377.71                    | 1.6               |
| 19        | 380               | 380               | 0.22            | 376.64                    | 1.6               |
| 20        | 380               | 380               | 0.16            | 376.56                    | 1.6               |

Note:

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

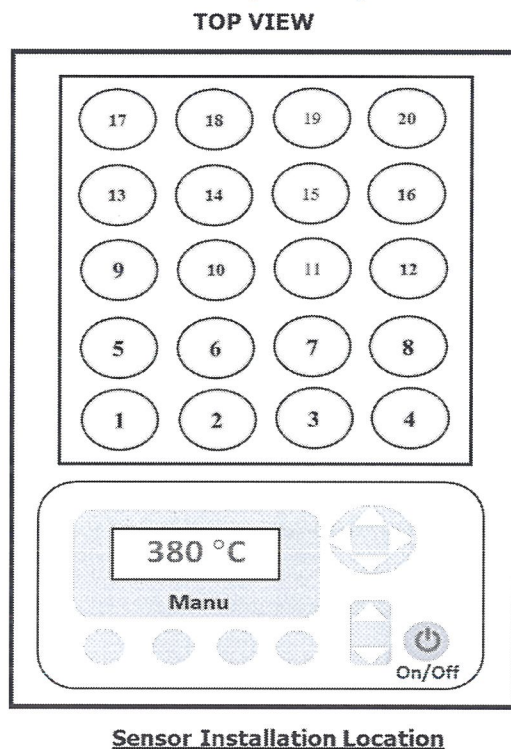


## Verification Report

**Certificate No.:** 2202361-001-01  
**Equipment:** HEATING BLOCK DIGESTION  
Model: 2520 Serial No.: 91794469  
Resolution: 1 °C ID No.: UAE.WAS.011/2560  
Manufacturer: FOSS  
**Date of Calibration:** 4-6 April 2022  
**Calibration point:** 380 °C  
**Calibration result:** Continued

Page 4 of 4

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



**Note:**

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

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

----- End -----



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.: 22TM1064

Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Incubator

**Manufacturer :** Memmert

**Model :** BE 400

**Serial No. :** e402.1032

**ID No. :** UAE.MIC.001/2546

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

**Location :** Microbiology Laboratory

**Received Order :** 11 July 2022

**Calibration Date :** 11 July 2022

**Ambient Temperature :** (  $26 \pm 10$  ) °C

**Relative Humidity :** (  $50 \pm 30$  ) %

**Issue Date :**

18 July 2022

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services

เอกสารไม่ควบคุม



Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2207-0245OC-2

Cert. No.: 22TM1064

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 | 22LM24    | 26 Feb 2023 |

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

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

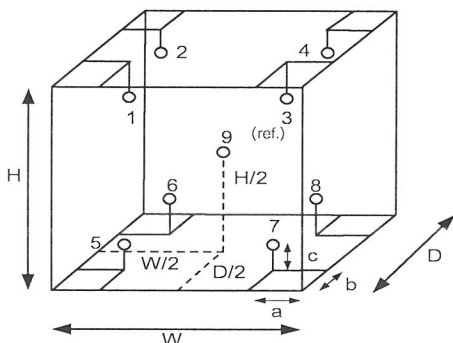
**Result of Calibration :-** ( \* ) Without Adjustment

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Close

**Environment during calibration**

|                    | Beginning | Finished |
|--------------------|-----------|----------|
| Temp. ( °C )       | 25        | 25       |
| REL.Humid. ( % )   | 62        | 63       |
| AC Supply ( Volt ) | 222       | 223      |



| 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          |

**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 m<sup>3</sup>

เอกสารไม่คว



Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2207-0245OC-2  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 22TM1064

