เอกสารสอบเทียบเครื่องมือตรวจวัด

Calibratech Co.,Ltd.

[illegible]

Certificate No. : 64-400532-1

Submitted by : Special Lab Envi and Consultant Co., Ltd

47 Moo 3 Tiwanon Tha-it, Pakkret, Nonthaburi 11120

Equipment : Water Bath

Manufacturer : Memmert | Model : WNB22

Range : N/A °C | Resolution : 0.1 °C

Serial No. : L520060[illegible] | ID No. : LB-Eq-04[illegible]

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

Ambient Temperature : (29.0 to 31.0) °C

Relative Humidity : (55 to 60) %

Line Voltage : (226.0 to 226.5) V

Date of Received : 1[illegible] October 2021

Date of Calibration : 2[illegible] October 2021

Date of Issue : 2[illegible] October 2021

Calibrated by : Pernpon Chanpu

Calibration Method : This instrument was calibrated by in-house method CAL-M4006 based on ASTM E715-[illegible]

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
400029 & 400031	64-400433-1	07 Apr 2022	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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

Elitetech Co.,Ltd.
[illegible]

Certificate No. : [illegible]

Result of Calibration : [illegible]

UUT Condition As-Received : [illegible]

Function : Temperature Measurement

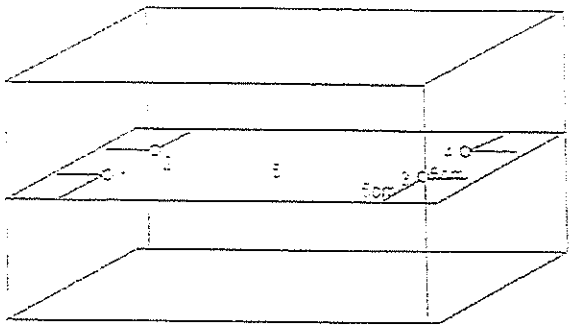


Fig.1

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) & Sensor No.					Uncertainty (± °C)	Measured Uniformity (± °C)	Measured Stability (± °C)
			1	2	3	4	5			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	84.80	84.80	84.85	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.24	[illegible]	0.14

Remark: The uncertainty is not comb no uniformity of the water bath

This result [illegible] accurate as [illegible] date and place of calibration only.

This reported uncertainty of measurement is based on a standard uncertainty multiplied by a coverage factor (k = 2) providing a level of confidence of approximately 95 %.

- [illegible] -

CAL
Calibratech Co.,Ltd.
[illegible]
[illegible]

ISO-TISI-TIS17025
CALIBRATION 0030

Certificate No. : 64-210396-1

Submitted by : Special Loc Entr And Consultant Co.,Ltd.

[illegible] 9, Moo 3, Tambol Tha-It, Pakkret, Nonthaburi 11120

Equipment : Weight

Manufacturer : LS Material : Stainless Steel

Weight size : [illegible] g

ID No. : LE-Eg-024

Assumed density of weight : 7950 kg / m^3

Assumed Air density : 1.2 kg / m^3

Environment : Ambient Temperature : (20 ± 2) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1007.7 mbar

Date of Received : 24 August 2021

Date of Calibration : 28 August 2021

Date of Issue : 28 August 2021

Calibrated by : Wunichai Swatphong

Calibration Method : In-house method CAL-M2101 based on OIML R 111-1 : 2004(E)

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

Standard Weight

ID No.	Cert. No.	Due Date	Traceability
E2413-E2425	[illegible]	27 Mar 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by

(Surachai Promthong)

Laboratory Manager

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

CAL
Calibratech Co.,Ltd.
[illegible] Moo 2 Soi[illegible] Rd. Bangpoo Pa[illegible] [illegible]
Tel [illegible] 904-[illegible] Fax [illegible] email [illegible]

[illegible] of Calibration

Certificate No. : 64-210390-1

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

No.	Nominal Value	Id Mark	Conventional mass Value	Measuring Uncertainty
[illegible]	[illegible]	[illegible]	[illegible] g [illegible] mg	± [illegible] mg

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%.

- oOo -

CAL
Calibratech Co.,Ltd.
[illegible]

ISO-TISI-TIS17025
CALIBRATION 0010

[illegible] Calibration

Certificate No. : 64-210396-3

Submitted by : Special Lab Equip And Consultant Co.,Ltd.
47/91 Moo 3, Tambol Tha-It, Pakkret, Nonthaburi 11120

Equipment : Weight

Manufacturer : LS Material : Stainless Steel

Weight size : 500 g

ID No. : LB-Eq-055

Assumed density of weight : 7950 kg / m^3

Assumed Air density : 1.2 kg / m^3

Environment : Ambient Temperature : (20 ± 2) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1005.3 mbar

Date of Received : 24 August 2021

Date of Calibration : 25 August 2021

Date of Issue : 28 August 2021

Calibrated by : Wuttichai Swatthong

Calibration Method : In-house method CAL-M2101 based on OIML R 111-1 : 2004(E)

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E2413-E2425	[illegible]	27 Mar 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by .

Surachai Promthong

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

CAL
Calibratech Co.,Ltd.
[illegible]

Certificate of Calibration

Certificate No. : 64-210396-2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

No.	Nominal Value	Id Mark	Conventional mass Value	Measuring Uncertainty
1	100 g	[illegible]	100 g [illegible] mg	± [illegible] mg

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

The 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%.

- oOo -

CAL
Calibratech Co.,Ltd.
[illegible]

ISO-TISI-TIS17025
CALIBRATION 0220

Certificate of Calibration

Certificate No. : 64-2100396-3

Submitted by : Special Lab Equip And Consultant Co.,Ltd.
47/90 Moo 3, Tambol Tha-it, Pakkret, Nonthaburi 11120

Equipment : Weight
Manufacturer : LS Material : Stainless Steel
Weight size : 200 g
ID No. : LB-Eq-036
Assumed density of weight : 7950 kg / m^3
Assumed Air density : 1.2 kg / m^3

Environment : Ambient Temperature : (20 ± 2) °C
Relative Humidity : (50 ± 10) %
Air Pressure 1005.0 mbar

Date of Received : 24 August 2021
Date of Calibration : 25 August 2021
Date of Issue : 25 August 2021
Calibrated by : Wunichai Srisaphong
Calibration Method : In-house method CAL-M2101 based on OIML R 111-1 : 2004(E)
Reference Standard Instruments : This certification is traceable to the International System of Units
Standard Weights

ID No.	Serial No.	Due Date	Traceability
E2419-E2425	[illegible]	27 Mar 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by :
Suradej Promthong
Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

CAL
Calibratech Co.,Ltd.
[illegible] Soi Mooban 2 Sukhumvit [illegible] Rd. Bangkok Pathrakanong [illegible]
Tel. [illegible] Fax. [illegible] e-mail : calibratech.cal@hotmail.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 04-210396-3

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

No.	Nominal Value	Material	Conventional mass Value	Measuring Uncertainty
1	200 g	[illegible]	200 g + 0.20 mg	± 0.17 mg

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%.

- oOo -

CAL

Calibratech Co.,Ltd.

[illegible]

[illegible]

[illegible]

Certificate No. : 05-400224-1

Submitted by : [illegible] Engineering Consultant Co., Ltd.

[illegible] Tambon Thanon, Pakkret, Nonthaburi 11120

Equipment : Digital Thermometer with TC probe

Temperature Indicator

Manufacturer : Thermo Scientific Model : TEMP 100K

Range : -250 C to 1372 C Resolution : 0.1 C

Serial No. : [illegible] ID No. : LB-Eq-013

Environment : Ambient Temperature : (23 ± 2) C

Relative Humidity : (50 ± 15) %

Line Voltage (220 ± 22) VAC

Date of Received : 27 April 2022

Date of Calibration : [illegible] May 2022

Date of Issue : [illegible] May 2022

Calibrated by : Chumpol Sutthawan

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4005 by compared with PRT in the liquid bath at the constant controlled temperature

The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
[illegible]	[illegible]	[illegible]	National Institute of Metrology Thailand (NIMT)
[illegible]	[illegible]	[illegible]	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
[illegible]	[illegible]	[illegible]	National Institute of Metrology Thailand (NIMT)
[illegible]	[illegible]	[illegible]	National Institute of Metrology Thailand (NIMT)

Approved by

Bunjerd Niam

Supervisor

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

CAL
Ultratech Co.,Ltd.

