

ภาคผนวกที่ 5

เอกสารสอบเทียบความถูกต้องของเครื่องมือ

เอกสาร 5-1 เอกสารสอบเทียบเครื่องมือการตรวจวิเคราะห์คุณภาพน้ำผิวดิน

เอกสารที่ 5-1

เอกสารสอบเทียบเครื่องมือการตรวจวิเคราะห์คุณภาพน้ำผิวดิน



CERTIFICATE No : 22T0572
REFERENCE No : 63773-4

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : LIQUID IN GLASS THERMOMETER
MANUFACTURER : PRECISION
MODEL : -10 °C TO 250 °C
SERIAL No : 33696
ID No : TM 24/59
RESOLUTION : 1 °C
TYPE : TOTAL IMMERSION
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : CHARUKIT L.
CALIBRATION DATE : 24-Jan-22
APPROVED BY : [REDACTED]
ISSUED DATE : 24-Jan-22
RECEIVED DATE : 19-Jan-22

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.



CERTIFICATE No : 22T0572

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : LIQUID IN GLASS THERMOMETER
MANUFACTURER : PRECISION
MODEL : -10 °C TO 250 °C
ID No : TM 24/59
RESOLUTION : 1 °C
RECEIVED DATE : 19-Jan-22
AMBIENT TEMPERATURE : 23 °C ± 3 °C
SERIAL NUMBER : 33696
TYPE : TOTAL IMMERSION
CALIBRATION DATE : 24-Jan-22
RELATIVE HUMIDITY : 50 %RH ± 20 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

- THIS INSTRUMENT WAS CALIBRATED BASED ON ASTM E77:1992 BY COMPARISON WITH STANDARD PLATINUM RESISTANCE THERMOMETER (SPRT) INTO LIQUID BATH TEMPERATURE CONTROLLER. THE TEMPERATURE SCALE USED WAS BASED ON ITS-90.
- REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) STANDARD THERMOMETER	1502	77964	21T3033	08-Mar-22
2) SPRT PROBE	5614	636626	21T3033	08-Mar-22
3) PRECISION BATH	7320	A21105	21T12433	16-Dec-22
- THIS RESULT WAS FOUND ACCURATE AS SHOWN ON DATE AND PLACE OF CALIBRATION ONLY.
- THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
- THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND).

RESULT OF CALIBRATION : WITHOUT ADJUSTMENT

STANDARD READING (°C)	UUC* READING (°C)	IMMERSION DEPTH (mm)	CORRECTION (°C)	EMERGENT STEM TEMPERATURE (°C)	UNCERTAINTY OF MEASUREMENT (±°C)
112.023	115.0	150	-2.977	N/A	0.15
117.407	121.0	156	-3.593	N/A	0.15

UUC* : UNIT UNDER CALIBRATION

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



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



Cert.No.: 22CH140
Page.: 1 of 2

Certificate of Calibration

Equipment : Conductivity Meter
Manufacturer : Mettler Toledo
Model : SevenCompact
Serial No. : C141708983
ID No. : -
Condition As-Received: Used Item
Received Date : 31 January 2022
Calibration Date : 02 February 2022
Reference : 2201-0954WSC-1
Submitted by : S.P.S. Consulting Service Co.,Ltd.
7 Soi Phahonyothin 24, Phahonyothin Rd.,
Chom Phon, Chatuchak, Bangkok 10900
Ambient Temperature : $(25 \pm 2.5) ^\circ\text{C}$
Relative Humidity : $(50 \pm 15) \%$
Calibration Procedure: In-house method :
- CP-CH6 : based on direct measurement by
using certified reference material (CRM)

Calibrated by : Warakorn Lernagatrakul

Approved by :

Approved Signatory

- (☒) Malee Butkruea
(☐) Saithip Meangmai
(☐) Warakorn Lernagatrakul

Issue Date : 10 February 2022

The Uncertainties are for a confidence probability of approximately 95%

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



Cert.No.: 22CH140

Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instrument :-

Instrument	Serial No.	ID No.	Certificate No.	Due date
1) Thermometer	1963878	130RC095	211977	17 Sep 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 :-

- Conductivity calibration solution, CPA chem Ltd., The measurement results are traceable to SI
through CPA chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Conductivity Solution	Manufacturer	Lot No.	Exp. date
147.0 $\mu\text{S/cm}$	CPA Chem	761020	02 Aug 2022
1413.0 $\mu\text{S/cm}$	CPA Chem	761021	02 Aug 2022
12.880 mS/cm	CPA Chem	761022	02 Aug 2022
111.3 mS/cm	CPA Chem	768164	12 Sep 2022