Page.: 3 of 3

| Calibration Point<br>( °C ) | UUC* Setting<br>( °C ) | UUC* Reading<br>( °C ) | Temperature stability<br>( ± °C ) | Temperature uniformity<br>( °C ) | Overall Variation<br>( °C ) | Uncertainty<br>( ± °C ) | Coverage Factor<br><i>k</i> |
|-----------------------------|------------------------|------------------------|-----------------------------------|----------------------------------|-----------------------------|-------------------------|-----------------------------|
| 37.0                        | 38.0                   | 38.0                   | 0.092                             | 0.62                             | 0.94                        | 0.30                    | 2                           |
| 56.0                        | 57.5                   | 57.5                   | 0.083                             | 0.87                             | 1.3                         | 0.42                    | 2                           |

| Calibration Point<br>( °C ) | Measured Temperature ( °C ) |        |        |        |        |        |        |        |          |
|-----------------------------|-----------------------------|--------|--------|--------|--------|--------|--------|--------|----------|
|                             | Position                    |        |        |        |        |        |        |        |          |
|                             | 1                           | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9 (ref.) |
| 37.0                        | 37.629                      | 37.576 | 37.476 | 37.577 | 36.834 | 36.997 | 36.824 | 37.038 | 37.387   |
| 56.0                        | 56.489                      | 56.520 | 56.445 | 56.485 | 55.291 | 55.589 | 55.899 | 55.591 | 56.097   |

**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-

เอกสารไม่คว





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.: 22TM563

Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Incubator

**Manufacturer :** Memmert

**Model :** IPP 260

**Serial No. :** V615.0187

**ID No. :** UAE.MIC.003/2559

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

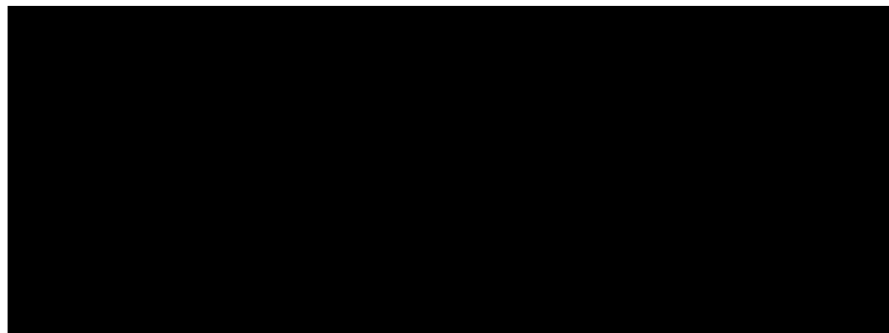
**Location :** Microbiology Laboratory

**Received Order :** 7 April 2022

**Calibration Date :** 7 April 2022

**Ambient Temperature :** ( 26 ± 10 ) °C

**Relative Humidity :** ( 50 ± 30 ) %



**Issue Date :**

18 April 2022

The Uncertainties are for a confidence probability of approximately 95%

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A 0040248



Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2204-0016OC-1

Cert. No.: 22TM563

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:-**

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

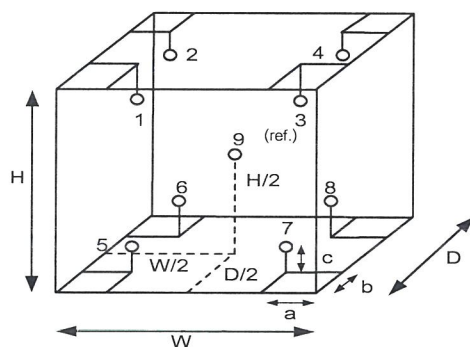
2. This certificate is valid only to the item calibrated on date and place of calibration.

