

ภาคผนวก จ

เอกสารสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์

---

List of Instruments Certification for Water Quality Analysis

| No.   | Instrument/Equipment | Parameter | Manufacturer | Model/Serial No.        | Calibrator                                           | Certification No. | Date of Calibration | Due date of Calibration | Remark |
|-------|----------------------|-----------|--------------|-------------------------|------------------------------------------------------|-------------------|---------------------|-------------------------|--------|
| Water |                      |           |              |                         |                                                      |                   |                     |                         |        |
| 1     | pH Meter             | pH        | Horiba       | LAQUA-PH210<br>HA1G0019 | Technology Promotion Association<br>(Thailand-Japan) | 23CH1226          | 27 Sep 23           | 26 Sep 24               | -      |



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
5544 PATTANAKARN ROAD SOI 13, SUANLUANG, SUANLUANG BANGKOK 10350  
TEL: 0-2717-3000-29 FAX: 0-2719-9484



Cert.No.: 23CH1226  
Page.: 1 of 3

## Certificate of Calibration

**Equipment :** pH Meter  
**Manufacturer :** Horiba  
**Model :** LAQUA-PH210  
**Serial No. :** HA1G0019  
**ID No. :** UAE.EFM.202/2564(EFM,pH,10/64)  
**Condition As-Received:** Used Item  
**Received Date :** 26 September 2023  
**Calibration Date :** 27 September 2023  
**Reference :** 2309-0861WSC-4  
**Submitted by :** United Analyst and Engineering Consultant Co.,Ltd.  
3 Sol Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhenong, Bangkok 10280  
**Ambient Temperature :** (25 ± 2.5) °C  
**Relative Humidity :** (50 ± 15) %  
**Calibration Procedure :** In-house method :  
- CP-CH5 by direct measurement with standard  
voltage calibrator and direct measurement with  
certified reference material (CRM)  
- CP-CH8 by comparison with standard thermometer

**Calibrated by :** Warakorn Lemgagrakul

**Approved by :**   
Approved Signatory

(✓) Saithip Meangmai  
( ) Warakorn Lemgagrakul  
( ) Porpan Palipin

**Issue Date :** 2 October 2023

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม  
A 0059073



Cert.No.: 23CH1226  
Page.: 2 of 3

### Condition of this calibration result

1. Reference Standard Instrument : -

| Instrument                     | Serial No. | ID No.   | Cert. No. | Due Date    |
|--------------------------------|------------|----------|-----------|-------------|
| 1) Document Process Calibrator | 54030049   | 130RC116 | 23E2802   | 27 Aug 2024 |
| 2) Ref. Standard Thermometer   | 4982054    | 110RC044 | 23I906    | 26 Jul 2024 |

This certification is traceable to the International System of Unit maintained through:-  
- Technology Promotion Association (Thailand-Japan)

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,  
ANSI-ASQ National Accreditation Board, Accredited No. AR-1635

| Buffer Solution | Manufacturer | Lot No. | Exp. date    |
|-----------------|--------------|---------|--------------|
| pH 4.008        | CPA chem     | 913598  | 14 July 2025 |
| pH 6.986        | CPA chem     | 853833  | 28 Dec 2023  |
| pH 9.997        | CPA chem     | 913600  | 14 July 2024 |

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

### Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4,7)(7,10)

| Unit Under Calibration     | Nominal Value | Standard Voltage Input | Actual Reading |       | Uncertainty of Measurement<br>( ± mV ) | Coverage factor<br>k |
|----------------------------|---------------|------------------------|----------------|-------|----------------------------------------|----------------------|
|                            |               |                        | mV             | pH    |                                        |                      |
| pH Meter<br>S/N.: HA1G0019 | 4.00          | 177.48                 | 177.6          | 4.01  | 0.058                                  | 2.00                 |
|                            | 7.00          | 0.00                   | 0.2            | 7.00  | 0.058                                  | 2.00                 |
|                            | 7.00          | 0.00                   | 0.2            | 7.00  | 0.058                                  | 2.00                 |
|                            | 10.00         | -177.48                | -177.2         | 10.01 | 0.058                                  | 2.00                 |

