

## ภาคผนวก 10

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เอกสารสอบเทียบเครื่องมือตรวจวัด  
ห้องปฏิบัติการวิเคราะห์เอกชน

# CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkret, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



NSG-TISI-TIS 17025  
CALIBRATION 0030

## Certificate of Calibration

**Certificate No. :** 67-400217-1

**Page : 1 of 2**

**Submitted by :** Special Lab Envi and Consultant Co., Ltd.  
47/91 Moo 3 Thambol Tha-it, Pakkret, Nonthaburi 11120

**Equipment :** Temperature controlled enclosure(Incubator)  
**Manufacturer :** Lovibond **Model :** FKU 1800  
**Range :** N/A °C **Resolution :** 0.1 °C  
**Serial No. :** 0925481-19 **ID No. :** LB-Eq-005

**Environment :** On site calibration was carried out at the Laboratory, Special Lab Envi and Consultant Co., Ltd.  
**Ambient Temperature :** (24.0 to 25.0) °C  
**Relative Humidity :** (50 to 55) %  
**Line Voltage :** (226.0 to 226.5) V

**Date of Received :** 20 April 2024

**Date of Calibration :** 20 April 2024

**Date of Issue :** 26 April 2024

**Calibrated by :** Kittisak Kokaeo

**Calibration Method :** CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

**Reference Standard Instruments :** This certification is traceable to the International System of Units  
Standard Digital Thermometer with RTD Probe

ID No.	Cert. No.	Due Date	Traceability
400046 & 400047	67-400047-2	26 Jul 2024	National Institute of Metrology Thailand (NIMT)

Approved by :

( Surachai Promthong )

Laboratory Manager

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 Calibratech Co.,Ltd.

CAL-F0031-03



# CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

## Certificate of Calibration

**Certificate No. : 67-400217-1**

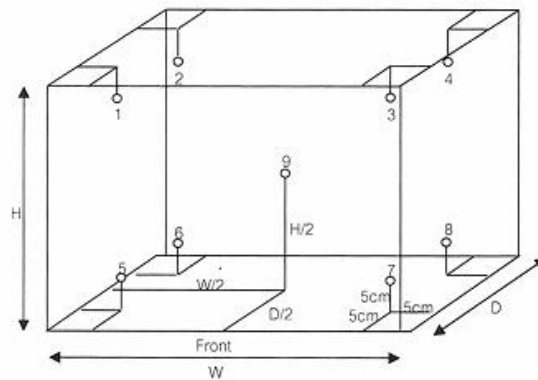
**Page : 2 of 2**

**Result of Calibration :** Without Adjustment

**UUC Condition As-Received :** Good

**Function :** Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.55 m

D = 0.73 m

H = 0.50 m

Capacity = 0.20 m<sup>3</sup>

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
30.0	30.0	30.0	30.09	30.21	30.18	30.17	30.52	30.49	30.13	30.32	30.13	0.31
35.0	35.0	35.0	34.95	35.17	35.13	35.14	35.62	35.67	35.04	35.40	35.19	0.32
37.0	37.0	37.0	36.94	37.16	37.13	37.11	37.60	37.64	37.02	37.37	37.16	0.33

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
30.0	30.0	30.0	0.42	0.03	0.46
35.0	35.0	35.0	0.50	0.04	0.77
37.0	37.0	37.0	0.51	0.06	0.79

**Remark** The uncertainty is not combine uniformity of the air chamber

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

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

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ABJ



CAL-F0031-03

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Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yuhoo.com, calibratech.cal@hotmail.com



NSC-TISI-TIS 17025  
CALIBRATION 0030

## Certificate of Calibration

**Certificate No. :** 67-400217-2

**Page :** 1 of 2

**Submitted by :** Special Lab Envi and Consultant Co., Ltd.  
47/91 Moo 3 Thambol Tha-it, Pakkret, Nonthaburi 11120

**Equipment :** Temperature controlled enclosure(Incubator)  
**Manufacturer :** Lovibond **Model :** FKU 1800  
**Range :** N/A °C **Resolution :** 0.1 °C  
**Serial No. :** 0914643-01 **ID No. :** LB-Eq-004