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



| Environment during calibration |           |          |
|--------------------------------|-----------|----------|
|                                | Beginning | Finished |
| Temp. ( °C )                   | 26        | 26       |
| REL.Humid. ( % )               | 60        | 62       |
| AC Supply ( Volt )             | 220       | 220      |

**Probe Installation Details :**

a = 5.0 cm  
b = 5.0 cm  
c = 5.0 cm

**Dimension of Chamber :**

D = 0.50 m  
W = 0.64 m  
H = 0.80 m  
Capacity = 0.26 m<sup>3</sup>

| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1          | 15RTD2/11         |
| 2          | 15RTD2/12         |
| 3          | 15RTD2/13         |
| 4          | 15RTD2/14         |
| 5          | 15RTD2/15         |
| 6          | 15RTD2/16         |
| 7          | 15RTD2/17         |
| 8          | 15RTD2/18         |
| 9 (ref.)   | 15RTD2/19         |

เอกสารไม่ควบคุม

a 1104310



Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2204-0016OC-1  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 22TM563

Page.: 3 of 3

| Calibration Point<br>( °C ) | UUC* Setting<br>( °C ) | UUC* Reading<br>( °C ) | Temperature stability<br>( ± °C ) | Temperature uniformity<br>( °C ) | Overall Variation<br>( °C ) | Uncertainty<br>( ± °C ) | Coverage Factor<br><i>k</i> |
|-----------------------------|------------------------|------------------------|-----------------------------------|----------------------------------|-----------------------------|-------------------------|-----------------------------|
| 35.0                        | 35.0                   | 35.0                   | 0.12                              | 0.53                             | 0.79                        | 0.30                    | 2                           |

| Calibration Point<br>( °C ) | Measured Temperature ( °C ) |        |        |        |        |        |        |        |          |
|-----------------------------|-----------------------------|--------|--------|--------|--------|--------|--------|--------|----------|
|                             | Position                    |        |        |        |        |        |        |        |          |
|                             | 1                           | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9 (ref.) |
| 35.0                        | 35.170                      | 35.167 | 34.938 | 34.844 | 34.816 | 34.854 | 34.584 | 34.730 | 34.780   |

**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 %.

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เอกสารไม่ควบคุม

a 1104309





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



Cert. No.: 22TM565

Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Water Bath

**Manufacturer :** Memmert

**Model :** WNE 14

**Serial No. :** L414.1407

**ID No. :** UAE.MIC.006/2558

**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 April 2022

**Calibration Date :** 7 April 2022

**Ambient Temperature :** ( 26 ± 10 ) °C

**Relative Humidity :** ( 50 ± 30 ) %

**Issue Date :**

18 April 2022

The Uncertainties are for a confidence probability of approximately 95%

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**Equipment :** Water Bath  
**Condition As-Received :** Used Item  
**Reference :** 2204-0016OC-4

**Cert. No.:** 22TM565

**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:-

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

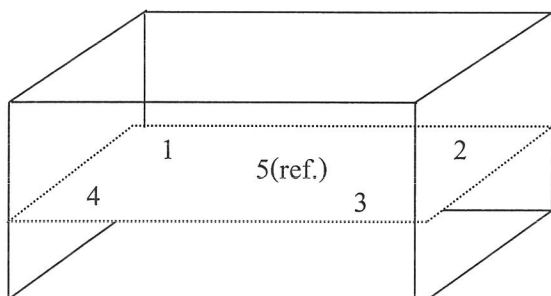
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

**Result of Calibration :-** ( \* ) Without Adjustment

**Function of UUC\* :** Temperature Source

|                          | Environmental |           | AC Voltage Supply |
|--------------------------|---------------|-----------|-------------------|
|                          | ( °C )        | ( %R.H. ) | ( Volt )          |
| Beginning of Calibration | 26            | 62        | 220               |
| Finished of Calibration  | 26            | 65        | 220               |



Front

| Position : | Ref. Std.<br>ID No.: |
|------------|----------------------|
| 1          | 70RC143              |
| 2          | 70RC144              |
| 3          | 70RC145              |
| 4          | 70RC146              |
| 5(ref.)    | 70RC147              |

เอกสารไม่



**Equipment :** Water Bath  
**Condition As-Received :** Used Item  
**Reference :** 2204-0016OC-4  
**Result of Calibration :-** ( \* ) Without Adjustment  
**Function of UUC\* :** Temperature Source