เอกสารไม่ควบคุม  
a 1182400



Cert.No.: 23CH1226  
Page.: 3 of 3

### Calibration Results

Function : pH Measurement

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

| Unit Under Calibration  | Standard pH Buffer Solution | Actual pH Reading | Actual mV Reading ( mV ) | Uncertainty of pH measurement ( ± ) | Coverage factor k |
|-------------------------|-----------------------------|-------------------|--------------------------|-------------------------------------|-------------------|
| pH Electrode<br>S/N.: - | 4.008                       | 4.01              | 141.5                    | 0.0079                              | 2.00              |
|                         | 6.986                       | 6.98              | -34.9                    | 0.011                               | 2.00              |
|                         | 6.986                       | 7.00              | -34.2                    | 0.011                               | 2.00              |
|                         | 9.997                       | 10.01             | -205.7                   | 0.0085                              | 2.00              |

### Function : Temperature Measurement

(\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : 9852

- Serial No. : -

Dimension of probe;

- Length : 103 mm

- Diameter : 16 mm

- Immersion Depth : 80 mm

| Calibration Point ( °C ) | Standard Temperature ( °C ) | UUC* Reading ( °C ) | Error ( °C ) | Uncertainty of measurement ( ± °C ) | Coverage factor k |
|--------------------------|-----------------------------|---------------------|--------------|-------------------------------------|-------------------|
| 25.0                     | 25.002                      | 25.0                | -0.002       | 0.13                                | 2.00              |
| 30.0                     | 30.004                      | 30.0                | -0.004       | 0.13                                | 2.00              |
| 35.0                     | 35.003                      | 35.0                | -0.003       | 0.13                                | 2.00              |

Remark : - UUC\* = Unit Under Calibration

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

-000-

เอกสารไม่ควบคุม  
a 1182399

## List of Instrument Certificates for Environmental Quality Analysis

| No. | Instrument/Equipment           | Parameter                                  | Manufacturer          | Model/Serial No.          | Calibrator                                              | Certification No. | Date of Calibration | Due date of Calibration* |
|-----|--------------------------------|--------------------------------------------|-----------------------|---------------------------|---------------------------------------------------------|-------------------|---------------------|--------------------------|
| 1   | Analytical Balance             | FAT OIL AND GREASE                         | Mettler Toledo        | AB204-S/FACT / 1129361010 | Technology Promotion Association (Thailand-Japan)       | 24MM292           | 11 May 24           | 10 May 25                |
| 2   | Analytical Balance             | SUSPENDED SOLIDS<br>TOTAL DISSOLVED SOLIDS | Mettler Toledo        | XSR205DUJ / C009071872    | National Food Institute, Ministry of Industry, Thailand | 2402283-001-01    | 2 Apr 24            | 1 Apr 25                 |
| 3   | DO Meter                       | BIOCHEMICAL OXYGEN DEMAND                  | YSI                   | 5100 / 11B 101863         | Technology Promotion Association (Thailand-Japan)       | 24TW39            | 21 Feb 24           | 20 Feb 25                |
| 4   | Digestion Units                | TOTAL KJELDAHL NITROGEN                    | Foss Tecator          | 2520 Auto / 91794469      | National Food Institute Ministry of Industry, Thailand  | 2402957-001-02    | 23 May 24           | 22 May 25                |
| 5   | Hot Air Oven                   | TOTAL DISSOLVED SOLIDS                     | Memmert               | UF55 / B212.0411          | Technology Promotion Association (Thailand-Japan)       | 24TM589           | 1 Apr 24            | 31 Mar 25                |
| 6   | Cooled Incubator               | TOTAL COLIFORM BACTERIA                    | Binder                | KB400 / WTB2020000015535  | Technology Promotion Association (Thailand-Japan)       | 24TM647           | 1 Apr 24            | 31 Mar 25                |
| 7   | Kjeltec System Distilling Unit | TOTAL KJELDAHL NITROGEN                    | Foss Tecator (Labtec) | KT200 / 91790524          | FOSS South East Asia                                    | 9810              | 8 Feb 24            | 7 Feb 25                 |
| 8   | Kjeltec Distillation Unit      | TOTAL KJELDAHL NITROGEN                    | FOSS                  | Kjeltec 8100 / 91889052   | FOSS South East Asia                                    | 8411              | 29 May 23           | 28 May 24                |
| 9   | pH Meter                       | pH                                         | Horiba                | LAQUA-PH210 / HA0E0009    | technology promotion association (thailand-japan)       | 24CH238           | 20 Feb 24           | 19 Feb 25                |

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, SUKHUMVIT, SUKHUMVIT 18, BANGKOK 10250  
TEL: 0-2717-3000-29 FAX: 0-2719-9484