Certificate No. : 05-400224-1

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement with Thermocouple probe Type K

Model : Type K Sheath Material : Teflon
Diameter : 1 mm. Length : 150 mm
Serial No. : N.A. ID No. : SL-39

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
150	[illegible]	[illegible]	[illegible]	[illegible]
50	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]

Model : AJA-[illegible] Sheath Material : Stainless
Diameter : 3.5 mm. Length : 200 mm.
Serial No. : N.A. ID No. : SL-40

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
150	[illegible]	[illegible]	[illegible]	[illegible]
50	[illegible]	[illegible]	[illegible]	[illegible]

Remark

[illegible] Without Calibration

This result of calibration [illegible] on date and place of calibration only.

The reported uncertainty of measurement was stated on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately [illegible]

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES

Certificate of Calibration

Equipment :	pH Meter
Manufacturer :	Eutech
Model :	pH 700
Serial No. :	2858459
ID No. :	LB-Eq-027
Condition As-Received:	Used Item
Received Date :	23 August 2021
Calibration Date :	3 September 2021
Reference :	2108-0663WN-1
Submitted by :	Special Lab Envi And Consultant Co.,Ltd 47/91-93 Moo 3 Thambon Tha-it, Pakkret Nonthaburi 11120
Ambient Temperature :	(26 ± 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)
Calibrated by :	Saithip Meangmai
Approved by :	Approved Signatory

( ) Malee Bukrues
( ) Saithip Meangmai
Waraporn Lempaprakul

Issue Date :	3 September 2021

The Uncertainties are for a confidence probability of approximately 95%

Condition of this calibration result

1. Reference Standard Instrument : -

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	43160066	180RC092	21E1223/1	27 Apr 2022

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

- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd., ANSI-ASQ National Accreditation Board. Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	754028	28 June 2023
pH 6.866	CPA chem	679462	12 Mar 2022
pH 9.181	CPA chem	754031	20 July 2022

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

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,9)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (±)	Coverage factor k
pH Electrode S/N: 9034419	4.008	4.01	169.2	0.0071	2.00
	6.866	6.87	0.5	0.0062	2.00
	9.181	9.18	-134.9	0.013	2.00

a 1070596

Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4,7,9)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement	Coverage factor
	pH	mV	mV	pH	(±mV)	k
pH Meter	0.00	414.12	414	0.02	0.58	2.00
S/N: 2558459	1.00	354.96	355	1.02	0.58	2.00
	2.00	295.80	296	2.02	0.58	2.00
	3.00	236.64	237	3.01	0.58	2.00
	4.00	177.48	177.4	4.01	0.058	2.00
	5.00	118.32	118.3	5.01	0.058	2.00
	6.00	59.16	59.1	6.00	0.058	2.00
	6.86	8.28	8.3	6.86	0.058	2.00
	7.00	0.00	0.0	7.00	0.058	2.00
	8.00	-59.16	-59.1	8.00	0.058	2.00
	9.00	-118.32	-118.3	9.00	0.058	2.00
	9.18	-128.97	-129.0	9.18	0.058	2.00
	10.00	-177.48	-177.5	10.00	0.058	2.00
	11.00	-236.64	-237	11.00	0.58	2.00
	12.00	-295.80	-296	12.00	0.58	2.00
	13.00	-354.96	-355	13.00	0.58	2.00
	14.00	-414.12	-414	14.00	0.58	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 %.

-oOo-

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
[illegible]
TEL [illegible] FAX [illegible]

Cert. No.: 21TM1547
Page.: 1 of 2

Certificate of Calibration

Equipment :	pH Meter with Sensor
Manufacturer :	Eutech
Model :	pH 700
Serial No. :	2858459
ID No. :	LB-Eq-027
Submitted by :	Special Lab Envi And Consultant Co.,Ltd. 47/91-93 Moo 3 Thambon Tha-it, Pakkret, Nonthaburi 11120
Location :	TPA Chemistry Calibration Laboratory
Received Order :	23 August 2021
Calibrated Date :	27 August 2021
Ambient Temperature :	(26 ± 10) °C
Relative Humidity :	(50 ± 30) %
AC Line Voltage :	(220 ± 22) V
Calibrated by :	Kunonit Promprat
Approved by :	Approved Signatory

- Pornchippa Tameyakul
- Malee Budkruea
- Suwit Injai

Issue Date : 31 August 2021

The Uncertainties are for a confidence probability of approximately 95%

[illegible] Equipment Calibration and Testing Services

A 0031535

Equipment : pH Meter with Sensor

Condition As-Received : Used Item

Reference : 2108-0663WM-2

Cert. No.: 21TM1547

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.

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) Digital Thermometer	1523	2168080	20I1389	20 Nov 2021

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

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

Result of Calibration :- (*) Without Adjustment

Function : Temperature measurement.

This instrument was connected with temperature sensor, ID No.: SL-33/1

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (±°C)	Coverage Factor k
25.0	100	25.0	25.000	0.000	0.16	2.00

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 %.

-oOo-

a 1069519

CAL

Calibratech Co.,Ltd.

[illegible]

ISO-17025-17011025
CALIBRATION NO.80

[illegible]

Certificate No. : 65-400213-3

Submitted by : Special Lab Environmental Consultant Co., Ltd.

47/91 Moo 3 Thambol Tha-it Pakkret Nonthaburi 11120

Equipment : Air Chamber (Refrigerator)

Manufacturer : Frozen — Model : CC-250C

Range : [illegible] °C — Resolution : 0.1 °C

Serial No. : 1001507016 — ID No. : LB-Eq-006

Environment : On site calibration was carried out at the Laboratory.

Special Lab Environmental Consultant Co., Ltd.

Ambient Temperature : (29.5 to 30.0) °C

Relative Humidity : (54 to 60) %

Line Voltage : (226.0 to 226.5) V

Date of Received : 27 April 2022

Date of Calibration : 27 April 2022

Date of Issue : 30 April 2022

Calibrated by : Bunjerd Masri

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	65-400041-1	28 Jul 2022	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

The Uncertainties are on a confidence probability of approximately 95%.

CAL

Calibratech Co.,Ltd.

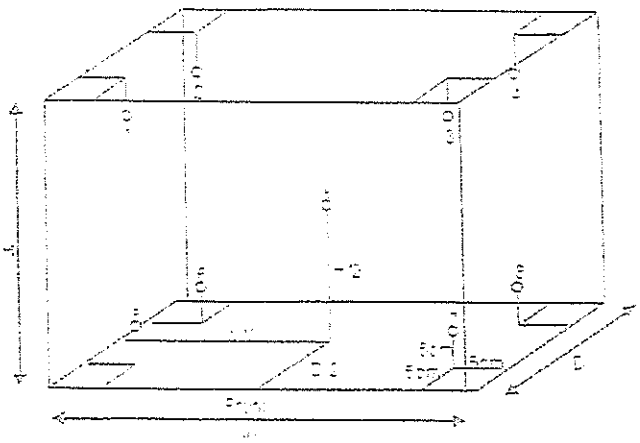
Certificate No. : 65-400213-3

Result of Calibration : Without Adjustment

UUC Condition as-Received : Good

Function : Temperature measurement

Test calibration was setting at condition at position (1 to 9)



Inside of Chamber

W = 1.40 m

D = 0.47 m

H = 1.48 m

Capacity = 0.71 m

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	[illegible]	5.5	[illegible]	[illegible]	3.66	3.67	4.78	5.35	3.64	3.52	4.57	1.39

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
30	[illegible]	5.5	[illegible]	0.04	[illegible]

Remark: The uncertainty [illegible] uniformity of the air chamber

This result of calibration was found accurate at 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%.

- End -

Perkin

PinAcle 900F
Preventive Maintenance Report

Company Name: SPECIAL LAB ENVI & CONSULTANT

Instrument Location: PAKKRET NONTHABURI 11120

Instrument Serial No.: PFBS17082303

Date: 03-Sep-2021

PinAAcle 900F Preventive Maintenance (PM)

Company Name:	SPECIAL LAB ENVI & CONSULTANT		
Address (Instrument Location):	PAKKRET NONTHABURI 11120		
Serial Number:	FFBS17082303	PM Number:	1 of 1
Customer Name (if applicable):	K. Fhatiha	Telephone Number:	(092) 283-9064
Customer Support Engineer Name:	K. Weerayoot Keadpon	Service Order Number:	WO-00925451
Date PM Performed: (DD-MMM-YYYY)	03-Sep-2021	Next PM Due Date: (DD-MMM-YYYY)	03-Sep-2022
Standard Labor Hours to Complete PM :		5 hours	

Part Number	Release	Publication Date	
09870145 Rev.9	4	January 2018	PerkinElmer

Scope

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

The customer should save their method before the PM begins.