- Control Conductivity calibration solution temperature by Water bath $(25 \pm 0.1) ^\circ\text{C}$

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

Calibration results

Function : Conductivity Measurement

(*) After Adjustment at 0.147, 1.413, 12.880, 111.3 mS/cm
Conductivity Electrode Serial No.: 5821320179

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement (\pm)	Coverage factor k
147.0 $\mu\text{S/cm}$	148.1 $\mu\text{S/cm}$	147.0 $\mu\text{S/cm}$	0.99 $\mu\text{S/cm}$	2.00
1413.0 $\mu\text{S/cm}$	1413 $\mu\text{S/cm}$	1413 $\mu\text{S/cm}$	9.2 $\mu\text{S/cm}$	2.00
12.880 mS/cm	12.61 mS/cm	12.88 mS/cm	0.086 mS/cm	2.00
111.3 mS/cm	105.7 mS/cm	111.4 mS/cm	0.76 mS/cm	2.00

Remark

- UUC* = Unit Under Calibration
- 147.0 $\mu\text{S/cm}$ Adjustment Cell constant = 0.550585 cm^{-1}
- 1413.0 $\mu\text{S/cm}$ Adjustment Cell constant = 0.554585 cm^{-1}
- 12.880 mS/cm Adjustment Cell constant = 0.562585 cm^{-1}
- 111.3 mS/cm Adjustment Cell constant = 0.578585 cm^{-1}

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

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a 1093760



CERT NO.: C22/0066B

PAGE : 1 OF 3

ISOCAL TECHNOLOGY CO.,LTD.
INDUSTRIAL INSTRUMENT CALIBRATION CENTER

170/405 Moo 3 Serithai Rd., Kannayao Kannayao Bangkok 10230

Tel. 0-2906-3040-1 Fax. 0-2919-9948

Certificate of Calibration

EQUIPMENT : PH METER
MODEL : HI98190
SERIAL NO. : 04260035101
ID NO. : B01
MANUFACTURER : HANNA
MADE IN : ROMANIA
SUBMITTED BY : S.P.S. CONSULTING SERVICE CO.,LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,JOMPOL,
CHATUCHAK , BANGKOK
AMBIENT TEMPERATURE : (23 ± 2) °C
RELATIVE HUMIDITY : (50 ± 15) %
CALIBRATED BY: WATCHARA INCHADEE
TECHNICIAN
APPROVED BY :
NARONG THEERARONG
ISSUE DATE : 23-Mar-2022

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL, EXCEPT WITH THE PRIOR
WRITTEN APPROVAL OF THE HEAD OF THE INDUSTRIAL INSTRUMENTS CALIBRATION CENTER.

**ISOCAL TECHNOLOGY CO., LTD.**

CERT NO.: C22/0066B

CALIBRATION REPORT

PAGE : 2 OF 3

EQUIPMENT : PH METER
MANUFACTURER : HANNA
MODEL : HI98190
SERIAL NO. : 04260035101
ID NO. : B01
CALIBRATION DATE : 19-Mar-2022
RECEIVED DATE : 17-Mar-2022
PROCEDURE USED :

CALIBRATION WERE CONDUCTED USING IN-HOUSE CALIBRATION PROCEDURE WI-18-22 ACCORDING TO
COMPARISON WITH PH SOLUTION STANDARD.

CONDITION OF THIS RESULT OF CALIBRATION

1. THIS RESULT OF CALIBRATION WAS FOUND ACCURATE AS SHOWN ON DATE AND PLACE OF CALIBRATION ONLY.
2. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL OF THIS RESULT OF CALIBRATION.
3. REFERENCE STANDARDS INSTRUMENTS :-

PH SOLUTION MODEL PH 4.01 SERIAL NO. 1.09435.1000 CERT. NO HC02910835 DATE 24-APR-2022
- NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY(NIST), U.S.A
-PHYSIKALISCH-TECHNISCHE BUNDESANSTALT (PTB),GERMANY.
THROUGH SUPELCO CO., LTD.