## Certificate of Calibration

Cert.No.: 24MM292  
Page: 1 of 3

Equipment : Electronic Balance  
Manufacturer : Mettler Toledo  
Model : AB204-S/FACT  
Serial No. : 1129381010  
ID No. : UAE.WAS.002/2552  
Submitted by : United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
Location : Balance Room (108)  
Received order : 11 May 2024  
Calibration Date : 11 May 2024  
Ambient Temperature : 15 °C to 40 °C  
Relative Humidity : 30 % to 90 %  
Calibrated by : Khitt Ruttanaprapachai  
Approved by :  
( ) Ponpan Paipim  
( ) Suwit Imjai  
(✓) Kunchit Promprat

Issue Date : 15 May 2024

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Electronic Balance  
Condition As-Received : Used Item  
Reference : 2405-0166OC-1

Cert.No.: 24MM292  
Page: 2 of 3

### Procedure used :-

Calibration were conducted using in-house calibration procedure CP-OB01 based on UKAS LAB 14  
according to direct measurement method against standard weight.

### Condition of this result of calibration

#### 1. Reference standard instruments:-

| Instruments                 | Model | Serial No. | ID No.  | Test report No. | Due date    |
|-----------------------------|-------|------------|---------|-----------------|-------------|
| 1) Standard Weight Set (E2) | 15854 | 24053      | 70RC007 | MM-0013-24      | 25 Jan 2026 |

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

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

Range capacity : 0 g to 220 g Resolution 0.0001 g

#### Before Adjustment :

| Applied Weight | Balance Reading | Correction | Measurement Uncertainty | Coverage Factor |
|----------------|-----------------|------------|-------------------------|-----------------|
| ( g )          | ( g )           | ( g )      | ( ± mg )                | ( k )           |
| 100            | 100.0000        | 0.0000     | 0.19                    | 2.03            |
| 200            | 200.0006        | -0.0006    | 0.30                    | 2               |

#### After Adjustment :

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

| Applied Weight | Standard Deviation of Reading ( g ) |
|----------------|-------------------------------------|
| ( g )          |                                     |
| 100            | 0.00007                             |
| 200            | 0.00005                             |



มูลนิธิส่งเสริมและพัฒนาวิทยาศาสตร์และเทคโนโลยี  
ศูนย์บริการและพัฒนาระบบมาตรฐานอาหาร  
Food Industrial Laboratory Service Center



## Calibration Certificate

Certificate No.: 2402283-001-01  
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
Address: 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong, Bangkok 10260

Page 1 of 4

Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: XSK205DU  
Serial No.: C009071872  
ID No.: UAE.WAO.012/2563

Order No.: 2402283  
Operation No.: 2402283-001  
Date of Receipt: 2 April 2024  
Date of Calibration: 2 April 2024

Calibrated by Mr.Jerawut Prapawattipong  
Scientist

Approved by ( Mr.Pheraphat Tuanjit )  
Manager, Division of Calibration Laboratory

Date of Issue: 9 April 2024

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.

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

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

## Calibration Report

Certificate No.: 2402283-001-01  
Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: XSR2050U  
Resolution: 0.0001 g / 0.0001 g  
Serial No.: C099071872  
ID No.: UAE.WAO.012/2563  
Capacity: 220 g

Date of Calibration: 2 April 2024 Page 2 of 4

Environment Condition: Ambient Temperature: 24.5 ± 0.5 °C Relative Humidity: 47.5 ± 2.5 %

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

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

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

2. Reference Standards:

| Reference Standard       | Model       | Serial No.     | Calibrated By  | Certificate No. | Due Date        |
|--------------------------|-------------|----------------|----------------|-----------------|-----------------|
| Standard Weight Class E2 | 1mg to 100g | 8905557572     | TCS            | M23040535       | 8 April 2024    |
| Instrument               | Model       | Serial No.     | Calibrated By  | Certificate No. | Due Date        |
| Thermo-Hygro Meter       | 606-H1      | NFI.BTH.016/23 | Quality Reborn | QE24-0343       | 9 February 2025 |

3. This certification is traceable to SI UNIT

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

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

Calibration Results:

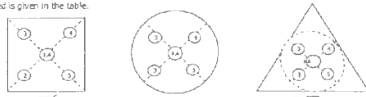
1. Repeatability of Reading:

| Nominal Value (g) | Standard Deviation of Reading (g) |
|-------------------|-----------------------------------|
| 40                | 0.000052                          |
| 80                | 0.000063                          |
| 100               | 0.000048                          |
| 200               | 0.000051                          |

2. Off-Center Error:

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

The balance reading obtained is given in the table.