General Instructions:

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

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

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

Update the PM sticker and instrument logbook as required.

Component List

Component / Specific Model	Serial #	Configuration Notes

Parts Lists

Parts Included with the PM		
Part Number (if applicable)	Description	Quantity
B0501656	Pan Filters	1
N8150156	O-Ring Kits for Sampling Introduction (Stainless Steels Nebulizer)	N/A
N8100127	O-Ring Kits for Sampling Introduction (Plastic Nebulizer)	2
N9301714	Replacement Acetylene Filter Cartridge	1
TH001002	Replacement Air Filter Cartridge	2

Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quality	Batch/Lot #	Expired Date (MM/YY)
N9300133	1000 mg/L Copper Standard	AR	35-200UV1	30-Jan-2022

Additional Reagents and Standards Required for PM (Customer Support Solution)				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A	DI Water	250 mL	AR	AR
N/A	0.5% HNO_3	250 mL	AR	AR

Additional Tools Required for PM			
Part Number (if applicable)	Description	Quantity	Serial #
N1013000	0.34 Neutral density filter	1	5503530856
N1013002	1.0A Neutral density filter	1	5503555491
03030997	System 2 EDL Driver	1	03030997
N3050605	As System 2 EDL	1	16148
N3050123	Cu Lumina HCL	1	021913-020070
N3050109	Ba Lumina HCL	1	102416-040180
N3050139	K Lumina HCL	1	110716-010060
N3050152	Ni Lumina HCL	1	100516-030190

Procedure Checklist

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

1. General:

   - ☑ Review the instrument performance with the customer and document any recent problems.
   - ☑ Inspect the customer log book and make any appropriate PM entries.
   - ☑ Perform general inspection of system for cleanliness.

2. PC Instrument Software:

   - ☑ Instrument Software user files/databases archived, packed, and/or deleted as needed.

3. Mechanical:

   - ☑ Inspect and clean all fans and filters. Replace filters if necessary
   - ☑ Inspect all gas lines for leaks and/or wear. Replace if needed.
   - ☑ Clean exterior of the instrument.
   - ☑ Inspect the burner head, burner chamber, and nebulizer. Clean if needed as stated in the Hardware Guide.
   - ☑ Check burner head dimensions with the feeler gauge as stated in the Hardware Guide in the Maintenance chapter section on cleaning the burner head and checking slotn width. Replace if out of specification
   - ☑ Check the condition of the end cap, burner head, and nebulizer O-rings. Replace if necessary.
   - ☑ Check the drain system for signs of wear. Replace worn or damaged parts.
   - ☑ Visually check for proper flame conditions when igniting the Air-C2H2 and N2O-C2H2 flames (if applicable).

4. Electrical:

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

5. Optics:

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

6. Gasses:

   - ☑ Verify that the Gasses supplied to the instrument are within the pressure and purity specifications found in the PinAAcle 900 Series Pre-Installation Checklist SDB.
   - ☑ Verify that the acetylene filter and air filter element is dry. Replace if necessary.

7. Flame Interlock Check:

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

Parameter	Specification	Test Results	Pass/Fail
Flame Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
Drain Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
Nebulizer Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
C_2H_2 Pressure Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
Air Pressure Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
Burner Head Sensor	Choosing Nitrous Oxide as the oxidant should trigger an interlock shuts down	Active	Passed

8. After PM Performance tests:

8.1 Detector Linearity with Barium

Description: Ensures that the detector is linear in the Visible Range.

Parameter	Specification	Certificate Value at 553.6 nm (Abs.)	Test Results	Pass/Fail
1.0 A ND Filter	± 5% from Cert.	0.8788	0.9766	Passed
0.2 A ND Filter	± 5% from Cert.	0.2042	0.1989	Passed

8.2 Baseline Noise at 1.0 Absorbance with Barium

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

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0015	Passed

8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.001	0.0002	Passed

8.4 D2 Background Compensation with Copper

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

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0079	Passed

8.5 AA-BG Baseline Noise with Copper

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

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

8.6 AA-BG Baseline Noise with Arsenic

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

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0011	Passed

8.7 Flame Sensitivity

Description: Instrument Sensitivity checked against Copper standard.

Standard Copper Sensitivity	Specification	Results (Abs.)	Pass/Fail
3 mg/L Sensitivity SS Neb (if applicable)	> 0.250 Abs.	NA	Not Applicable
2 mg/L Sensitivity HS Neb (if applicable)	> 0.250 Abs.	0.3221	Passed

10. Review:

☑ Review with the customer PM work performed.

☑ Review with the customer routine maintenance procedures.

☑ Discuss recommended customer supplied materials to have on hand.

☑ Attach PM sticker.

Additional Comments

Additional Comments Regarding the PM

Review

The preventive maintenance checks and if applicable performance tests for PinAAcle 900F have been completed. *This PinAAcle 900F Passes ☑ Fails ☐ the preventive maintenance.*	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative:	Date: 08-Sep-2021 (DD-MMM-YYYY)
Authorized Customer Representative:	Date: (DD-MMM-YYYY)

CAL

Calibratech Co.,Ltd.

[illegible]

Certificate No. : 65-200126-1

Submitted by : Special Lab Envi and Consultant Co., Ltd.

[illegible] Pakkret, Nonthaburi 11120

Equipment : Electronic Balance

Manufacturer : A&D Model : GR-200

Serial No. : 14245312 ID No. : LB-Eg-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 : 26.8 to 27.0 C

Relative Humidity : 53.6 to 55.7 %

Air Pressure : mbar

Date of Received : 27 April 2022

Date of Calibration : 27 April 2022

Date of Issue : 13 May 2022

Calibrated by : Kanadath Thimpichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref. LAB 14 Edition 5, July 2015

Reference Standard Instruments : [illegible] is traceable to the International System of Units

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
SD-WB-04	[illegible]	[illegible] 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by

Suradat Poontong

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

[illegible]

CAL

Calibratech Co.,Ltd.

[illegible]

[illegible] Calibration

Certificate No. : 65-200126-1

Result of Calibration : [illegible] Without Adjustment

UUC Condition As-Received : [illegible]

Deviation of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty ± (g)
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

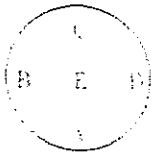
The result of calibration was found accurate as shown on date and place of calibration only.

The reported uncertainty of measurement is based on a standard uncertainty multiplied by a coverage factor k = 2.1, providing a level of confidence of approximately 95%.

Eccentric error: Load level [illegible] g

A B C D E

[illegible] g



Repeatability: Load level [illegible] g

Sigma [illegible] g

- oOo -

CAL

Calibratech Co.,Ltd.

[illegible]

ISO-TISI-TISI 0038
CALIBRATION 0030

Certificate No. : 65-400213-1

Submitted by : Special Lab Equipment and Consultant Co., Ltd.

47/91 Moo 3 Tambol Tha-it, Paktret, Nonthaburi 11120

Equipment : Air Chamber (Incubator)

Manufacturer : Lovibond | Model : FKU 1800

Range : [illegible] °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 Equipment and Consultant Co., Ltd.

Ambient Temperature : (29.0 to 30.0) °C

Relative Humidity : (45 to 50) %

Line Voltage (226.0 to 226.5) V

Date of Received : 27 April 2022

Date of Calibration : 27 April 2022

Date of Issue : 30 April 2022

Calibrated by : Permpoon Chanpa

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 Thermocouple probe

ID No.	Cert. No.	Due Date	Traceability
400029 & 400030	[illegible]	23 May 2022	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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

CAL
Calibratech Co.,Ltd.