PH SOLUTION MODEL PH 7.01 SERIAL NO. 1.09439.1000 CERT. NO HC02387439 DUE DATE 18-APR-2022
- NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY(NIST), U.S.A
-PHYSIKALISCH-TECHNISCHE BUNDESANSTALT (PTB),GERMANY.
THROUGH SUPELCO CO., LTD.

PH SOLUTION MODEL PH 10.01 SERIAL NO. 1.09438.1000 CERT. NO HC01501438 DUE DATE 27-MAR-2022
- NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY(NIST), U.S.A
-PHYSIKALISCH-TECHNISCHE BUNDESANSTALT (PTB),GERMANY.
THROUGH SUPELCO CO., LTD.



ISOCAL TECHNOLOGY CO., LTD.

CALIBRATION REPORT

CERT.NO.: C22/0066B

PAGE : 3 OF 3

RESULT OF CALIBRATION: ADJUSTMENT (YES)

FUNCTION: PH MEASUREMENT WITH SOLUTION @ 25 °C

SCALE RANGE : 4.01 pH TO 10.01 pH

RESOLUTION: 0.01 pH

STANDARD VALUE (pH)	UUC READING (pH)	ERROR (pH)	UNCERTAINTY (pH)
4.01	3.97	-0.04	0.012
7.01	7.03	0.02	0.012
10.01	10.04	0.03	0.012

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE OF APPROXIMATELY 95%

UUC = UNIT UNDER CALIBRATE

- oOo -

**QUALITY CALIBRATION CO.,LTD.**

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.com

CERTIFICATE No : 22M2568

REFERENCE No : 64386-2

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE

MANUFACTURER : SARTORIUS

MODEL : BSA224S-CW

SERIAL No : 36591842

ID No : BA 08/61

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : TETNITHI W.

CALIBRATION DATE : 11-Mar-22

APPROVED BY :

ISSUED DATE : 17-Mar-22

RECEIVED DATE : 11-Mar-22

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.

F-G010 REV 02

**QUALITY CALIBRATION CO.,LTD.**

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.com

CERTIFICATE No : 22M2568

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : BSA224S-CW

MANUFACTURER : SARTORIUS S/N : 36591842

ID No : BA 08/61 RECEIVED DATE : 11-Mar-22

AIR PRESSURE : 1008mbar \pm 1mbar CALIBRATION DATE : 11-Mar-22

AMBIENT TEMPERATURE : 22°C \pm 1°C RELATIVE HUMIDITY : 51%RH \pm 10% RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS ADJUSTED USING WEIGHT OF QUALITY CALIBRATION TO ADJUST. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) STANDARD WEIGHT SET	E2	QK-I-151	C02210415	09-Feb-23

3. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON DATE AND PLACE OF CALIBRATION ONLY.

4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH CENTRAL BUREAU OF WEIGHTS&MEASURES

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

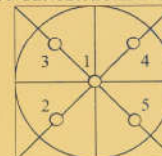
1. ZERO SETTING FUNCTION : NORMAL

2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 200 g WAS 0.000048 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.00	0.0000	0.0000	0.000078
0.10	0.1000	0.0000	0.000078
0.20	0.2000	0.0000	0.000078
0.50	0.5000	0.0000	0.000079
1.00	1.0000	0.0000	0.000079
2.00	2.0000	0.0000	0.000080
5.00	5.0000	0.0000	0.000081
10.00	10.0000	0.0000	0.000084
20.00	20.0000	0.0000	0.000089
50.00	50.0000	0.0000	0.00011
100.00	100.0000	0.0000	0.00019
200.00	199.9999	0.0001	0.00032

5. OFF CENTER LOADING ERROR

POINT	READING (g)
1	99.9999
2	100.0000
3	99.9999
4	100.0000
5	100.0000
OFF-CENTER LOADING	0.0001

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT PRODUCTION AREA
THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT

F-G010 REV 02



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

214 Bangwaek Rd. Bangpai Bangkae Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 http://www.mit.in.th



CALIBRATION CERTIFICATE

Certificate No. : SS2110-013-0003

Date Issued : 04-Oct-21

Customer & Calibrated Place : S.P.S. CONSULTING SERVICE CO., LTD.
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment : Incubator
Manufacturer : BINDER
Model : BD 115
Serial No. : 12-16967
ID No./Tag No. : IN 05/56
Date Received : 01-Oct-21
Date Calibrated : 01-Oct-21
Calibrated by : Mr. Jame Khaothong

Calibration Method or Calibration Procedure Used

Standard method : CP-05 TLAS G-20.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.