**Environment :** On site calibration was carried out at the Laboratory, Special Lab Envi and Consultant Co., Ltd.  
**Ambient Temperature :** (26.0 to 27.0) °C  
**Relative Humidity :** (45 to 50) %  
**Line Voltage :** (226.0 to 226.5) V

**Date of Received :** 20 April 2024

**Date of Calibration :** 20 April 2024

**Date of Issue :** 26 April 2024

**Calibrated by :** Kittisak Kokaeo

**Calibration Method :** CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

**Reference Standard Instruments :** This certification is traceable to the International System of Units  
Standard Digital Thermometer with RTD Probe

ID No.	Cert. No.	Due Date	Traceability
400046 & 400042	67-400047-1	25 Jul 2024	National Institute of Metrology Thailand (NIMT)

Approved by :

( Surachai Promthong )

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

**Certificate No. : 67-400217-2**

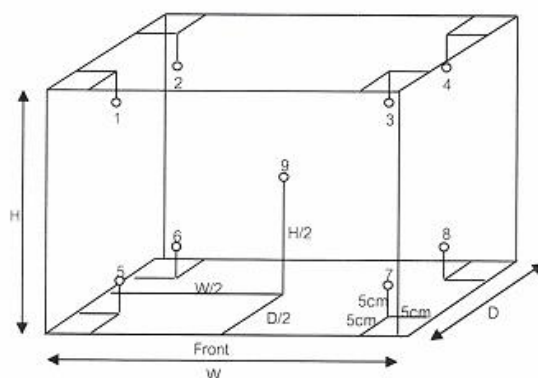
**Page : 2 of 2**

**Result of Calibration :** Without Adjustment

**UUC Condition As-Received :** Good

**Function :** Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.55 m

D = 0.73 m

H = 0.50 m

Capacity = 0.20 m<sup>3</sup>

Test Point ( °C )	Setting Temperature ( °C )	Indicating Temperature ( °C )	Measured Temperature ( °C ) @ Sensor No.									Uncertainty ( ± °C )
			1	2	3	4	5	6	7	8	9	
20.0	19.9	19.9	20.27	20.24	20.07	20.06	20.15	20.14	20.21	20.03	20.12	0.44

Test Point ( °C )	Setting Temperature ( °C )	Indicating Temperature ( °C )	Measured Uniformity ( °C )	Measured Stability ( °C )	Overall Variation ( °C )
20.0	19.9	19.9	0.24	0.20	0.54

**Remark** The uncertainty is not combine uniformity of the air chamber

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

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

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*AB*



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NSC-TISI-TIS 17025  
CALIBRATION 0030

## Certificate of Calibration

**Certificate No. :** 67-200136-1

**Page : 1 of 2**

**Submitted by :** Special Lab Envi and Consultant Co., Ltd.  
47/91-93 Moo 3, Tambol Tha-It, Pakkret, Nonthaburi 11120

**Equipment :** Electronic Balance  
**Manufacturer :** AND **Model :** GR-200  
**Serial No. :** 14245322 **ID No. :** LB-Eq-016  
**Capacity :** 210 g **Resolution :** 0.0001 g

**Environment :** On site calibration was carried out at the Laboratory,  
Special Lab Envi and Consultant Co., Ltd.

**Ambient Temperature :** (27.3 to 27.7) °C

**Relative Humidity :** (42.5 to 44.0) %

**Air Pressure :** 1006.0 mbar

**Date of Received :** 20 April 2024

**Date of Calibration :** 20 April 2024

**Date of Issue :** 24 April 2024

**Calibrated by :** Akaradath Thippichai

**Calibration Method :** In-house method CAL-M2001 based on UKAS Publication ref : LAB 14  
Edition 7 - November 2022

**Reference Standard Instruments :** This certification is traceable to the International System of Units

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02232088	08 Nov 2024	National Institute of Metrology (Thailand), (NIMT)

Approved by :

( Surachai Promthong )

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

**Certificate No. : 67-200136-1**

**Page : 2 of 2**

**Result of Calibration :** Without Adjustment

**UUC Condition As-Received :** Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty $\pm$ (g)
0.001	0.0000	0.00012
0.01	0.0000	0.00012
0.1	0.0000	0.00012
0.5	0.0000	0.00013
2	0.0000	0.00013
5	-0.0001	0.00013
10	0.0000	0.00013
50	0.0000	0.00015
100	0.0000	0.00020
200	0.0001	0.00038

