

ภาคผนวก จ

สำเนาเอกสารรับรองเครื่องมือการตรวจวัด



Certificate of Calibration

Certificate No. : 67-420106-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wistekukhakon 25, Pracha-Utd Rd., Thungkru Bangkok 10140 Thailand

Equipment :

pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

Range : N/A

Resolution : 0.01 pH

Serial No. : 2884323

ID No. : N/A

Electrode

Model : ECFC7252101B

Serial No. : 01X099320

Environment : On site calibration was carried out at the Laboratory, M Green Group Co., Ltd.

Ambient Temperature : (26.3 to 26.7)°C

Relative Humidity : (40 to 45) %

Date of Received : 20 September 2024

Date of Calibration : 20 September 2024

Date of Issue : 21 September 2024

Calibrated by : Permpon Champu

Calibration Method : In-house method CAL-M4201 direct measurement by using standard voltage calibrator and using certified reference material (CRM)

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

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00307/66	23 Aug 2025	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.008	61293328	1027612	15 Sep 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.987	61297593	1027614	15 Sep 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61306165	1027613	15 Sep 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :

(Permpon Champu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-420106-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (± mV)
			(pH)	(mV)		
4, 7, 10	177.4800	4	4.00	177.5	0.0	0.12
	0.0000	7	7.00	0.0	0.0	0.086
	-177.4800	10	10.00	-177.4	-0.1	0.12

Function : pH meter with electrode

Performing a three - buffer standard curve using buffer nominal pH (4,7,10)

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.008	4.01	0.00	0.0097
	6.987	7.00	-0.01	0.011
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. : 67-400547-1

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisatsukhakhon 25, Pracha-Ud Rd., Thungkru Bangkok 10140 Thailand

Equipment : Temperature Indicator with Thermistor Probe

Temperature Indicator

Manufacturer : Eutech
Range : N/A °C
Serial No. : 2884323
Thermistor probe
Model : N/A
Resolution : 0.1 °C
ID No. : N/ADiameter : 3 mm.
Serial No. : PH5TEMB01P 279
ID No. : N/A
Sheath Material : Stainless
Length : 115 mm.

Environment : On site calibration was carried out at the Laboratory, M Green Group Co., Ltd.

Ambient Temperature : (26.3 to 26.7) °C
Relative Humidity : (40 to 45) %
Line Voltage : (220.0 to 223.0) VACDate of Received : 20 September 2024
Date of Calibration : 20 September 2024
Date of Issue : 21 September 2024
Calibrated by : Permpon Chumpu

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 :

This certification is traceable to the International System of Units

1. Platinum Resistance Thermometer (PRT)

ID No. Cert. No. Due Date Traceability
400002 TT-0095-24 01 Jul 2026 National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No. Cert. No. Due Date Traceability
400033 24E633 21 Feb 2026 National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chumpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-400547-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
130	25.004	24.9	0.1	0.19

Remarks

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. : 67-200334-1 Page : 1 of 2

Submitted by : M Green Group Co., Ltd.
188/46 Wisutesukrakhon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 ThailandEquipment : Electronic Balance
Manufacturer : SHIMADZU Model : AP225WD
Serial No. : D316300690
Capacity : 220 g Resolution : 0.00001g/102g, 0.0001g/220g

Environment : On site calibration was carried out at the Laboratory, M Green Group Co., Ltd.

Ambient Temperature : (24.9 to 26.3) °C
Relative Humidity : (40.8 to 55.4) %
Air Pressure : 1003.9 mbarDate of Received : 20 September 2024
Date of Calibration : 20 September 2024
Date of Issue : 21 September 2024

Calibrated by : Akaradeth Thippichai

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

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

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

Approved by :

(SaJa Sangkhum)
Supervisor

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

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Certificate of Calibration

Certificate No. : 67-200334-1 Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty ± (g)
0.001	0.00000	0.000015
0.01	0.00000	0.000016
0.1	0.00000	0.000018
1	0.00000	0.000026
10	0.00000	0.000053
20	-0.00003	0.000071
50	0.00006	0.00011
100	0.00004	0.00020
150	0.0001	0.00038
200	0.0000	0.00038

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2.13 , providing a level of confidence of approximately 95%

Eccentric error	Load test : 50 g	A	B	C	D	E
		-0.00005	0.00001	0.00002	0.00000	0.00000 g

Repeatability
Load test : 200 g
Sider. : 0.000000 g

-0.00 -





Certificate of Calibration

Certificate No. : 67-410112-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisetukulakhon 25, Pracha-Utd Rd., Thungru, Bangkok 10140 Thailand

Equipment :

Digital Thermo-Hygrometer

Manufacturer : Digicon

Model : TH-02A

Range Temperature : 0 °C to 50 °C Resolution : 0.1 °C

Range Humidity : 20 %R.H. to 99 %R.H. Resolution : 1 %R.H.