**Cert. No.:** 22TM565

**Page.:** 3 of 3

| Calibration<br>point<br>( °C ) | UUC*<br>Setting<br>( °C ) | UUC*<br>Reading<br>( °C ) | Average* Standard Reading ( °C ) |        |        |        |          |
|--------------------------------|---------------------------|---------------------------|----------------------------------|--------|--------|--------|----------|
|                                |                           |                           | Position                         |        |        |        |          |
|                                |                           |                           | 1                                | 2      | 3      | 4      | 5 (ref.) |
| 44.5                           | 44.5                      | 44.5                      | 44.424                           | 44.409 | 44.478 | 44.470 | 44.581   |

| Calibration<br>point<br>( °C ) | Uniformity<br>( °C ) | Stability<br>( ± °C ) | Uncertainty<br>( ± °C ) | Coverage<br>Factor<br><i>k</i> |
|--------------------------------|----------------------|-----------------------|-------------------------|--------------------------------|
| 44.5                           | 0.22                 | 0.039                 | 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 %.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
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TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 22TM564

Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Water Bath

**Manufacturer :** Memmert

**Model :** WNE 14

**Serial No. :** L414.1410

**ID No. :** UAE.MIC.007/2558

**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 April 2022

**Calibration Date :** 7 April 2022

**Ambient Temperature :** ( 26 ± 10 ) °C

**Relative Humidity :** ( 50 ± 30 ) %

**Issue Date :**

18 April 2022

The Uncertainties are for a confidence probability of approximately 95%

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**Equipment :** Water Bath  
**Condition As-Received :** Used Item  
**Reference :** 2204-0016OC-5

**Cert. No.:** 22TM564

**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:-

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

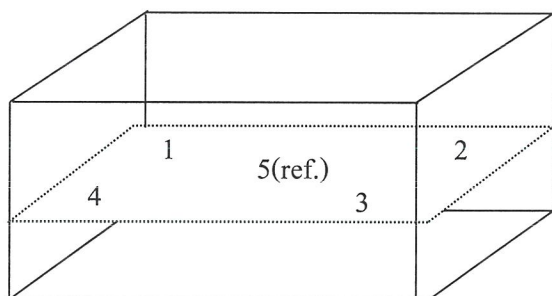
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

**Result of Calibration :-** ( \* ) Without Adjustment

**Function of UUC\* :** Temperature Source

|                          | Environmental |           | AC Voltage Supply |
|--------------------------|---------------|-----------|-------------------|
|                          | ( °C )        | ( %R.H. ) | ( Volt )          |
| Beginning of Calibration | 26            | 60        | 220               |
| Finished of Calibration  | 26            | 62        | 220               |



Front

| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1          | 70RC143           |
| 2          | 70RC144           |
| 3          | 70RC145           |
| 4          | 70RC146           |
| 5(ref.)    | 70RC147           |

เอกสารไม่คว



Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2204-0016OC-5  
**Result of Calibration :-** ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source

Cert. No.: 22TM564

Page.: 3 of 3

| Calibration<br>point<br>( °C ) | UUC*<br>Setting<br>( °C ) | UUC*<br>Reading<br>( °C ) | Average* Standard Reading ( °C ) |        |        |        |          |
|--------------------------------|---------------------------|---------------------------|----------------------------------|--------|--------|--------|----------|
|                                |                           |                           | Position                         |        |        |        |          |
|                                |                           |                           | 1                                | 2      | 3      | 4      | 5 (ref.) |
| 44.5                           | 44.5                      | 44.5                      | 44.498                           | 44.530 | 44.542 | 44.635 | 44.591   |

| Calibration<br>point<br>( °C ) | Uniformity<br>( °C ) | Stability<br>( ± °C ) | Uncertainty<br>( ± °C ) | Coverage<br>Factor<br><i>k</i> |
|--------------------------------|----------------------|-----------------------|-------------------------|--------------------------------|
| 44.5                           | 0.16                 | 0.068                 | 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 %.