Approved by :

(Mr. Nathapong Krudaum)



Certificate No. : SS2110-013-0003

Environment : Ambient Temperature : Start record 26.0 °C, Stop record 25.7 °C
Relative Humidity : Start record 56.5 %RH, Stop record 55.7 %RH

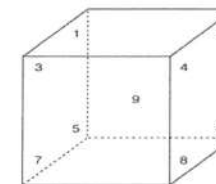
Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
35	35.0	35.0	0.12	0.40	0.45
41.5	41.5	41.5	0.11	0.39	0.51

Without adjustment

Calibration Temperature (°C)	STD No. 1 (°C)	STD No. 2 (°C)	STD No. 3 (°C)	STD No. 4 (°C)	STD No. 5 (°C)	STD No. 6 (°C)	STD No. 7 (°C)	STD No. 8 (°C)	STD No. 9 (°C)	Uncertainty ⁴ ±°C
35	35.01	35.11	34.95	35.00	34.99	34.95	35.07	35.07	35.23	0.23
41.5	41.47	41.47	41.40	41.49	41.37	41.33	41.43	41.51	41.62	0.22

Note : Probe No. 9 is Reference Probe

Setting Air Fresh No. 0



Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. AD2107-034-0001 for Digital Thermometer with Probe (Agilent) Module 1 (245) Serial No. US37005130, Due 04-Feb-22

- Notes :
- The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
 - The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.
 - Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
 - The uncertainty of measurement is included temperature stability.
 - The temperature uniformity, stability, overall variation and indicating temperature is applicable to all air or gas filled temperature controlled enclosures at atmospheric pressure.

End of Certificate



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.: 22TW98
Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : 5000-230V
Serial No. : 15B100751
ID No. : -
Received Date : 20 April 2022
Test Date : 21 April 2022
Reference : 2204-0429WC-1
Submitted by : S.P.S. Consulting Service Co.,Ltd.
7 Phaholyothin 24, Phaholyothin Road.,
Jompol, Chatuchak, Bangkok 10900
Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In - house method : CP-CH9
by Comparison Technique with Azide Modification Method
Tested by : Walalak Sirithean
Approved by : 
(/) Malee Butkruea
() Saithip Meangmai
() Warakorn Lerngagtrakul
Issue Date : 25 April 2022

B 0286555



Cert.No.: 22TW98
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

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

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1) Burette	-	130BU10	21CG1389	25 Mar 2023
2) Balance	1126143764	140RC004	21MM430	21 Sep 2022

2. Standard Material :-

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

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: 14J100195

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.12	8.14	0.0084

This report was certified only for the instrument we tested. It is allowable to use for study the system efficiency. The environmental impact control and present to organization it may concerned. 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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a 1105753



WO-01513756/2022

MAINTENANCE AND TEST CERTIFICATE MODEL
OPTIMA 5300DV

Customer :	<u>S.P.S.Consulting Service Co.,Ltd</u>	Date Tested:	<u>January 12, 2022</u>
		Recommendation Recertification	
Address :	<u>7 Soi Phaholyothin 24</u>	Period	<u>6</u> Months
	<u>Paholyothin Road</u>	Recertification Due:	<u>July 12, 2022</u>
	<u>Jompol Chatuchak, Bangkok 1090</u>	Date Last Certified:	<u>July 14, 2021</u>
User Name:	<u>K.Phenpha Vipasthawat</u>	Visit Number:	<u>2 of 2</u>
Phone:	<u>083-9269252</u>	PerkinElmer Phone:	<u>02-719-6420 ext 206</u>
Fax:	<u>02-513-4221</u>	PerkinElmer Fax:	<u>02-318-5597</u>

CONFIGURATION TESTED		ACCESSORIES/COMPONENT NOT INCLUDED
MODEL	SERIAL NUMBER	
<u>OPTIMA 5300DV</u>	<u>077C7042401</u>	
TESTED EQUIPMENT	CALIBRATION NUMBER	EXPIRATION
<u>IPV Methods</u>		
TEST STANDARD USED	PART NUMBER	EXPIRATION DATE
<u>Multielement Standard</u>	<u>N069-1579</u>	<u>August 30, 2022</u>
<u>Wavecal Solution</u>	<u>N058-2152</u>	<u>January 30, 2022</u>
<u>VIS Wavecal solution</u>	<u>N930-2946</u>	<u>June 30, 2022</u>
<u>Instrument Cal. STD4</u>	<u>N930-0221</u>	<u>August 30, 2022</u>
CUSTOMER SUPPLIED	COMMENTS	CUSTOMER INITIALS
<u>2 % HNO3</u>		
<u>10 % HNO3</u>		