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

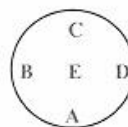
This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k = 2.06$ , providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

A	B	C	D	E
-0.0003	0.0000	0.0006	-0.0001	0.0000

g



Repeatability

Load test : 200 g

Stdev. : 0.00005 g

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CAL-F0031-03

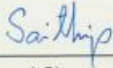




TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000 FAX. 0-2719-9484

Cert.No.: 24TW29  
Page.: 1 of 2

## Certificate of Testing

Equipment : DO Meter  
Manufacturer : Hanna  
Model : HI98193  
Serial No. : 03030056991  
ID No. : LB-Eq-014  
Received Date : 05 February 2024  
Test Date : 06 February 2024  
Reference : 2402-0129WN-1  
Submitted by : Special Lab Envi And Consultant Co.,Ltd  
47/91-93, 96 Moo 3 Thambon Tha-it,  
Pakkret, Nonthaburi 11120  
Laboratory Condition : Temperature (  $25 \pm 5$  ) °C  
Humidity (  $50 \pm 20$  ) %  
Test Procedure : In - house method : CP-CH9  
by Comparison Technique with Azide Modification Method  
Tested by : Walalak Sirithean  
Approved by :   
Approved Signatory  
( ☒ ) Saithip Meangmai  
( ☐ ) Warakorn Lemgagtrakul  
( ☐ ) Ponpan Paipim  
Issue Date : 7 February 2024

B 0333618





Cert.No.: 24TW29

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).

<u>Instruments</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1. Burette	-	130BU10	23CG1172	22 Mar 2025
2. Balance	1124013382	140RC006	23MM18	20 Feb 2024

**2. Standard Material :-**

<u>Material</u>	<u>Manufacturer</u>	<u>Lot.No.</u>	<u>Assay</u>
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

**Result :** Dissolved Oxygen Meter Adjustment With Air 100 %  
Dissolved Oxygen Probe No.: KC1N20CDJ

<b>Titration Method (Azide Modification Method)</b> (mg/L)	<b>DO Meter Reading</b> (mg/L)	<b>Standard Deviation</b> (mg/L)
8.18	8.18	0.0084

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

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Saitip

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**BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.**  
**CALIBRATION LABORATORY**

99/9 Moo 2, Maha Sawat, Phutthamonthon, Nakhon Pathom 73170, Thailand. Tel: +66 3424 5299 Fax: +66 3424 5250  
E-mail: bkk@becthai.com Website: www.becthai.com



NSC-TISI-TIS 17025  
CALIBRATION 0131

Certificate No. : CAL-24-099 Page : 1 of 3

### CERTIFICATE OF CALIBRATION

Equipment	:	Spectrophotometer
Manufacturer	:	Thermo Scientific
Model	:	Genesys 20
Serial No.	:	3SGT041007
ID No.	:	LB-Eq-029
Customer	:	Special Lab Envi And Consultant Co.,Ltd.
	:	47/91-93 Moo 3, Tambol Tait, Amphur Pakrad,
	:	Nonthaburi, 11120
Location	:	Becthai Laboratory
Date of Receipt	:	30 April 2024
Date of Calibration	:	2 May 2024
Date of Issue	:	2 May 2024
Ambient Temperature	:	(25±10) °C
Relative Humidity	:	(60±20) %
Condition As-Received	:	Used Item

Calibrated by

Ms. Bussayamas Noppakhun

Calibration Engineer

Approved by



( Ms. Jintana Sangthaijaroenlap )

Calibration Manager

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

This certificate may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Indicated values are valid for the state of the Spectrophotometer at the time of calibration only.