| 1        | 2        | 3        | 4       | 5        | 6        | (Maximum Difference) |
|----------|----------|----------|---------|----------|----------|----------------------|
| (g)      | (g)      | (g)      | (g)     | (g)      | (g)      | (g)                  |
| 100.0002 | 100.0001 | 100.0002 | 99.9999 | 100.0001 | 100.0001 | 0.0003               |

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

## Calibration Report

Certificate No.: 2402283-001-01  
Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: XSR2050U  
Resolution: 0.0001 g / 0.0001 g  
Serial No.: C099071872  
ID No.: UAE.WAO.012/2563  
Capacity: 220 g

Date of Calibration: 2 April 2024 Page 3 of 4

Calibration Results: (Continued)

Calibration Range: 0 - 80 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 0 - 80 g; Resolution: 0.0001 g)

| Nominal Value | Standard Value | Average Reading | Correction | Uncertainty | Coverage Factor |
|---------------|----------------|-----------------|------------|-------------|-----------------|
| Unloaded      | 0.000000       | 0.00000         | 0.00000    | 0.0000088   | 2.00            |
| 0.001         | 0.001003       | 0.00101         | -0.00001   | 0.0000091   | 2.00            |
| 0.005         | 0.005003       | 0.00499         | 0.00001    | 0.0000094   | 2.00            |
| 0.01          | 0.010003       | 0.01000         | 0.00000    | 0.0000091   | 2.00            |
| 0.05          | 0.049996       | 0.05000         | 0.00000    | 0.0000098   | 2.00            |
| 0.1           | 0.100011       | 0.10000         | 0.00001    | 0.000011    | 2.00            |
| 0.5           | 0.500016       | 0.50001         | 0.00001    | 0.000014    | 2.00            |
| 1             | 1.000003       | 1.00002         | -0.00002   | 0.000016    | 2.00            |
| 2             | 2.000023       | 2.00001         | 0.00001    | 0.000017    | 2.00            |
| 5             | 5.000017       | 5.00002         | -0.00001   | 0.000020    | 2.00            |
| 10            | 10.000009      | 10.00000        | 0.00001    | 0.000026    | 2.00            |
| 20            | 20.000011      | 20.00002        | -0.00001   | 0.000037    | 2.00            |
| 30            | 30.000040      | 30.00003        | 0.00001    | 0.000052    | 2.00            |
| 50            | 50.000038      | 50.00004        | -0.00001   | 0.000068    | 2.00            |
| 80            | 80.000068      | 80.00005        | 0.00002    | 0.00011     | 2.00            |

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

## Calibration Report

Certificate No.: 2402283-001-01  
Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: XSR2050U  
Resolution: 0.0001 g / 0.0001 g  
Serial No.: C099071872  
ID No.: UAE.WAO.012/2563  
Capacity: 220 g

Date of Calibration: 2 April 2024 Page 4 of 4

Calibration Results: (Continued)

Calibration Range: 81 - 200 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 81 - 200 g; Resolution: 0.0001 g)

| Nominal Value | Standard Value | Average Reading | Correction | Uncertainty | Coverage Factor |
|---------------|----------------|-----------------|------------|-------------|-----------------|
| 90            | 90.00010       | 90.0000         | 0.0001     | 0.000015    | 2.00            |
| 100           | 100.00006      | 100.0000        | 0.0001     | 0.000015    | 2.00            |
| 110           | 110.00007      | 110.0001        | -0.00003   | 0.000017    | 2.00            |
| 120           | 120.00009      | 120.0000        | 0.0001     | 0.000018    | 2.00            |
| 130           | 130.00010      | 130.0000        | 0.0001     | 0.000019    | 2.00            |
| 140           | 140.00014      | 140.0000        | 0.0001     | 0.000020    | 2.00            |
| 150           | 150.00009      | 150.0001        | -0.00001   | 0.000020    | 2.00            |
| 160           | 160.00010      | 160.0001        | 0.0000     | 0.000022    | 2.00            |
| 170           | 170.00012      | 170.0001        | 0.0000     | 0.000023    | 2.00            |
| 200           | 200.00016      | 200.0000        | 0.0002     | 0.000028    | 2.00            |