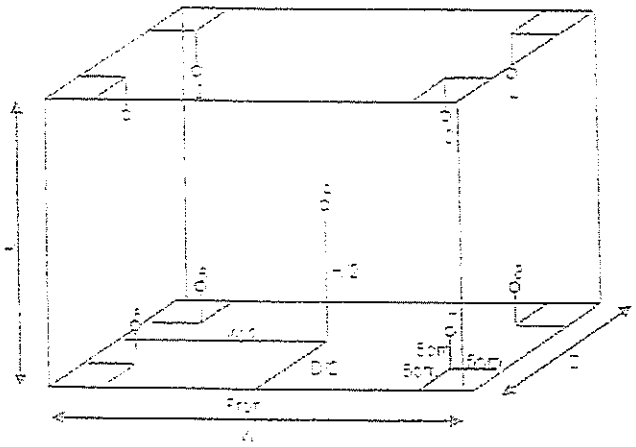
Certificate No. : 65-400213-1

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

The measurement was carried out at the following positions (in meter)



Inside of Chamber

W = 0.55 m

D = 0.73 m

H = 0.50 m

Capacity = 0.20 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty
			1	2	3	4	5	6	7	8	9	(± °C)
30.0	30.0	30.0	30.0	29.9	30.0	30.0	29.9	29.9	30.1	30.1	30.0	0.55
35.0	35.0	35.0	34.9	34.9	35.0	35.1	35.0	35.0	35.1	35.1	35.0	0.54
37.0	37.0	37.0	36.7	36.7	36.9	36.9	36.9	36.9	37.0	37.0	37.0	0.55

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
30.0	30.0	30.0	0.3	0.1	0.5
35.0	35.0	35.0	0.3	0.1	0.5
37.0	37.0	37.0	0.4	0.1	0.5

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%.

BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY
300 Phaholyothin Road, Phayathai, Bangkok 10400, Thailand Tel: +66 2615-2929 Fax: +66 2615-2950-1
E-mail: bkk@becthai.com Website: www.becthai.com

Certificate No. CAL-22-284

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 Talt , Amphur Pakrad
	:	Nonthaburi, 11120
Location	:	Becthai Laboratory
Date of Receipt		5 May 2022
Date of Calibration		5 May 2022
Date of Issue		5 May 2022
Ambient Temperature		(25±10) °C
Relative Humidity		(60±20) %
Condition As-Received		Used Item

Calibrated by

(Mr Somphon Duangnguen)
Calibration Engineer

Approved by

(Ms Jintana Sangthaljaroentap)
Calibration Manager

The reported expanded uncertainty of measurement was based on a combined standard uncertainty multiplied by a coverage factor k = 2 which corresponds to 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 only at the date the spectrophotometer at the time of calibration only.

BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY
509 Phaholyothin Road, Phayathai, Bangkok 10400, Thailand Tel: +66 2615-2929 Fax: +66 2615-2350-1
E-mail: bid@becthai.com Website: www.becthai.com

Certificate No. : CAL-22-264

CALIBRATION REPORT

Conditions of this result of calibration

1. Reference Standard Material

Material	Model	Serial No	Cert No	Due date
Holmium Glass Filter	FIM-HG	24563	90313	2 Mar 23
Didymium Glass Filter	FIM-DG	24562	9031[illegible]	2 Mar 23
Neutral Density Filter	FIM-N[illegible]	24568	90324	3 Mar 23

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

3. Method of calibration

The calibration procedure was carried out according to the Guide to [illegible] based on ASTM E275-08 (2013) and ASTM E925-09 (2014)

4. Result of calibration :

[✓ without adjustment] ☐ after adjustment

5. Equipment Specifications

Spectral Bandwidth : 5 nm
Data Interval : 1 nm
Scan Speed : N/A nm/min

BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY
300 Phaholyothin Road, Phayathai, Bangkok 10400, Thailand Tel: +66 2615-2929 Fax: +66 2615-2950-1
E-mail: bbl@becthai.com Website: www.becthai.com

Certificate No. CAL-22-234

CALIBRATION REPORT

Wavelength Calibration

Certified Values of Reference Material (nm)	Nominal Value (nm)	UUC* Reading (nm)	Error (nm)	Uncertainty of Measurement (± nm)
416.40	416	416	0.60	0.69
537.02	537	537	1.00	0.69
635.07	635	636	1.00	0.69

Photometric Calibration for Visible

Wavelength (nm)	Certified Values of Reference Material (A)	UUC* Reading (A)	Error (A)	Uncertainty of Measurement (± A)
430.1	Zero	0.000	0.0000	0.0028
	0.5824	0.583	0.0006	0.0042
	0.7288	0.728	-0.0008	0.0040
	1.0377	1.036	-0.0017	0.0040
465.0	Zero	0.000	0.0000	0.0028
	0.5669	0.566	0.0007	0.0042
	0.7126	0.710	-0.0026	0.0037
	[illegible]	[illegible]	-0.0021	0.0037
465.0	Zero	0.000	0.0001	0.0028
	0.5256	0.527	0.0014	0.0044
	0.6735	0.670	-0.0035	0.0038
	0.9882	0.986	-0.0022	0.0034
546.1 (546.0)	Zero	0.000	0.0000	0.0028
	0.5238	0.524	0.0002	0.0038
	0.6982	0.698	-0.0002	0.0031
	0.9913	0.994	0.0027	0.0032
590.0	Zero	0.000	0.0000	0.0028
	0.5578	0.559	0.0012	0.0036
	0.7533	0.752	-0.0003	0.0031
	1.0747	1.075	0.0003	0.0032
635.0	Zero	0.000	0.0000	0.0028
	0.5866	0.588	0.0025	0.0035
	0.7301	0.734	0.0039	0.0031
	1.0454	1.047	0.0016	0.0031

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 -

ที่ อก ๐๓๑๐(๑)/ ๒ ๑ ๘

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ เขตราชเทวี
กรุงเทพมหานคร ๑๐๔๐๐

๑๕ มกราคม ๒๕๖๔

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท สเปเชี่ยล แล็บ เอ็นไว แอนด์ คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๓ พฤศจิกายน ๒๕๖๓

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน บริษัท สเปเชี่ยล แล็บ เอ็นไว แอนด์ คอนซัลแตนท์ จำกัด จำนวน ๒ แผ่น

ตามหนังสือที่อ้างถึง บริษัท สเปเชี่ยล แล็บ เอ็นไว แอนด์ คอนซัลแตนท์ จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๓๓ สถานที่ตั้งเลขที่ ๔๗/๙๑-๙๓ หมู่ที่ ๓ ตำบลท่าอิฐ อำเภอปากเกร็ด จังหวัดนนทบุรี ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท สเปเชี่ยล แล็บ เอ็นไว แอนด์ คอนซัลแตนท์ จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

๑) นายนิอัสฮัน นิมะ	ทะเบียนเลขที่ ว-๑๓๓-ค-๕๒๘๗
๒) นายมะปาริ อาแวก็อจิ	ทะเบียนเลขที่ ว-๑๓๓-ค-๕๔๗๐
๓) นางสาวสุวิมล หมวดหมัย	ทะเบียนเลขที่ ว-๑๓๓-ค-๙๑๔๒
๔) นางสาวอาสมะ แซเลาะ	ทะเบียนเลขที่ ว-๑๓๓-ค-๙๑๔๓
๕) นางสาวกัญญากัทร แซ่เติ๋น	ทะเบียนเลขที่ ว-๑๓๓-ค-๙๑๔๔

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์

๑) นางสาวฟาติฮะห์ สุหลง	ทะเบียนเลขที่ ว-๑๓๓-จ-๙๑๔๕
๒) นางสาวอัศวาณี-ยูโซะ	ทะเบียนเลขที่ ว-๑๓๓-จ-๙๑๔๖
๓) นางสาวสุไมยะห์ ดือราแม็ง	ทะเบียนเลขที่ ว-๑๓๓-จ-๙๑๔๗
๔) นางสาวนูรไซมะฮ์ ไลสากา	ทะเบียนเลขที่ ว-๑๓๓-จ-๙๑๔๘
๕) นายเสรี จันทวี	ทะเบียนเลขที่ ว-๑๓๓-จ-๙๑๔๙
๖) นางสาวอรุณรัตน์ เขียวน้ำชุม	ทะเบียนเลขที่ ว-๑๓๓-จ-๙๑๕๐
๗) นางสาวณภัสภรณ์ ธนะอั้วมีสม	ทะเบียนเลขที่ ว-๑๓๓-จ-๙๑๕๑

ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๒๖ รายการ ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้...