Serial No. : 1819A0771796 ID No. : N/A

Environment :

Ambient Temperature : (23 ± 2) °C

Relative Humidity : (50 ± 15) %

Date of Received : 20 September 2024

Date of Calibration : 23 September to 24 September 2024

Date of Issue : 24 September 2024

Calibrated by : Chortip Samchusri

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4013 by compared with standard probe sensor humidity/temperature into humidity/temperature chamber.

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

Digital Indicator with Standard Probe Temp&Hum

ID.No. Cert.No. Due.Date Traceability

400034 & 400035 SG-H-00611/67 04 Jan 2025 Success Gateway Co., Ltd., Accredited by TISI Calibration No.0268

Approved by :

(Permon Chamru)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-410112-1

Page : 2 of 2

UUC Condition As-Received : Good

Result of Calibration : Without Adjustment

Function : Temperature measurement

Reference Humidity @ 50 %R.H.

Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
19.99	19.7	0.3	0.46
25.00	24.7	0.3	0.46
30.01	29.7	0.3	0.46

Result of Calibration : Without Adjustment

Function : Humidity measurement

Reference Temperature @ 25 °C

Standard Humidity (%R.H.)	UUC Reading (%R.H.)	Correction (%R.H.)	Uncertainty (± %R.H.)
40.01	38	2	2.2
60.00	56	4	2.3

Remark

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. : 67-400548-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisetukhachon 25, Pracha-Ud Rd., Thungkru Bangkok 10140 Thailand

Equipment :

Temperature controlled enclosure (Refrigerator)

Manufacturer : Biobase

Model : BXC-V250M (II)

Range : N/A °C

Resolution : 0.1 °C

Serial No. : YC025025190108

ID No. : N/A

Environment :

On site calibration was carried out at the Laboratory, M Green Group Co., Ltd.

Ambient Temperature : (26.3 to 27.4) °C

Relative Humidity : (39 to 47) %

Line Voltage : (226.0 to 230.0) V

Date of Received :

20 September 2024

Date of Calibration :

20 September 2024

Date of Issue :

21 September 2024

Calibrated by :

Permpon Champa

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.

Traceability

400046 & 400042

26 Jan 2025

National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Champa)

Supervisor

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Certificate of Calibration

Certificate No. : 67-400548-1

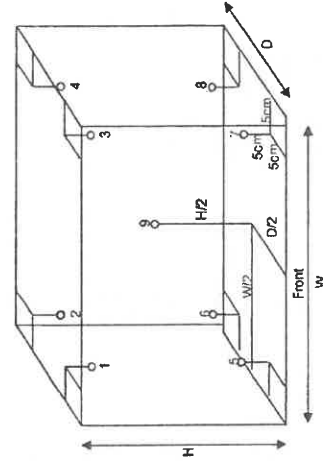
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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

Inside of Chamber
W = 0.50 m
D = 0.40 m
H = 1.20 m
Capacity = 0.24 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									D (± °C)
			1	2	3	4	5	6	7	8	9	
4.0	2.0	2.0	4.70	4.42	5.04	4.99	4.52	4.22	4.74	4.67	3.89	0.45

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)		Measured Stability (°C)		Overall Variation (°C)
			1.23	0.13	0.13	0.13	
4.0	2.0	2.00					1.40

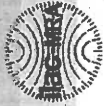
Remark The uncertainty is not combine uniformity of the air chamber

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

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

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Certificate of Calibration

Certificate No. : 67-400548-2 Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisetukhakhon 25, Pracha-Utd Rd., Thungru Bangkok 10140 Thailand

Equipment : Temperature controlled enclosure (Oven)

Manufacturer : Memmert

Model : UF110

Range : N/A °C Resolution : 0.1 °C

Serial No. : B419.1092 ID No. : N/A

Environment : On site calibration was carried out at the Laboratory, M Green Group Co., Ltd.