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เอกสารไม่คว

Mettler-Toledo (Thailand) Ltd.

846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District

Bangna District, Bangkok 10260

+66 2723 0382

MT-TH.ServiceSupport@mt.com



NSC-TISI-TIS 17025  
CALIBRATION 0062

## 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:**   
\* 0 3 3 2 4 0 1 4 9 4 \*

### Weighing Device

**Manufacturer:** Mettler Toledo **Instrument Type:** Weighing Instrument  
**Model:** MS603S/01 **Asset Number:** UAE.MIC.008/2553  
**Serial No.:** B007010311 **Terminal Model:** N/A  
**Building:** N/A **Terminal Serial No.:** N/A  
**Floor:** 2 **Terminal Asset No.:** N/A  
**Room:** Balance Room (206)

| Range | Max. Capacity | Readability (d) |
|-------|---------------|-----------------|
| 1     | 620 g         | 0.001 g         |

### Procedure

**Calibration Guideline:** EURAMET cg-18 v. 4.0 (11/2015)  
**METTLER TOLEDO Work Instruction:** CP/W002/20

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.

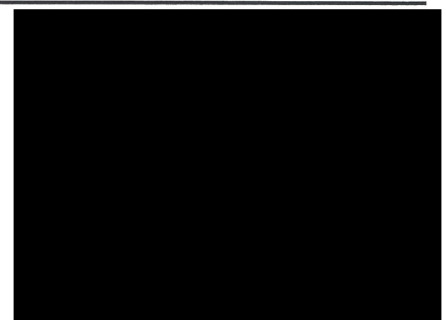
In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

|          | Temperature    |              | Humidity      |             |
|----------|----------------|--------------|---------------|-------------|
| As Found | Start: 22.8 °C | End: 23.0 °C | Start: 49.9 % | End: 58.3 % |

**As Found Calibration Date:** 07-Apr-2022  
**As Left Calibration Date:** N/A  
**Issue Date:** 08-Apr-2022

**Calibrator:**

**Approved Signatory:**





## Measurement Results

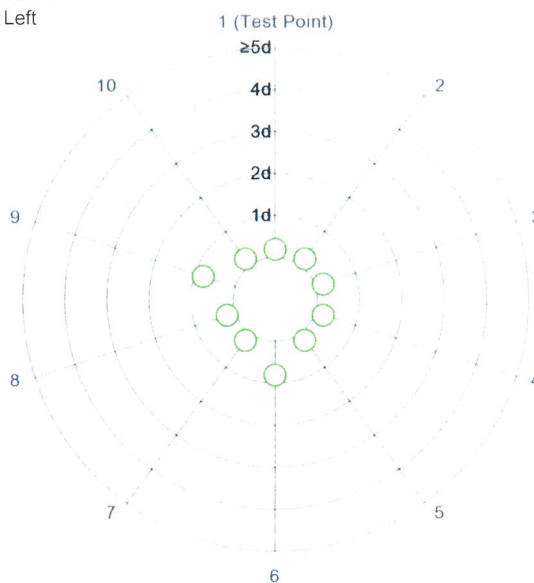
### Repeatability

Test Load: 200 g

|    | As Found  | As Left |
|----|-----------|---------|
| 1  | 200.001 g | N/A     |
| 2  | 200.001 g | N/A     |
| 3  | 200.001 g | N/A     |
| 4  | 200.001 g | N/A     |
| 5  | 200.001 g | N/A     |
| 6  | 200.000 g | N/A     |
| 7  | 200.001 g | N/A     |
| 8  | 200.001 g | N/A     |
| 9  | 200.000 g | N/A     |
| 10 | 200.001 g | N/A     |

|                    |          |     |
|--------------------|----------|-----|
| Standard Deviation | 0.0004 g | N/A |
|--------------------|----------|-----|

○ As Found  
◆ As Left



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

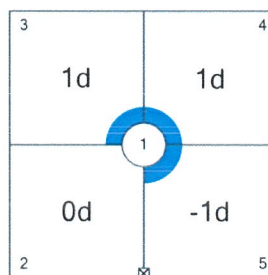
The results of this graph are based upon the absolute values of the differences from the mean value.