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒๕ มกราคม ๒๕๖๗ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นางจินดา เตชะศรินทร์)
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๒๐๒ ๔๐๐๒ ๐ ๒๒๐๒ ๔๑๔๖
โทรสาร ๐ ๒๓๕๔ ๓๒๐๘ ๐ ๒๓๕๔ ๓๔๑๕

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท สเปเชี่ยล แล็บ เอ็นไว แอนด์ คอนซัลแตนท์ จำกัด เลขทะเบียน ว-๑๓๓
ที่ อก ๐๓๑๐(๑)/ ๒ ๓ ๘ ลงวันที่ ๐ ๕ มกราคม ๒๕๖๔

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๖ รายการ

<u>น้ำเสีย จำนวน 26 รายการ</u>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Arsenic	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[2]
2	Barium	Digestion, Direct Nitrous Oxide-Acetylene Flame Method[2]
3	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method[2] 2) 5-Day BOD Test, Membrane Electrode Method[2]
4	Cadmium	Digestion, Direct Air-Acetylene Flame Method[2]
5	Chemical Oxygen Demand	Closed Reflux, Colorimetric Method[2]
6	Color	ADMi Weighted-Ordinate Spectrophotometric Method[2]
7	Copper	Digestion, Direct Air-Acetylene Flame Method[2]
8	Cyanide	Distillation, Colorimetric Method[2]
9	Formaldehyde	Distillation, Colorimetric Method[1]
10	Free Chlorine	DPD Colorimetric Method[2]
11	Hexavalent Chromium	Colorimetric Method[2]
12	Lead	Digestion, Direct Air-Acetylene Flame Method[2]
13	Manganese	Digestion, Direct Air-Acetylene Flame Method[2]
14	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[2]
15	Nickel	Digestion, Direct Air-Acetylene Flame Method[2]
16	Oil & Grease	Liquid-Liquid, Partition-Gravimetric Method[2]
17	pH	Electrometric Method[2]
18	Phenols	1) Distillation, Chloroform Extraction Method[2] 2) Distillation, Direct Photometric Method[2]
19	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[2]
20	Sulfide	ZnS Precipitation, Iodometric Method[2]
21	Temperature	Laboratory and Field Methods[2]
22	Total Dissolved Solids	Dried at 180 °C[2]
23	Total Kjeldahl Nitrogen	Macro Kjeldahl Method[2]
24	Total Suspended Solids	Dried at 103-105 °C[2]
25	Trivalent Chromium	Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation[2]
26	Zinc	Digestion, Direct Air-Acetylene Flame Method[2]

(นางริกาญจน์ อัตรสกุลวิไล)
ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
และทะเบียนห้องปฏิบัติการ

<u>เอกสารอ้างอิง...</u>

<u>เอกสารอ้างอิง</u>

1. สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4. กรุงเทพฯ: เรือนแก้วการพิมพ์, 2547.

2. APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 23rd ed. Washington, DC: APHA, 2017.

(นางริกาญจน์ ฉัตรศกุลวิไล)
ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
และทะเบียนห้องปฏิบัติการ

Calibratech Co.,Ltd.

Certificate No. : 64-400532-1

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

Equipment : Water Bath

Manufacturer : Memmert | Model : WNB22

Range : N.A. C | Resolution 0.1 C

Serial No. : L520.0201 | ID No. : LB-Eq-041

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

Ambient Temperature : (29.0 to 31.0) C

Relative Humidity : (55 to 60) %

Line Voltage : (226.0 to 226.5) V

Date of Received : 20 October 2021

Date of Calibration : 20 October 2021

Date of Issue : 20 October 2021

Calibrated by : Pernpon Champu

Calibration Method : This instrument was calibrated by In-house method CAL-M4006 based on ASTM E715-80
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
400029 & 400061	64-400433-1	07 Apr 2022	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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

Chibatech Co.,Ltd.

Certificate No. : 64-400532-1

Result of Calibration : Without Adjustment

UUT Condition At-Received : [illegible]

Function : Temperature measurement

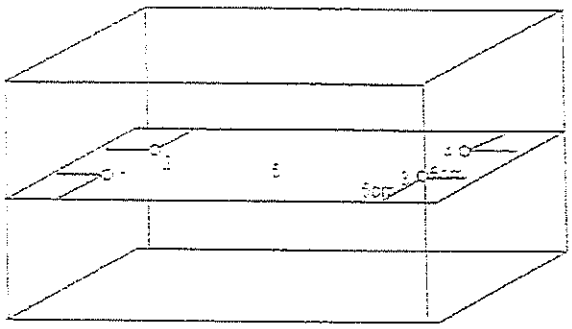


Fig.1

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) & Sensor No.					Uncertainty (±°C)	Measured Uniformity (°C)	Measured Stability (°C)
			1	2	3	4	5			
0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45	45	45	[illegible]	[illegible]	44.44	44.82	44.87	[illegible]	[illegible]	0.05
95.0	95.0	95.0	[illegible]	94.61	94.82	94.80	94.85	0.15	0.10	0.04
100.0	[illegible]	[illegible]	[illegible]	[illegible]	100.65	100.82	100.69	0.24	0.27	0.14

Remark: The uncertainty is not containing uniformity of the water bath.

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

The 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%.

- end -

CAL
Calibratech Co.,Ltd.
[illegible] No. 2, Bangkruai / Pak, Bangkruai, Pakkret, Nonthaburi 11120
Tel. [illegible]211 Fax. [illegible] e-mail: calibratech.co@yahoo.com, calibratech.co@hotmail.com

ilac-MRA
NSC-TISI-TIS 17025
CALIBRATION 0030

[illegible] Calibration

Certificate No. : 64-210396-1

Submitted by : Special Lab Equip And Consultant Co.,Ltd.
47 91 Moo 3, Tambol Tha-It, Pakkret, Nonthaburi 11120

Equipment : Weight
Manufacturer : LS Material : Stainless Steel
Weight size : 1 g
ID No. : LB-Eq-034
Assumed density of weight : 7950 kg / m^3
Assumed Air density : 1.2 kg / m^3

Environment : Ambient Temperature : (20 ± 2) °C
Relative Humidity : (50 ± 10) %
Air Pressure : 1007.7 mbar

Date of Received : 24 August 2021
Date of Calibration : 28 August 2021
Date of Issue : 28 August 2021
Calibrated by : Wunichai Swatphong
Calibration Method : In-house method CAL-M2101 based on OIML R 111-1 : 2004(E)
Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E2413-E2-25	[illegible]	27 Mar 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by

(Surachai Promthong)
Laboratory Manager

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

CAL
Calibratech Co.,Ltd.
[illegible] Moo 2, Sukhaphiban 5 Rd., Bangphue, Pakkret, Nonthaburi 11120
Tel. [illegible] 964-[illegible] Fax [illegible] 964-[illegible] e-mail: calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 64-210396-1

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

No.	Nominal Value	Id Mark	Conventional mass Value	Measuring Uncertainty
1	5	[illegible]	1 g +0.041 mg	± 0.023 mg

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%.

- oOo -

CAL
Calibratech Co.,Ltd.
[illegible] Moo 2, Suthiphanichakan 3 Rd., Bangrak, Pakkret, Nonthaburi 11120
Tel. [illegible] Fax. [illegible] e-mail: calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

ISO/IEC 17025
NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-210396-2

Submitted by : Special Lab Equip And Consultant Co.,Ltd.
47/91 Moo 3, Tambol Tha-It, Pakkret, Nonthaburi 11120

Equipment : Weight

Manufacturer : LS Material : Stainless Steel

Weight size : 100 g

ID No. : LB-Eq-035

Assumed density of weight : 7950 kg / m^3

Assumed Air density : 1.2 kg / m^3

Environment : Ambient Temperature : (20 ± 2) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1005.3 mbar

Date of Received : 24 August 2021

Date of Calibration : 26 August 2021

Date of Issue : 28 August 2021

Calibrated by : Wunnchai Swaiphong

Calibration Method : In-house method CAL-M2101 based on OIML R 111-1 : 2004(E)

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E2413-E2425	[illegible]	27 Mar 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by .