Ambient Temperature : (26.3 to 27.4) °C

Relative Humidity : (39 to 47) %

Line Voltage : (226.0 to 230.0) V

Date of Received : 20 September 2024

Date of Calibration : 20 September 2024

Date of Issue : 21 September 2024

Calibrated by : Permon Chianpu

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.

400046 & 400023 67-400198-1

Traceability

National Institute of Metrology Thailand (NIMT)

Approved by :

(Permon Chianpu)

Supervisor

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Certificate of Calibration

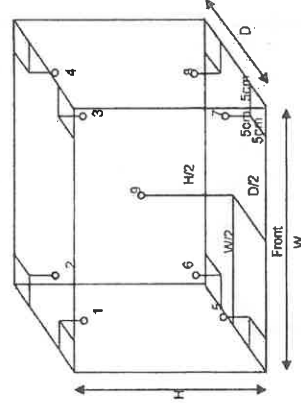
Certificate No. : 67-400548-2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.56 m

D = 0.40 m

H = 0.48 m

Capacity = 0.11 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C)									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
103.0	103.0	103.0	102.3	102.9	103.7	103.7	102.3	102.3	103.8	102.2	102.7	0.82
104.0	104.0	104.0	103.3	103.9	104.8	104.8	103.2	103.2	104.8	103.2	103.7	0.84
105.0	105.0	105.0	104.3	104.9	105.8	105.7	104.3	104.3	105.8	104.3	104.7	0.83
150.0	150.0	150.0	149.3	149.9	151.3	151.2	149.1	149.2	151.2	149.3	149.5	1.1
180.0	180.0	180.0	179.0	179.8	181.4	181.1	178.8	179.0	181.1	178.8	179.3	1.1

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
103.0	103.0	103.0	1.3	0.3	2.0
104.0	104.0	104.0	1.5	0.3	2.1
105.0	105.0	105.0	1.4	0.3	2.0
150.0	150.0	150.0	2.3	0.5	2.7
180.0	180.0	180.0	2.5	0.5	3.3

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

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2,

providing a level of confidence of approximately 95%

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Certificate of Calibration

Certificate No. : 67-400548-3

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisatsukhakhon 25, Pracha-Utd Rd., Thungku Bangkok 10140 Thailand

Equipment :

Water Bath

Manufacturer : Memmert

Model : WNB29

Range : N/A °C

Resolution :0.1 °C

Serial No. : L619.0037

ID No. : N/A

Environment :

On site calibration was carried out at the Laboratory, M Green Group Co., Ltd.

Ambient Temperature :

(26.3 to 27.4) °C

Relative Humidity :

(39 to 47) %

Line Voltage :

(226.0 to 230.0)V

Date of Received :

20 September 2024

Date of Calibration :

20 September 2024

Date of Issue :

21 September 2024

Calibrated by :

Permpoon Chanpu

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

400046 & 400024

30 Sep 2024

National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpoon Chanpu)

Supervisor

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Certificate of Calibration

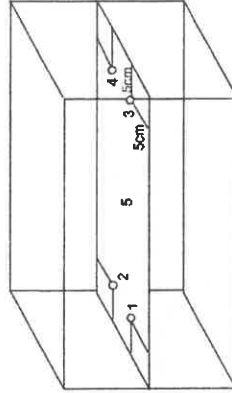
Certificate No. : 67-400548-3

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

Test Point (°C)	Selling Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.					Uncertainty (± °C)	Measured Uniformity (°C)	Measured Stability (°C)
			1	2	3	4	5			
85.0	85.0	85.0	84.55	84.44	84.49	84.46	84.62	0.20	0.25	0.06

Remark. The uncertainty is not combine uniformity of the water bath

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

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

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Certificate of Calibration

Page : 1 of 2

Certificate No. : 67-400548-4

Submitted by : M Green Group Co., Ltd.

188/46 Wisatsukhakhon 25, Pracha-Utd Rd., Thungkrui Bangkok 10140 Thailand

Equipment : Temperature controlled enclosure (Incubator)

Manufacturer : Biobase

Range : 0 °C to 65 °C

Model : Biochemistry Incubator

Resolution : 0.1 °C

Serial No. : KYP1502202003

ID No. : N/A

Environment : On site calibration was carried out at the Laboratory, M Green Group Co., Ltd.