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WO-01513756/2022

MAINTENANCE AND TEST CERTIFICATE MODEL
OPTIMA 5300DV

SERIAL NUMBER	<u>077C7042401</u>	DATE TESTED	<u>January 12, 2022</u>
1. MECHANICAL CHECKS			
A. Inspect and clean all fans and filters.			<input type="checkbox"/>
B. Inspect and replace as necessary, all torch components including the RF coil.			<input type="checkbox"/>
C. Inspect all tubing for sign of clacking or leaking.			<input type="checkbox"/>
D. Adjust water and gas pressure regulator settings.			<input type="checkbox"/>
E. Inspect and leak check pneumatics drawers.			<input type="checkbox"/>
F. Clean the exterior of the instrument.			<input type="checkbox"/>
2. OPTICAL CHECKS			
A. Inspect and clean all optical components.			<input type="checkbox"/>
B. As required, check and replace all purgefilters.			<input type="checkbox"/>
C. Recheck optical alignment.			<input type="checkbox"/>
3. COOLING SYSTEM CHECKS			
A. Perform preventive maintenance on chiller.			<input type="checkbox"/>
B. Flush out the chiller every year.			<input type="checkbox"/>
4. PERFORMANCE CHECKS			
A. Torch View Alignment.			<input type="checkbox"/>
B. Wavelength Calibration.			<input type="checkbox"/>

Page 2 of 4



MAINTENANCE AND TEST CERTIFICATE MODEL
OPTIMA 5300DV

SERIAL NUMBER : 077C7042401		DATE TESTED : January 12, 2022	
PARAMETER	SPECIFICATION		FINAL VALUE
Spectral Resolution : UV	As 193.696 nm	≤ 0.007	0.00554
	Ni 231.604 nm	≤ 0.008	0.00725
	Ni 341.476 nm	≤ 0.012	0.00752
Spectral Resolution : VIS	La 408.672 nm	≤ 0.020	0.01616
	Ba 455.403 nm	≤ 0.025	0.02416
Precision			
	As 193.656 nm	% RSD < 1.0	0.34 %
	Zn 213.856 nm	% RSD < 1.0	0.27 %
	Mn 257.610 nm	% RSD < 1.0	0.41 %
	La 379.478 nm	% RSD < 1.0	0.57 %
	Ba 455.403 nm	% RSD < 1.0	0.33 %
	Ba 493.408 nm	% RSD < 1.0	0.26 %
Detection Limits : Axial	Tl 190.080 nm	3(sd)	5.51 ppb
	As 193.696 nm	3(sd)	8.59 ppb
	Pb 220.353 nm	3(sd)	0.50 ppb
Detection Limits : Radial	As 193.696 nm	3(sd)	21.00 ppb
	Zn 213.856 nm	3(sd)	0.32 ppb
	Mn 257.610 nm	3(sd)	0.18 ppb
	La 379.478 nm	3(sd)	0.44 ppb
	Ba 455.403 nm	3(sd)	0.17 ppb
	Ba 493.408 nm	3(sd)	0.12 ppb
BEC : Axial (IB X 500)/(IS-IB)	Cd 226.502 nm	≤ 150 ppb	12.46
BEC : Radial (IB X 1000)/(IS-IB)	Mn 257.610 nm	≤ 45 ppb	30.82



MAINTENANCE AND TEST CERTIFICATE MODEL
OPTIMA 5300DV

SERIAL NUMBER	077C7042401	DATE TESTED	January 12, 2022
Remarks :	Commissioning follow as commissioning performance sheets. 		
This is to certify that the above tests have been performed and the configuration tested <div style="display: flex; align-items: center;"> <input checked="" type="checkbox"/> meets <input type="checkbox"/> does not meet </div>			
the PerkinElmer Specifications listed on this certificate.			
This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.			
Service Department PerkinElmer Ltd.			
Authorized Representative:	<div style="background-color: black; width: 100px; height: 20px; margin: 0 auto;"></div> <div style="display: flex; justify-content: center; align-items: center;"> (<div style="text-align: center;"> Mr. Wiphan Promlunda Service Engineer </div>) </div>		