Surachai Promthong

Laboratory Manager

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

CAL
Calibratech Co.,Ltd.
[illegible] Soi Kamonsanti 1 Rd., Bangkhod Pakkret Nonthaburi 11120
Tel [illegible] 96-[illegible] Fax [illegible] e-mail calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 64-210396-2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

No	Nominal Value	Id Mark	Conventional mass Value	Measuring Uncertainty
1	100 g	none	100 g [illegible] mg	± [illegible] mg

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

The 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%

- oOo -

CAL
Calibratech Co.,Ltd.
[illegible] Bangkhud Pakkret Nonthaburi 11120
[illegible] 964-6211 Fax [illegible] email: calibratech.cal@yahoo.com calibratech.cal@hotmail.com

ISO-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-210396-3

Submitted by : Special Lab Equip And Consultant Co.,Ltd.
47-91 Moo 3, Tambol Tha-It, Pakkret, Nonthaburi 11120

Equipment : Weight
Manufacturer : LS Material : Stainless Steel
Weight size : 200 g
ID No. : LB-Eq-036
Assumed density of weight : 7950 kg / m^3
Assumed Air density : 1.2 kg / m^3

Environment : Ambient Temperature : (20 ± 2) °C
Relative Humidity : (50 ± 10) %
Air Pressure 1005.0 mbar

Date of Received : 24 August 2021
Date of Calibration : 28 August 2021
Date of Issue : 28 August 2021
Calibrated by : Wunichai Swatphong
Calibration Method : In-house method CAL-M2101 based on OIML R 111-1 : 2004(E)
Reference Standard Instruments : This certification is traceable to the International System of Units
Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E2419-E2425	[illegible]	27 Mar 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by :
(Suradhai Promthong)
Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

CAL
Calibratech Co.,Ltd.
[illegible]

Certificate of Calibration

Certificate No. : 04-210396-3

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

No	Nominal Value	Id.Mark	Conventional mass Value	Measuring Uncertainty
1	200 g	none	200 g +0.20 mg	± 0.17 mg

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%

- oOo -

CAL

Calibratech Co.,Ltd.

[illegible]

[illegible] Calibration

Certificate No. : 65-400224-1

Submitted by : Special Lab Equipment Consultant Co., Ltd.

27 Soi Moo 3, Tersaeng Thai-ut, Pakkret, Nonthaburi 11120

Equipment : Digital Thermometer with TC probe

Temperature Indicator

Manufacturer : Thermo Scientific Model : TEMP 10K

Range : -250 C to 1372 C Resolution : 0.1 C

Serial No. : [illegible] ID No. : LB-Eq-013

Environment : Ambient Temperature : (23 ± 2) C

Relative Humidity : (50 ± 15) %

Line Voltage (220 ± 22) VAC

Date of Received : 27 April 2022

Date of Calibration : 03 May 2022

Date of Issue : 03 May 2022

Calibrated by : Chonnip Sumonsiri

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4003 by compared with PRT in the liquid bath at the constant controlled temperature

The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
[illegible]	TT-[illegible]-21	07 Feb 2024	National Institute of Metrology Thailand (NIMT)
[illegible]	TT-[illegible]-2	[illegible] 2023	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
[illegible]	[illegible]	[illegible] 2023	National Institute of Metrology Thailand (NIMT)
[illegible]	[illegible]	[illegible] 2023	National Institute of Metrology Thailand (NIMT)

Approved by

Bunjerd Maen

Supervisor

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

CAL
Jibratech Co.,Ltd.

Certificate No. : 05-400224-1

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement with Thermocouple probe Type K

Model : Type K Sheath Material : Teflon
Diameter : 2 mm. Length : 1500 mm.
Serial No. : N/A ID No. : SL-39

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
150	[illegible]	[illegible]	[illegible]	0.18
50	[illegible]	[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]	[illegible]	0.45
10	[illegible]	[illegible]	[illegible]	0.58
2	[illegible]	[illegible]	[illegible]	0.65

Model : [illegible] Sheath Material : Stainless
Diameter : [illegible] mm. Length : [illegible] mm.
Serial No. : N/A ID No. : SL-40

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
120	[illegible]	[illegible]	[illegible]	[illegible]
120	[illegible]	[illegible]	[illegible]	[illegible]

Remark

UUC Unit Under Calibration

This result of calibration was found at the time 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 %.

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
COMPUTER SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
[illegible] FOUNDATION BUILDING [illegible] BANGNA (HO)
[illegible]

Cert.No.: 21CH1148
Page.: 1 of 3

Certificate of Calibration

Equipment :	pH Meter
Manufacturer :	Eutech
Model :	pH 700
Serial No. :	2858459
ID No. :	LB-Eq-027
Condition As-Received:	Used Item
Received Date :	23 August 2021
Calibration Date :	3 September 2021
Reference :	2108-0663WN-1
Submitted by :	Special Lab Envi And Consultant Co.,Ltd 47/91-93 Moo 3 Thambon Tha-it, Pakkret Nonthaburi 11120
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)
Calibrated by :	Saithip Meangmai
Approved by :	Approved Signatory

( ) Malee Butkruea
( ) Saithip Meangmai
( ) Werakorn Lerngaprakul

Issue Date : 9 September 2021

The Uncertainties are for a confidence probability of approximately 95%

Condition of this calibration result

1. Reference Standard Instrument : -

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	43160086	130RC092	21E1223/1	27 Apr 2022

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

- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	754028	28 June 2023
pH 6.866	CPA chem	679462	12 Mar 2022
pH 9.181	CPA chem	754031	20 July 2022

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

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,9)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (±)	Coverage factor k
pH Electrode S/N: 3034419	4.008	4.01	169.2	0.0071	2.00
	6.866	6.87	0.5	0.0082	2.00
	9.181	9.18	-134.9	0.013	2.00

Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4,7,9)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement	Coverage factor
	pH	mV	mV	pH	(±mV)	k
pH Meter S/N.: 2558459	0.00	414.12	414	0.02	0.58	2.00
	1.00	354.96	355	1.02	0.58	2.00
	2.00	295.80	296	2.02	0.58	2.00
	3.00	236.64	237	3.01	0.58	2.00
	4.00	177.48	177.4	4.01	0.058	2.00
	5.00	118.32	118.3	5.01	0.058	2.00
	6.00	59.16	59.1	6.00	0.058	2.00
	6.86	8.28	8.3	6.86	0.058	2.00
	7.00	0.00	0.0	7.00	0.058	2.00
	8.00	-59.16	-59.1	8.00	0.058	2.00
	9.00	-118.32	-118.3	9.00	0.058	2.00
	9.18	-128.97	-129.0	9.18	0.058	2.00
	10.00	-177.48	-177.5	10.00	0.058	2.00
	11.00	-236.64	-237	11.00	0.58	2.00
	12.00	-295.80	-296	12.00	0.58	2.00
	13.00	-354.96	-355	13.00	0.58	2.00
	14.00	-414.12	-414	14.00	0.58	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-

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
[illegible] HUAMAK, HUAMAK, HUAI KHWANG, BANGKOK [illegible]
TEL. [illegible] FAX. [illegible]

ISO-TICH TIS17025
CALIBRATION 00 05

Cert. No.: 21TM1547
Page.: 1 of 2

Certificate of Calibration

Equipment :	pH Meter with Sensor
Manufacturer :	Eutech
Model :	pH 700
Serial No. :	2858459
ID No. :	LB-Eq-027
Submitted by :	Special Lab Envi And Consultant Co.,Ltd. 47/91-93 Moo 3 Thambon Tha-it, Pakkret, Nonthaburi 11120
Location :	TPA Chemistry Calibration Laboratory
Received Order :	23 August 2021
Calibrated Date :	27 August 2021
Ambient Temperature :	(26 ± 10) °C
Relative Humidity :	(50 ± 30) %
AC Line Voltage :	(220 ± 22) V
Calibrated by :	Kunchit Promprat
Approved by :	Approved Signatory

( ) Pornchippa Tameyakul
( ) Malee Butkruea
( ) Suwit Imjai

Issue Date : 31 August 2021

The Uncertainties are for a confidence probability of approximately 95%

[illegible] Technology Services & Equipment Calibration and Testing Services

A 0031535

Equipment : pH Meter with Sensor

Condition As-Received : Used Item

Reference : 2108-0663WN-2

Cert. No.: 21TM1547

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.

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) Digital Thermometer	1523	2188080	20I1389	20 Nov 2021

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

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

Result of Calibration :- (*) Without Adjustment

Function : Temperature measurement.

This instrument was connected with temperature sensor, ID No.: SL-33/1

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (±°C)	Coverage Factor k
25.0	100	25.0	25.000	0.000	0.16	2.00

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 %.

-o0o-

a 1069519

CAL

Calibratech Co.,Ltd.

[illegible]

[illegible]

Certificate No. : 05-400213-3

Submitted by : Special Lab Equipment and Consultant Co., Ltd.