### Eccentricity

Test Load: 200 g

| Position | As Found  | As Left |
|----------|-----------|---------|
| 1        | 200.001 g | N/A     |
| 2        | 200.001 g | N/A     |
| 3        | 200.002 g | N/A     |
| 4        | 200.002 g | N/A     |
| 5        | 200.000 g | N/A     |

|                   |         |     |
|-------------------|---------|-----|
| Maximum Deviation | 0.001 g | N/A |
|-------------------|---------|-----|



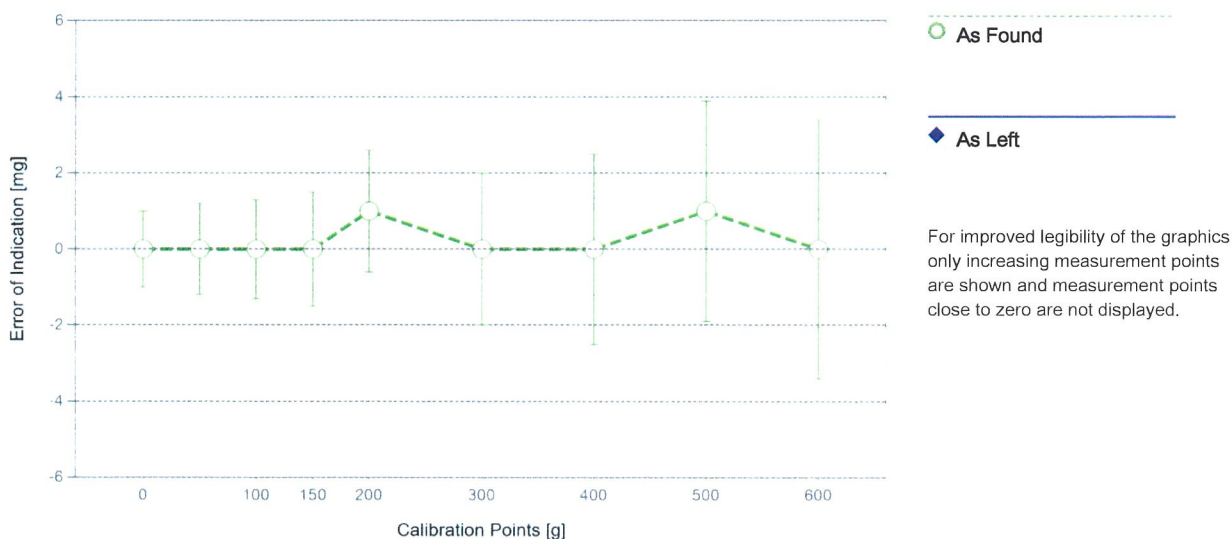
As Found

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

## Error of Indication

### As Found

|    | Reference Value | Indication | Error of Indication | Expanded Uncertainty | k |
|----|-----------------|------------|---------------------|----------------------|---|
| 1  | 0.000 g         | 0.000 g    | 0.000 g             | 1.0 mg               | 2 |
| 2  | 0.500 g         | 0.500 g    | 0.000 g             | 1.2 mg               | 2 |
| 3  | 1.000 g         | 1.000 g    | 0.000 g             | 1.2 mg               | 2 |
| 4  | 50.000 g        | 50.000 g   | 0.000 g             | 1.2 mg               | 2 |
| 5  | 100.000 g       | 100.000 g  | 0.000 g             | 1.3 mg               | 2 |
| 6  | 150.000 g       | 150.000 g  | 0.000 g             | 1.5 mg               | 2 |
| 7  | 200.000 g       | 200.001 g  | 0.001 g             | 1.6 mg               | 2 |
| 8  | 300.001 g       | 300.001 g  | 0.000 g             | 2.0 mg               | 2 |
| 9  | 400.001 g       | 400.001 g  | 0.000 g             | 2.5 mg               | 2 |
| 10 | 500.001 g       | 500.002 g  | 0.001 g             | 2.9 mg               | 2 |
| 11 | 600.001 g       | 600.001 g  | 0.000 g             | 3.4 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 F1