ISSUE: 6 REV:5

FM-CAL-33/2

20/02/24



**BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.**  
**CALIBRATION LABORATORY**

99/9 Moo 2, Meha Sawat, Phutthamonthon, Nakhon Pathom 73170, Thailand. Tel: +66 3424 5299 Fax: +66 3424 5250  
 E-mail: bkk@becthai.com Website: www.becthai.com



Certificate No. : CAL-24-099

Page : 2 of 3

## CALIBRATION REPORT

### Conditions of this result of calibration

#### 1. Reference Standard Material :

Material	Model	Serial No.	Cert.No.	Due date
Holmium Glass Filter	RM-HG	12705	117342	13 December 2025
Neutral Density Filter	RM-1N2N3N	8323	117341	13 December 2025

2. Traceability : This certification is traceable to the International System of Unit maintained at ;  
 The Sarna Scientific Ltd. Accredited Calibration Laboratory No. 0659.

#### 3. Method of calibration :

The calibration procedure was carried out according to ASTM E275-08 (2022) and ASTM E925-09 (2014).

#### 4. Result of calibration :

( ☒ ) without adjustment ( ☐ ) after adjustment

#### 5. Equipment Specifications:

Spectral Bandwidth :	8	nm
Data Interval :	1	nm
Scan Speed :	N/A	nm/min

ISSUE: 6 REV:5

FM-CAL-33/2

20/02/24





**BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.**  
**CALIBRATION LABORATORY**

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 E-mail : bkk@becthai.com Website : www.becthai.com



Certificate No. : CAL-24-099

Page : 3 of 3

## CALIBRATION REPORT

### Wavelength Calibration

Certified Values of Reference Material	Nominal Value (nm)	UUC*Reading (nm)	Error (nm)	Uncertainty of Measurement ( $\pm$ nm)	k Factor
418.40	418	418	-0.40	0.59	2.00
537.00	537	537	0.00	0.59	2.00
638.00	638	639	1.00	0.59	2.00

### Photometric Calibration for Visible

Wavelength (nm)	Certified Values of Reference Material (A)	UUC* Reading (A)	Error (A)	Uncertainty of Measurement ( $\pm$ A)	k Factor
420.0	Zero	0.000	0.0000	0.0028	2.00
	0.5703	0.573	0.0027	0.0045	2.00
	0.7336	0.734	0.0004	0.0045	2.00
	1.0709	1.075	0.0041	0.0045	2.00
440.0	Zero	0.000	0.0000	0.0028	2.00
	0.5592	0.557	-0.0022	0.0045	2.00
	0.716	0.717	0.0010	0.0045	2.00
	1.0454	1.044	-0.0014	0.0045	2.00
465.0	Zero	0.000	0.0000	0.0028	2.00
	0.5094	0.511	0.0016	0.0045	2.00
	0.6601	0.664	0.0039	0.0045	2.00
	0.963	0.966	0.0030	0.0045	2.00
546.1 (546.0)	Zero	0.000	0.0000	0.0028	2.00
	0.5206	0.523	0.0024	0.0045	2.00
	0.6677	0.665	-0.0027	0.0045	2.00
	0.9763	0.979	0.0027	0.0045	2.00
590.0	Zero	0.000	0.0000	0.0028	2.00
	0.5522	0.555	0.0028	0.0045	2.00
	0.6966	0.699	0.0024	0.0045	2.00
	1.0201	1.022	0.0019	0.0045	2.00
635.0	Zero	0.000	0.0000	0.0028	2.00
	0.5377	0.538	0.0003	0.0045	2.00
	0.6649	0.667	0.0021	0.0045	2.00
	0.9736	0.977	0.0034	0.0045	2.00

**Remark :** Each individual filter is measured against the empty filter holder (blank) used to zero the Spectrophotometer.