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

----- End -----

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



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000 FAX. 0-2719-9494

## Certificate of Testing

Equipment : DO Meter  
Manufacturer : YSI  
Model : 5100  
Serial No. : 11B 101863  
ID No. : UAE.WAO.004/2554  
Received Date : 20 February 2024  
Test Date : 21 February 2024  
Reference : 2402-0620DSC-1  
Submitted by : United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260  
Laboratory Condition : Temperature ( 25 ± 5 ) °C  
Humidity ( 50 ± 20 ) %  
Test Procedure : In - house method : CP-CH9  
by Comparison Technique with Azide Modification Method  
Tested by : Walalak Sirthean  
Approved by :   
Approved Signatory  
( ) Pornthippe Temayakul  
( ) Unnopphol Harechai  
(✓) Sailhip Moangmai  
Issue Date : 22 February 2024

Cert.No.: 24TW39  
Page: 1 of 2

เอกสารไม่ควบคุม



Cert.No.: 24TW39  
Page.: 2 of 2

#### Condition of this result of calibration

##### 1. Reference Standard Instruments :

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

| Instruments | Serial No. | ID No.   | Certificate No. | Due Date     |
|-------------|------------|----------|-----------------|--------------|
| 1. Burette  | -          | 130BU10  | 23CG1172        | 22 Mar 2025  |
| 2. Balance  | 14233921   | 110RC001 | 23MM405         | 16 July 2024 |

##### 2. Standard Material :-

| Material                        | Manufacturer | Lot No.   | Assay  |
|---------------------------------|--------------|-----------|--------|
| Sodium Thiosulfate pentahydrate | Merck        | AM1763316 | 100.2% |

**Result :** Dissolved Oxygen Meter Adjustment With Air 100 %  
Dissolved Oxygen Probe No.: 22B100125

| Titration Method<br>(Azide Modification Method)<br>(mg/L) | DO Meter<br>Reading<br>(mg/L) | Standard Deviation<br>(mg/L) |
|-----------------------------------------------------------|-------------------------------|------------------------------|
| 8.20                                                      | 8.19                          | 0.0055                       |

This report was certified only for the instrument we tested. It is allowable to use for study  
Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced  
other in full without written approval of the laboratory

-o-o-

เอกสารไม่



มูลนิธิสถาบันพัฒนาอุตสาหกรรมอาหาร  
ศูนย์บริการห้องปฏิบัติการอุตสาหกรรมอาหาร  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center

## Verification Certificate

Substitute for Certificate No.: 2402957-001-01

Certificate No.: 2402957-001-02

Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Address: 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakhong, Bangkok 10260

Page 1 of 4

Equipment: HEATING BLOCK DIGESTION

Manufacturer: FOSS

Model: 2520

Serial No.: 91794469

ID No.: UAE.WAS.011/2560

Order No.: 2402957

Operation No.: 2402957-001

Date of Receipt: 23 May 2024

Date of Calibration: 23-24 May 2024

Calibrated by Mr.Jerawut Prapawattipong  
Scientist

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

Date of Issue: 18 June 2024

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



มูลนิธิสถาบันพัฒนาอุตสาหกรรมอาหาร  
ศูนย์บริการห้องปฏิบัติการอุตสาหกรรมอาหาร  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center

## Verification Report

Certificate No.: 2402957-001-02

Equipment: HEATING BLOCK DIGESTION

Model: 2520 Serial No.: 91794469  
Resolution: 1 °C ID No.: UAE.WAS.011/2560  
Manufacturer: FOSS

Date of Calibration: 23-24 May 2024

Page 2 of 4

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

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.

##### 2. Reference Standard Instrument :

| Instrument                            | Model            | Serial No.                                   | Certificate No. | Due Date   | Through                          |
|---------------------------------------|------------------|----------------------------------------------|-----------------|------------|----------------------------------|
| Digital Thermometer with Thermocouple | 34570A<br>Type R | 44440111111111111111<br>10010101010101010101 | TC23/0048       | 2-Jun-2024 | N.M. Technical Center Laboratory |

3. This certificate is traceable to international system of units (SI Units).

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

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

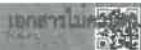
6. Condition of Calibrated item : Good

UUC\* Description

Time of Record - Hour 30 Minute At 380 °C

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

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



มูลนิธิสถาบันพัฒนาอุตสาหกรรมอาหาร  
ศูนย์บริการห้องปฏิบัติการอุตสาหกรรมอาหาร  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center

## Verification Report

Certificate No.: 2402957-001-02

Equipment: HEATING BLOCK DIGESTION

Model: 2520 Serial No.: 91794469  
Resolution: 1 °C ID No.: UAE.WAS.011/2560  
Manufacturer: FOSS

Date of Calibration: 23-24 May 2024

Page 3 of 4

Calibration point:

Calibration result: 380 °C

#### Reporting of Temperature

| Block No. | UUC* Setting (°C) | UUC* Reading (°C) | Stability (±°C) | Standard Thermometer (°C) | Uncertainty (±°C) |
|-----------|-------------------|-------------------|-----------------|---------------------------|-------------------|
| 1         | 380               | 380               | 0.56            | 378.86                    | 2.1               |
| 2         | 380               | 380               | 0.40            | 378.41                    | 2.1               |
| 3         | 380               | 380               | 1.18            | 378.94                    | 2.1               |
| 4         | 380               | 380               | 0.44            | 377.64                    | 1.6               |
| 5         | 380               | 380               | 0.11            | 377.75                    | 1.6               |
| 6         | 380               | 380               | 0.14            | 378.35                    | 1.6               |
| 7         | 380               | 380               | 1.17            | 377.09                    | 2.1               |
| 8         | 380               | 380               | 0.33            | 377.08                    | 2.1               |
| 9         | 380               | 380               | 0.14            | 376.61                    | 2.1               |
| 10        | 380               | 380               | 0.96            | 377.74                    | 2.1               |
| 11        | 380               | 380               | 0.40            | 377.17                    | 2.1               |
| 12        | 380               | 380               | 1.18            | 377.71                    | 2.1               |
| 13        | 380               | 380               | 0.44            | 379.07                    | 1.6               |
| 14        | 380               | 380               | 0.11            | 379.19                    | 1.6               |
| 15        | 380               | 380               | 0.14            | 379.78                    | 1.6               |
| 16        | 380               | 380               | 1.17            | 378.74                    | 2.1               |
| 17        | 380               | 380               | 0.33            | 378.74                    | 2.1               |
| 18        | 380               | 380               | 0.14            | 378.77                    | 2.1               |
| 19        | 380               | 380               | 0.96            | 379.53                    | 2.1               |
| 20        | 380               | 380               | 0.40            | 378.96                    | 2.1               |

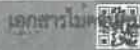
Note:

- 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.

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





มูลนิธิส่งเสริมและพัฒนาอุตสาหกรรม  
อาหารและโภชนาการ  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center

## Verification Report

Certificate No.: 2402957-001-02  
Equipment: HEATING BLOCK DIGESTION  
Model: 2520 Serial No.: 91794469  
Resolution: 1 °C ID No.: UAE.WAS.011/2560  
Manufacturer: FOSS  
Date of Calibration: 23-24 May 2024  
Calibration point: 380 °C  
Calibration result: Continued

Page 4 of 4

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



Sensor Installation Location

Remark: Edited Date of Calibration from 23-24 May 204 to 23-24 May 2024.

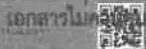
### NOTE:

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

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

----- End -----

FC-5-012 Revision: 01 Date: 20-04-65



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
53/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL: 0-2711-3000-29 FAX: 0-2719-9484



## Certificate of Calibration

Cert. No.: 24TM589  
Page: 1 of 3

Equipment: Hot Air Oven  
Manufacturer: Memmert  
Model: UF 55  
Serial No.: B212.0411  
ID No.: UAE.WAO.005/2556  
Submitted by: United Analyst and Engineering Consultant Co., Ltd.  
3 Sol Udomsuk 41, Sukhumvit Road,  
Bangchak, Phraekhonong,  
Bangkok 10260  
Location: Lab Floor 2  
Received Order: 01 April 2024  
Calibration Data: 01 - 02 April 2024  
Ambient Temperature: (26 ± 10) °C  
Relative Humidity: (50 ± 30) %  
Calibrated by: Krisda Malee  
Approved by: [Signature]  
( ) Ponpan Paipim  
(✓) Suwit Imjai  
( ) Kunchit Promprat

Issue Date: 5 April 2024

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม  
A 0065065



Equipment: Hot Air Oven  
Condition As-Received: Used item  
Reference: 2404-0004OC-3  
Certificate No.: 24TM589  
Page: 2 of 3

Procedure Used :-  
Calibration were conducted using calibration procedure GP-OT02 based on TLAS G-20 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

- Reference standard instrument:-  
Instrument Serial No. Cert. No. Traceable Due Date  
1) Data Acquisition MY57013711 23LM115 TPA 11 Jul 2024
- This certificate is valid only to the item calibrated on date and place of calibration.
- This certification is traceable to the International System of Unit.