|                     |               |                       |             |
|---------------------|---------------|-----------------------|-------------|
| Weight Set No.:     | WS55          | Date of Issue:        | 09-Jul-2021 |
| Certificate Number: | CCM-0137-21-C | Calibration Due Date: | 07-Jul-2022 |

### Weight Set 2: OIML E2

|                     |            |                       |             |
|---------------------|------------|-----------------------|-------------|
| Weight Set No.:     | WS80       | Date of Issue:        | 23-Feb-2022 |
| Certificate Number: | C208581631 | Calibration Due Date: | 14-Aug-2023 |

### Thermo Hygrometer

|                     |         |                       |             |
|---------------------|---------|-----------------------|-------------|
| Equipment No.:      | IN161   | Date of Issue:        | 14-Jun-2021 |
| Certificate Number: | 21H1220 | Calibration Due Date: | 01-Jun-2022 |

## Remarks

FACT adjustment functionality activated  
Equipment condition: Good  
Next calibration according to customer's procedure  
Calibration data not decide by calibration laboratory

### End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

## 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:  $3.0 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: 3 K

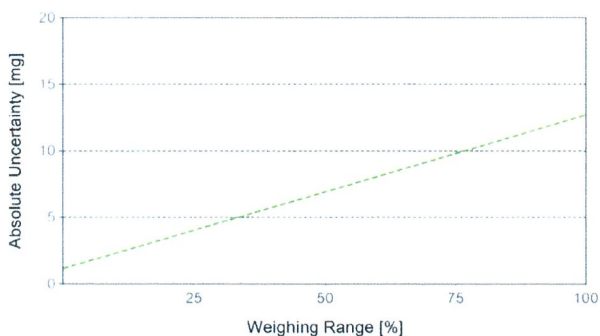
### Linearization of Uncertainty Equation

| Range |         |       | As Found   | As Left |
|-------|---------|-------|--|---------|
|       | d       | Max   |  |         |
| 1     | 0.001 g | 620 g | $U_1 = 1.2 \text{ mg} + 0.0186 \text{ mg/g} \cdot R$ | N/A     |

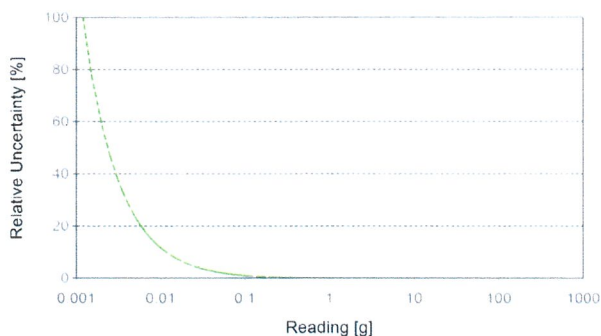
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

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

| Net Indication | As Found |         | As Left |     |
|----------------|----------|---------|---------|-----|
| 0.062 g        | 1.2 mg   | 1.9%    | N/A     | N/A |
| 0.620 g        | 1.2 mg   | 0.20%   | N/A     | N/A |
| 6.200 g        | 1.3 mg   | 0.021%  | N/A     | N/A |
| 62.000 g       | 2.4 mg   | 0.0038% | N/A     | N/A |
| 620.000 g      | 13 mg    | 0.0021% | N/A     | N/A |



As Found



As Left