**Note:**

UUC\* : Unit Under Calibration

- End of Report -

ISSUE: 6 REV:5

FM-CAL-33/2

20/02/24

<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: left;"> <h1 style="margin: 0;">CAL</h1> <p><b>Calibratech Co.,Ltd.</b>  7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpoo, Pakkred, Nonthaburi 11120  Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com</p> </div> <div style="text-align: right;"> <p style="font-size: 0.8em;">NSC-TISI-TIS 17025 CALIBRATION 0030</p> </div> </div> <h2 style="text-align: center; margin-top: 20px;">Certificate of Calibration</h2>	<p><b>Page : 1 of 2</b></p>									
<p><b>Certificate No. : 67-300222-6</b></p>										
<p><b>Submitted by : Special Lab Envi and Consultant Co., Ltd.</b>  47/91-93 Moo 3, Tambol Tha-It, Pakkret, Nonthaburi 11120</p>										
<p><b>Equipment : Burette</b></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Manufacturer : Witeg</td> <td style="width: 50%;">Class : A</td> </tr> <tr> <td>Capacity : 25 ml</td> <td>Graduation : 0.05 ml</td> </tr> <tr> <td>ID No. : LB-Gw-001</td> <td></td> </tr> </table>		Manufacturer : Witeg	Class : A	Capacity : 25 ml	Graduation : 0.05 ml	ID No. : LB-Gw-001				
Manufacturer : Witeg	Class : A									
Capacity : 25 ml	Graduation : 0.05 ml									
ID No. : LB-Gw-001										
<p><b>Environment :</b></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 40%;">Ambient Temperature :</td> <td style="width: 20%;">( 20 ± 3 )</td> <td style="width: 40%;">°C</td> </tr> <tr> <td>Relative Humidity :</td> <td>( 50 ± 10 )</td> <td>%</td> </tr> <tr> <td>Air Pressure :</td> <td>1002.7</td> <td>mbar.</td> </tr> </table>		Ambient Temperature :	( 20 ± 3 )	°C	Relative Humidity :	( 50 ± 10 )	%	Air Pressure :	1002.7	mbar.
Ambient Temperature :	( 20 ± 3 )	°C								
Relative Humidity :	( 50 ± 10 )	%								
Air Pressure :	1002.7	mbar.								
<p><b>Date of Received : 20 April 2024</b></p>										
<p><b>Date of Calibration : 27 April 2024</b></p>										
<p><b>Date of Issue : 27 April 2024</b></p>										
<p><b>Calibrated by : Wipa.Tovadee</b></p>										
<p><b>Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22</b></p>										
<p><b>Reference Standard Instruments :</b> This certification is traceable to the International System of Units</p>										
<p>Electronic Balance</p> <table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left; font-weight: normal;">ID No.</th> <th style="text-align: left; font-weight: normal;">Cert. No.</th> <th style="text-align: left; font-weight: normal;">Due Date</th> <th style="text-align: left; font-weight: normal;">Traceability</th> </tr> </thead> <tbody> <tr> <td>241003</td> <td>66-200388-2</td> <td>02 Jun 2024</td> <td>National Institute of Metrology (Thailand) (NIMT)</td> </tr> </tbody> </table>		ID No.	Cert. No.	Due Date	Traceability	241003	66-200388-2	02 Jun 2024	National Institute of Metrology (Thailand) (NIMT)	
ID No.	Cert. No.	Due Date	Traceability							
241003	66-200388-2	02 Jun 2024	National Institute of Metrology (Thailand) (NIMT)							
<p>Approved by : </p> <p>( Wipa Tovadee )</p> <p>Supervisor</p>										
<p>The Uncertainties are for a confidence probability of approximately 95%</p> <p>This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co.,Ltd.</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <span>CAL-F0031-03</span> </div>										



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 Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

## Certificate of Calibration

**Certificate No. :** 67-300222-6

**Result of Calibration :** This result of true Volume is referred to standard temperature at 20 °C

**UUC Condition As-Received :** Good

**Page : 2 of 2**

Delivery Time : 40.01 sec.


Nominal Volume ( ml )	Measuring Volume ( ml )
10	10.0029
20	20.0018
25	25.0167

Uncertainty of measurement with in  $\pm$  0.0066 ml


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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k = 2.00$  ,  
 providing a level of confidence of approximately 95%

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CAL-F0031-03





**Thermology Co., Ltd.**

96/177-96/178 Moo 6, T. La-harn, A. Bangbuathong, Nonthaburi 11110  
Tel : 0 2191 6479 Fax : 0 2191 6480 website : www.thermology.co