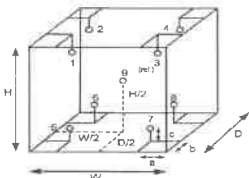
Remark: TPA: Technology Promotion Association (Thailand - Japan)

Result of Calibration:- ( ) Without Adjustment

Function of UUC\*: Temperature Source

Fresh air setting: Close

| Environment during calibration |           |          |
|--------------------------------|-----------|----------|
|                                | Beginning | Finished |
| Temp. (°C)                     | 27        | 26       |
| REL Humid. (%)                 | 47        | 48       |
| AC Supply (Voll)               | 221       | 220      |



Probe Installation Details: Dimension of Chamber:  
a = 5.0 cm D = 0.50 m  
b = 5.0 cm W = 0.80 m  
c = 5.0 cm H = 0.75 m  
Capacity = 0.30 m³

| Ref. Std. ID No.: @ Calibration Point |                 |              |
|---------------------------------------|-----------------|--------------|
| Position:                             | (120 to 180) °C | (104) °C     |
| 1                                     | 21-18TC-01      | 22-18RTD-2/1 |
| 2                                     | 21-18TC-02      | 18RTD-2/2    |
| 3                                     | 21-18TC-03      | 18RTD-2/3    |
| 4                                     | 21-18TC-04      | 18RTD-2/4    |
| 5                                     | 21-18TC-05      | 18RTD-2/5    |
| 6                                     | 21-18TC-06      | 18RTD-2/6    |
| 7                                     | 21-18TC-07      | 18RTD-2/7    |
| 8                                     | 21-18TC-08      | 18RTD-2/8    |
| 9 (ref.)                              | 21-18TC-09      | 18RTD-2/9    |



Equipment: Hot Air Oven  
Condition As-Received: Used item  
Reference: 2404-0004OC-3  
Certificate No.: 24TM589  
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) | Coverage Factor |
|------------------------|-------------------|-------------------|------------------------------|-----------------------------|------------------------|-----------------|
| 104.0                  | 104.0             | 104.0             | 0.032                        | 0.47                        | 0.84                   | 2               |
| 120.0                  | 120.0             | 120.0             | 0.12                         | 0.72                        | 1.3                    | 2               |
| 180.0                  | 180.0             | 180.0             | 0.13                         | 1.2                         | 1.5                    | 2               |

| Calibration Point (°C) | Measured Temperature (°C) |         |         |         |         |         |         |         |          | Uncertainty (± °C) |
|------------------------|---------------------------|---------|---------|---------|---------|---------|---------|---------|----------|--------------------|
|                        | 1                         | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9 (ref.) |                    |
| 104.0                  | 104.464                   | 103.647 | 104.228 | 104.232 | 104.106 | 103.601 | 104.275 | 104.127 | 104.013  | 0.42               |
| 120.0                  | 120.496                   | 120.089 | 120.639 | 120.596 | 119.531 | 119.644 | 120.364 | 120.144 | 120.158  | 1.1                |
| 180.0                  | 180.574                   | 179.769 | 180.265 | 180.870 | 179.594 | 179.790 | 180.287 | 179.981 | 179.802  | 1.1                |

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

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

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

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

UUC\*: Unit Under Calibration

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

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

-000-

เอกสารไม่ควบคุม  
a 1209739

เอกสารไม่ควบคุม  
a 1209738



Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2404-00030C-6  
Procedure Used :-

Cert. No.: 24TM647  
Page : 2 of 3

## Certificate of Calibration

Cert. No.: 24TM647  
Page : 1 of 3

Equipment : Incubator  
Manufacturer : Binder  
Model : KB 400 E8  
Serial No. : 2020000015535  
ID No. : UAE.MC.018/2564  
Submitted by : United Analyst and Engineering Consultant Co., Ltd.  
3 Sol Udomsuk 41, Sukhumvit Road,  
Bangchak, Phraekhong,  
Bangkok 10260  
Location : Microbiology Laboratory (302)  
Received Order : 01 April 2024  
Calibration Date : 01 April 2024  
Ambient Temperature :  $(26 \pm 10) ^\circ\text{C}$   
Relative Humidity :  $(50 \pm 30) \%$   
Calibrated by : Man Pattanapongpaiboon  
Approved by :  
( ) Ponpan Paipim  
(✓) Suwit Imjai  
( ) Kunchit Promprat

Issue Date : 7 April 2024

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).  
The temperature scale used was based on ITS-90.