47/91 Moo 3 Thambol Tha-it Pakkret Nonthaburi 11120

Equipment : Air Chamber (Refrigerator)

Manufacturer : Frozen — Model : CC-250C

Range : N.A. °C — Resolution : 0.1 °C

Serial No. : 1081307016 — ID No. : LB-Eq-006

Environment : On site calibration was carried out at the Laboratory.

Special Lab Equipment and Consultant Co., Ltd.

Ambient Temperature : (29.5 to 30.8) °C

Relative Humidity : (54 to 60) %

Line Voltage : (226.0 to 226.5) V

Date of Received : 27 April 2022

Date of Calibration : 27 April 2022

Date of Issue : 30 April 2022

Calibrated by : Bunjerd Masri

Calibration Method : CAL-M-004, 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	05-400621-1	28 Jul 2022	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

CAL
Calibratech Co.,Ltd.

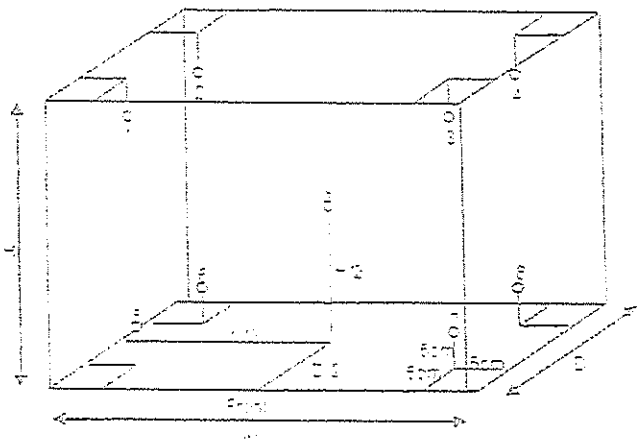
Certificate No. : 65-400213-3

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

The calibration was carried out based at position of (close)



Inside of Chamber

W = 1.10 m

D = 0.47 m

H = 1.48 m

Capacity = 0.71 m³

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	30	5.5	5.00	5.09	3.56	3.57	4.76	5.35	3.64	3.52	4.57	1.39

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
30	30	5.5	1.10	0.04	1.9

Remark: The uncertainty is not consider uniformity of the air chamber

The 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%.

- - 0o - -

Perkin

PinAAcle 900F
Preventive Maintenance Report

Company Name: SPECIAL LAB ENVI & CONSULTANT

Instrument Location: PAKKRET NONTHABURI 11120

Instrument Serial No.: PFBS17082303

Date: 03-Sep-2021

PinAAcle 900F Preventive Maintenance (PM)

Company Name:	SPECIAL LAB ENVI & CONSULTANT		
Address (Instrument Location):	PAKKRET NONTHABURI 11120		
Serial Number:	PFBS17082303	PM Number:	1 of 1
Customer Name (If applicable):	K. Phatiha	Telephone Number:	(092) 268-9054
Customer Support Engineer Name:	K. Weerayoot Keadpon	Service Order Number:	WO-00825451
Date PM Performed: (DD-MMM-YYYY)	03-Sep-2021	Next PM Due Date: (DD-MMM-YYYY)	03-Sep-2022
Standard Labor Hours to Complete PM :		5 hours	

Part Number	Release	Publication Date	
09870145 Rev.9	4	January 2018	PerkinElmer

Scope

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

The customer should save their method before the PM begins.

General Instructions:

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

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

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

Update the PM sticker and instrument logbook as required.

Component List

Component / Specific Model	Serial #	Configuration Notes

Parts Lists

Parts Included with the PM		
Part Number (If applicable)	Description	Quantity
B0501696	Fan Filters	1
N8160156	O-Ring Kits for Sampling Introduction (Stainless Steels Nebulizer)	N/A
N8100107	O-Ring Kits for Sampling Introduction (Plastic Nebulizer)	2
N8901724	Replacement Acetylene Filter Cartridge	1
TH001002	Replacement Air Filter Cartridge	2

Additional Reagents and Standards Required for PM				
Part Number (If applicable)	Description	Quality	Batch/Lot #	Expired Date (MM/YY)
N9300183	1000 mg/L Copper Standard	AR	25-200UY1	30-Jan-2022

Additional Reagents and Standards Required for PM (Customer Support Solution)				
Part Number (If applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A	DI Water	250 mL	AR	AR
N/A	0.5% HNO_3	250 mL	AR	AR

Additional Tools Required for PM			
Part Number (if applicable)	Description	Quantity	Serial #
N1013000	0.2A Neutral density filter	1	5503530856
N1013002	1.0A Neutral density filter	1	5503555491
03030997	System 2 EDL Driver	1	03030997
N3050605	As System 2 EDL	1	16148
N3050123	Cu Lumina HCL	1	021913-020070
N3050109	Ba Lumina HCL	1	102416-040160
N3050139	K Lumina HCL	1	110716-010060
N3050150	Ni Lumina HCL	1	100516-030190

Procedure Checklist

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

1. General:

   - ☐ Review the instrument performance with the customer and document any recent problems.
   - ☐ Inspect the customer log book and make any appropriate PM entries.
   - ☐ Perform general inspection of system for cleanliness.

2. PC Instrument Software:

   - ☐ Instrument Software user files/databases archived, packed, and/or deleted as needed.

3. Mechanical:

   - ☐ Inspect and clean all fans and filters. Replace filters if necessary
   - ☐ Inspect all gas lines for leaks and/or wear. Replace if needed.
   - ☐ Clean exterior of the instrument.
   - ☐ Inspect the burner head, burner chamber, and nebulizer. Clean if needed as stated in the Hardware Guide.
   - ☐ Check burner head dimensions with the feeler gauge as stated in the Hardware Guide in the Maintenance chapter section on cleaning the burner head and checking sloth width. Replace if out of specification
   - ☐ Check the condition of the end cap, burner head, and nebulizer O-rings. Replace if necessary.
   - ☐ Check the drain system for signs of wear. Replace worn or damaged parts.
   - ☐ Visually check for proper flame conditions when igniting the Air-C2H2 and N2O-C2H2 flames (if applicable).

4. Electrical:

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

5. Optics:

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

6. Gasses:

   - ☐ Verify that the Gasses supplied to the Instrument are within the pressure and purity specifications found in the PinAAcle 900 Series Pre-installation Checklist SDB.
   - ☐ Verify that the acetylene filter and air filter element is dry. Replace if necessary.

7. Flame Interlock Check:

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

Parameter	Specification	Test Results	Pass/Fail
Flame Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
Drain Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
Nebulizer Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
C_2H_2 Pressure Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
Air Pressure Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Passed
Burner Head Sensor	Choosing Nitrous Oxide as the oxidant should trigger an interlock shuts down	Active	Passed

8. After PM Performance tests:

8.1 Detector Linearity with Barium

Description: Ensures that the detector is linear in the Visible Range.

Parameter	Specification	Certificate Value at 553.6 nm (Abs.)	Test Results	Pass/Fail
1.0 A ND Filter	± 5% from Cert.	0.9798	0.9766	Passed
0.2 A ND Filter	± 5% from Cert.	0.2042	0.1989	Passed

8.2 Baseline Noise at 1.0 Absorbance with Barium

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

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0015	Passed

8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.001	0.0002	Passed

8.4 D_2 Background Compensation with Copper

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

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0079	Passed

8.5 AA-BG Baseline Noise with Copper

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

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

8.6 AA-BG Baseline Noise with Arsenic

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

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0011	Passed

8.7 Flame Sensitivity

Description: Instrument Sensitivity checked against Copper standard.

Standard Copper Sensitivity	Specification	Results (Abs.)	Pass/Fail
5 mg/L Sensitivity SS Neb (if applicable)	> 0.250 Abs.	NA	Not Applicable
2 mg/L Sensitivity HS Neb (if applicable)	> 0.250 Abs.	0.3221	Passed

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

Additional Comments

Additional Comments Regarding the PM

Review

The preventive maintenance checks and if applicable performance tests for PinAAcle 900F have been completed. *This PinAAcle 900F Passes ☑ Fails ☐ the preventive maintenance.*	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative:	Date: 08-Sep-2021 (DD-MMM-YYYY)
Authorized Customer Representative:	Date: (DD-MMM-YYYY)

CAL

Calibratech Co.,Ltd.

[illegible]

[illegible]

Certificate No. : 65-200126-1

Submitted by : Special Lab Equip and Consultant Co., Ltd.