## CALIBRATION CERTIFICATE

<b>Date of Issue</b>	Jun 21, 2024	<b>Cert No.</b>	24/2294
<b>Site Calibration</b>		<b>Order No.</b>	24060309
<b>Customer</b>	SPECIAL LAB ENVI AND CONSULTANT CO., LTD. 47/91 Moo 3, Tha-It, Pakkert, Nonthaburi 11120		
<b>Place of Calibration</b>	Laboratory Room		
<b>Description</b>	Oven		
<b>Model</b>	UF30		
<b>Serial No.</b>	B123.0544		
<b>ID.No.</b>	LB-Eq-047		
<b>Date of Receipt</b>	Jun 19, 2024		
<b>Date of Calibration</b>	Jun 19, 2024		
<b>Environment</b>			
<b>Temperature</b>	(Min)	29.2 °C	(Max) 33.1 °C
<b>Relative Humidity</b>	(Min)	40.6 %RH	(Max) 49.7 %RH

### Calibration Method

WI-17 : The reference thermometer was placed into the chamber and measurement was performed based on AS-2853.

The temperature scale in use at this laboratory is the International Temperature Scale of 1990.

### Standard

1) Data Acquisition with Sensor Model 34972A S/N. MY59002130, Certificate No. QR24-0873, Calibrated by Quality Reborn Co., Ltd., ONAC Calibration No. 0292. Due Date Apr 18, 2025.

This certificate is traceable to SI unit.

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*Signature*

This certificate is issued in accordance with the conditions of Thermology Laboratory. The traceability to recognised national standard and the unit of measurement realised at corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of laboratory.



**Thermology Co., Ltd.**

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## CALIBRATION CERTIFICATE

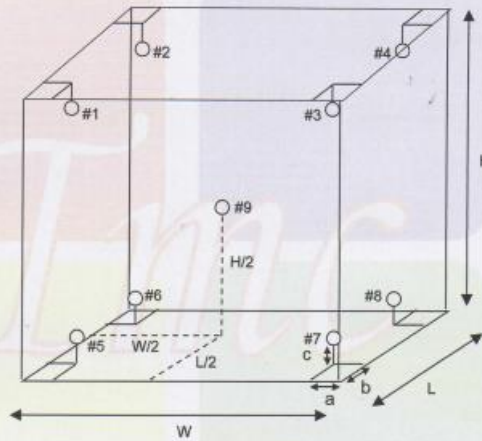
Date of Issue Jun 21, 2024

Cert No. 24/2294

Site Calibration

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Results (without adjustment)



Position of reference thermometers were placed

### Note.

- 1). Dimension (W x L x H) is 40 x 25 x 32 cm.
- 2). Stability - greatest one half of difference between max peak and min peak of each reference probe measured temperature obtained during the calibration interval.
- 3). Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions. The reference sensor should preferably be located at the geometric center of the chamber.

*Signature*



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## CALIBRATION CERTIFICATE

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Results (without adjustment)

Cal Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability ±(°C)	Uniformity (°C)	Uncertainty ±(°C)
104.0	104.0	104.0	Position 1	104.402	0.079	0.697	0.35
			Position 2	103.716			
			Position 3	103.784			
			Position 4	103.652			
			Position 5	104.005			
			Position 6	103.668			
			Position 7	103.555			
			Position 8	103.750			
			Position 9	103.743			

Cal Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability ±(°C)	Uniformity (°C)	Uncertainty ±(°C)
150.0	150.0	150.0	Position 1	151.015	0.115	1.214	0.44
			Position 2	149.798			
			Position 3	149.866			
			Position 4	149.624			
			Position 5	150.425			
			Position 6	149.715			
			Position 7	149.490			
			Position 8	150.027			
			Position 9	149.857			

On





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## CALIBRATION CERTIFICATE

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Site Calibration

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Results (without adjustment)

Cal Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)	Stability ±(°C)	Uniformity (°C)	Uncertainty ±(°C)
180.0	180.0	180.0	Position 1	0.102	1.491	0.49
			Position 2			
			Position 3			
			Position 4			
			Position 5			
			Position 6			
			Position 7			
			Position 8			
			Position 9			

The stability and uniformity was taken into account in the measurement uncertainty stated.

The above results are valid exclusively for calibration samples as mentioned in the report.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with ONAC requirements.

APPROVED SIGNATORY :

[ ] MR. PRAJUCKPETCH THONGSOOKCHOTE

[✓] MR. DAMRONG Mulsing

[ ] MR. JATURAPAT THONGSOOKCHOTE