### Condition of this result of calibration

1. Reference standard instrument:-

| Instrument          | Serial No. | Cert. No. | Traceable | Due Date    |
|---------------------|------------|-----------|-----------|-------------|
| 1) Data Acquisition | MY49023932 | 23LM122   | TPA       | 26 Jul 2024 |

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

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

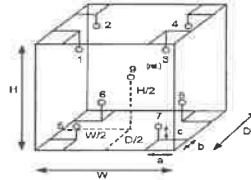
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration : ( \* ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close

| Environment during calibration |           |          |
|--------------------------------|-----------|----------|
|                                | Beginning | Finished |
| Temp. ( °C )                   | 24        | 24       |
| REL Humid. ( % )               | 54        | 57       |
| AC Supply ( Volt )             | 221       | 223      |



### Probe Installation Details :

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

### Dimension of Chamber :

D = 0.48 m  
W = 0.65 m  
H = 1.2 m  
Capacity = 0.37 m<sup>3</sup>

| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1          | 20-18RTD-01       |
| 2          | 20-18RTD-02       |
| 3          | 20-16RTD-03       |
| 4          | 23-16RTD-04       |
| 5          | 22-16RTD-05       |
| 6          | 20-16RTD-06       |
| 7          | 20-16RTD-07       |
| 8          | 22-18RTD-08       |
| 9 (ref.)   | 22-15RTD-09       |



Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2404-00030C-6  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 24TM647  
Page : 3 of 3

| Calibration Point ( °C ) | UUC* Setting ( °C ) | UUC* Reading ( °C ) | Temperature stability ( ± °C ) | Temperature uniformity ( °C ) | Overall Variation ( °C ) | Coverage Factor k |
|--------------------------|---------------------|---------------------|--------------------------------|-------------------------------|--------------------------|-------------------|
| 35.0                     | 35.0                | 35.0                | 0.035                          | 0.18                          | 0.22                     | 2                 |

| Calibration Point ( °C ) | Measured Temperature ( °C ) |        |        |        |        |        |        |        |          | Uncertainty ( ± °C ) |
|--------------------------|-----------------------------|--------|--------|--------|--------|--------|--------|--------|----------|----------------------|
|                          | 1                           | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9 (ref.) |                      |
| 35.0                     | 35.000                      | 35.022 | 34.841 | 34.851 | 35.027 | 35.011 | 35.023 | 35.028 | 35.007   | 0.30                 |

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 %.

-o-o-

เอกสารไม่ควบคุม

# FOSS

## Customer Service Report

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

Report No: 9810

Date: 9 Feb 2024

Customer: UAE

Address: Bangkok

Instrument: KJ200

Serial: 91790524

Hours: Travel To Customer  
Start: 09:30  
Finish: 09:30

Labour  
09:30  
12:00

Travel From Customer  
12:00  
16:30

| Application     |   | Special        |   | Job Type     |   | Standard |   |
|-----------------|---|----------------|---|--------------|---|----------|---|
| Normal          | x | Courtesy Visit | x | Installation | x | Training | x |
| Distributor     | x | PMA Onboarding | x | Quote        | x | In House | x |
| Internal        | x | Warranty       | x | Repair       | x | PM       | x |
| Digital Service | x | Sales Support  | x | Remote       | x | Other    | x |

PD/Quote Number: / if applicable

PMA Type: FOSSCATC if applicable Contract No. if applicable

| Details of Work / Test            |  | Condition / Status            |
|-----------------------------------|--|-------------------------------|
| # PMA KJ200                       |  |                               |
| - ตรวจเช็คสภาพเครื่อง             |  |                               |
| - ตรวจสอบแบตเตอรี่ 3 ชม 100%      |  |                               |
| - Calibrate 30 Hz - 50 Hz         |  |                               |
| - ตรวจสอบการตั้งค่า               |  |                               |
| - ตรวจสอบการตั้งค่า               |  |                               |
| # ตรวจเช็คสภาพเครื่อง             |  |                               |
| 10000225 Serial R24 Complete 1 PC |  |                               |
| Instrument Ready for Use          |  | OK Not OK If not OK - Comment |

| Part No: | Batch      | Description                    | Qty |
|----------|------------|--------------------------------|-----|
| 10009965 | 14.12.2020 | FOSS KJ200 30 Hz 100 Hz 100 Hz | 1   |

I confirm this report is accurate and complete  
Signed FOSS: [Signature]  
Signed Customer: [Signature]  
Name: [Name]  
Name: [Name]  
Would you be willing to participate in a brief survey in order to tell us how we performed? [ ] Email: [ ]

เอกสารไม่ควบคุม