[illegible] Moo 5, Tambol Tha-It, Pakkret, Nonthaburi 11120

Equipment : Electronic Balance

Manufacturer : A&D Model : GR-200

Serial No. : 14245322 ID No. : LB-Eg-016

Capacity : 210 g Resolution : 0.0001 g

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

Ambient Temperature : (26.8 to 27.0) °C

Relative Humidity : (53.6 to 55.7) %

Air Pressure : mbar

Date of Received : 27 April 2022

Date of Calibration : 27 April 2022

Date of Issue : 13 May 2022

Calibrated by : Chanadath Thongchai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref. LAB 14 Edition 5, July 2015

Reference Standard Instruments : [illegible] verification is traceable to the International System of Units

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
52mi-ED-04	[illegible]	[illegible] 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by :

Sutachai Promtong

Laboratory Manager

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

CAL
Calibratech Co.,Ltd.
[illegible]

Certificate No. : 65-200126-1

Result of Calibration : [illegible] without Adjustment

UUT Condition As-Received : [illegible]

Departure of indication from nominal value

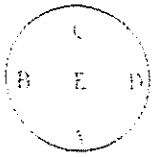
Nominal Value (g)	Correction (g)	Uncertainty ± (g)
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

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

The reported uncertainty of measurement is based on a standard uncertainty multiplied by a coverage factor k = [illegible], providing a level of confidence of approximately [illegible] 95%.

Eccentric error: Load test [illegible] g

A [illegible] B [illegible] C [illegible] D [illegible] E [illegible] g



Repeatability: Load test [illegible] g

Sigma [illegible] g

- [illegible] -

CAL

Calibratech Co.,Ltd.

[illegible]

ISO-TISI-TIS17025 CALIBRATION LOGO

[illegible] of Calibration

Certificate No. : 65-400213-1

Submitted by : Special Lab Equip and Consultant Co., Ltd.

47/91 Moo 2 Tambol Tha-it, Pakkret, Nonthaburi 11120

Equipment : Air Chamber (Incubator)

Manufacturer : Lovibond — Model : FKU 1800

Range : [illegible] C — Resolution : 0.1 C

Serial No. : 1925481-19 — ID No : LB-Eq-005

Environment : On site calibration was carried out at the Laboratory.

Special Lab Equip and Consultant Co., Ltd.

Ambient Temperature : (29.0 to 30.0) C

Relative Humidity : (45 to 50) %

Line Voltage (226.0 to 226.5) V

Date of Received : 27 April 2022

Date of Calibration : 27 April 2022

Date of Issue : 30 April 2022

Calibrated by : Pennpon Chantra

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 Thermocouple probe

ID No.	Cert. No.	Due Date	Traceability
400029 & 400030	64-400587-1	23 May 2022	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

CAL

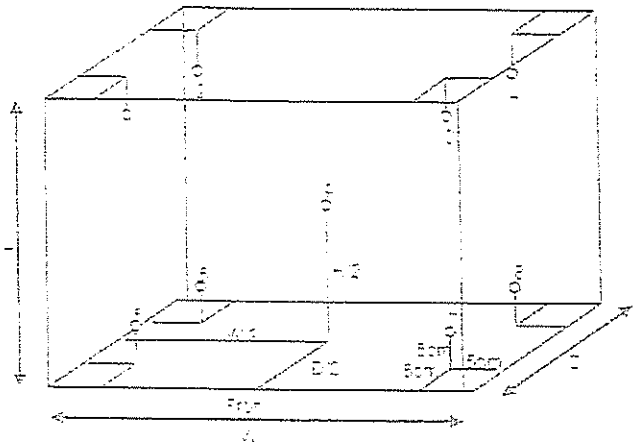
Calibratech Co.,Ltd.

Certificate No. : 65-400213-1

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Inside of Chamber

W = 0.55 m

D = 0.73 m

H = 0.50 m

Capacity = 0.20 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty
			1	2	3	4	5	6	7	8	9	(± °C)
30.0	30.0	30.0	30.0	29.8	30.1	30.0	29.9	29.9	30.1	30.1	30.0	0.55
35.0	35.0	35.0	34.9	34.8	35.0	35.1	35.0	35.0	35.1	35.1	35.0	0.54
37.0	37.0	37.0	36.7	36.7	36.9	36.9	36.9	36.9	37.0	37.0	37.0	0.55

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
30.0	30.0	30.0	0.3	0.1	0.5
35.0	35.0	35.0	0.3	0.1	0.5
37.0	37.0	37.0	0.4	0.1	0.5

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%.

-oOo-

BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY
300 Phaholyothin Road, Phayathai, Bangkok 10400, Thailand Tel: +66 2615-2929 Fax: +66 2615-2950-1
E-mail: bbk@becthai.com Website: www.becthai.com

Certificate No. CAL-22-384

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 Talt , Amphur Pakkad
	:	Nonthaburi, 11120
Location	:	Becthai Laboratory
Date of Receipt		5 May 2022
Date of Calibration		5 May 2022
Date of Issue		5 May 2022
Ambient Temperature		(25±10) °C
Relative Humidity		(60±20) %
Condition As-Received		Used item

Calibrated by

(Mr. Somphop Duangnguan)
Calibration Engineer

Approved by

(Ms. Jintana Sangthaijaroenlap)
Calibration Manager

The reported expanded uncertainty of measurement was based on a combined standard uncertainty multiplied by a coverage factor k = 2 [illegible] confidence level, 95%.

This certificate may not be reproduced [illegible] except with the prior written approval of the Head of Calibration Laboratory.

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

BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY
300 Phaholyothin Road, Phayathai, Bangkok 10400, Thailand Tel: +66 2615-2929 Fax: +66 2615-2550-1
E-mail: bldl@bectha.com Website: www.bectha.com

Certificate No. CAL-22-264

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	24563	90313	3 Mar 23
Didymium Glass Filter	RM-DG	24562	90311	3 Mar 23
Neutral Density Filter	RM-NL2(5%)	24568	90324	3 Mar 23

2. Traceability: This certification is traceable to the International System of Units maintained at The Standard Identification Authorized Calibration Laboratory No. 0659

3. Method of calibration

The calibration procedure was carried out according to the Guide to CPM-CAL-02 based on ASTM E275-08 (2013) and ASTM E925-13 (2018)

4. Result of calibration

	Without adjustment	After adjustment

5. Equipment Specifications

Spectral Bandwidth	5	nm
Data Interval	1	nm
Scan Speed	N/A	nm/min

BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY
300 Phaholyothin Road, Phayathai, Bangkok 10400, Thailand Tel: +66 2615-2929 Fax: +66 2615-2930-1
E-mail: bbl@becthai.com Website: www.becthai.com

Certificate No. : CAL-22-234

CALIBRATION REPORT

Wavelength Calibration

Certified Values of Reference Material (nm)	Nominal Value (nm)	UUC* Reading (nm)	Error (nm)	Uncertainty of Measurement (± nm)
416.40	416	416	0.50	0.59
537.00	537	537	1.00	0.59
636.00	636	636	0.00	0.59

Photometric Calibration for Visible

Wavelength (nm)	Certified Values of Reference Material (A)	UUC* Reading (A)	Error (A)	Uncertainty of Measurement (± A)
440.1	Zero	0.000	0.0000	0.0028
	0.5624	0.563	0.0006	0.0044
	0.7365	0.735	-0.0006	0.0040
	0.9577	0.956	-0.0017	0.0040
465.0	Zero	0.000	0.0000	0.0028
	0.5669	0.566	0.0001	0.0042
	0.7126	0.710	-0.0026	0.0037
	[illegible]	[illegible]	-0.0022	0.0037
555.0	Zero	0.000	0.0001	0.0028
	0.5256	0.527	0.0014	0.0044
	0.6735	0.670	-0.0035	0.0035
	0.9862	0.986	-0.0002	0.0034
546.1 546.0	Zero	0.000	0.0000	0.0028
	0.5038	0.504	0.0004	0.0035
	0.6962	0.695	-0.0002	0.0031
	0.9913	0.994	0.0027	0.0032
590.1	Zero	0.000	0.0000	0.0028
	0.5678	0.569	0.0012	0.0036
	0.7523	0.752	-0.0003	0.0031
	1.0757	1.076	0.0003	0.0032
635.0	Zero	0.000	0.0000	0.0028
	0.5665	0.565	0.0025	0.0038
	0.7352	0.734	0.0019	0.0037
	1.1464	1.147	0.0016	0.0031

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

Note

UUC* : Unit Under Calibration

- End of Report -