Ambient Temperature : (31.0 to 32.0) °C

Relative Humidity : (50 to 55) %

Line Voltage : (226.0 to 230.0) V

Date of Received : 20 September 2024

Date of Calibration : 20 September 2024

Date of Issue : 21 September 2024

Calibrated by : Pempon Chuapu

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.

400029 & 400048 67-400444-1

Traceability

Due Date

02 Feb 2025 National Institute of Metrology Thailand (NIMT)

Approved by :

(Perrupon Chuapu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Page : 2 of 2

Certificate No. : 67-400548-4

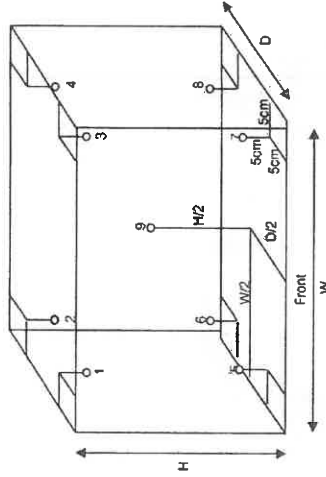
Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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

Inside of Chamber
 W = 0.45 m
 D = 0.41 m
 H = 0.85 m
 Capacity = 0.16 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	
20.0	20.4	20.4	20.23	20.18	20.08	20.15	19.90	19.92	19.96	19.90	19.96	0.82

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)		Measured Stability (°C)		Overall Variation (°C)
			0.38	0.43	0.43	0.43	
20.0	20.4	20.4	0.38	0.43	0.43	0.43	0.96

Remarks: The uncertainty is not combine uniformity of the air chamber

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

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

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Certificate of Calibration

Certificate No. : 67-400560-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisatsuknakkhon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 Thailand

Equipment :

Liquid in Glass Thermometer

Manufacturer : N/A

Model : N/A

Range : 0°C to 100 °C

Resolution : 1 °C

Serial No. : N/A

Immersion : Total

ID No. : 94-49747

Environment :

Ambient Temperature : (23 ± 2) °C

Relative Humidity : (50 ± 15) %

Line Voltage : (220 ± 22) VAC

Date of Received : 20 September 2024

Date of Calibration : 23 September 2024

Date of Issue : 23 September 2024

Calibrated by : Chotip Sanchusri

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4001 based on ASTM E77-07 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 : This certification is traceable to the International System of Units

1. Platinum Resistance Thermometer (PRT)

ID No. Cert.No. Due Date

400001 TT-0023-24 16 Feb 2026

Traceability

National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No. Cert.No. Due Date

400003 23E1866 01 Jun 2025

Traceability

National Institute of Metrology Thailand (NIMT)

400004 23E1866 01 Jun 2025

National Institute of Metrology Thailand (NIMT)

Approved by :

(Pempon Champa)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-400560-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Ice point check : UUC* reading 0 °C Standard reading -0.0321 °C

Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
39.8223	40	-0.2	0.31

Remark

UUC : Unit Under Calibration

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%

- 0.031 °C -





Certificate of Calibration

Certificate No. : 67-300569-1

Page : 1 of 2

Submitted by

: M Green Group Co., Ltd.

188/46 Wisatesuknakhon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 Thailand

Equipment

: Burette

Manufacturer : GLASSCO

Class : A

Capacity : 10 ml

Graduation : 0.05 ml

ID No. : 2212-0344-1

Environment

: Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1008.0 mbar.

Date of Received

: 20 September 2024

Date of Calibration

: 23 September 2024

Date of Issue

: 23 September 2024

Calibrated by

: Areerat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID.No.

241005

Cert.No.

67-200210-4

Due Date

02 Dec 2024

Traceability

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Tovadee)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-300569-1

Page : 2 of 2

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

IUC Condition As-Received : Good

Delivery Time : 19.92 sec.

Nominal Volume (ml)	Measuring Volume (ml)
2	2.0044
5	5.0024
10	9.9915

Uncertainty of measurement with in ± 0.0039 ml :

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

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

-o0o-





Certificate of Calibration

Certificate No. : 67-300569-2

Page : 1 of 2

Submitted by

: M Green Group Co., Ltd.

188/46 Wisetsuknakhon 25, Pracha-Ud Rd., Thungkru, Bangkok 10140 Thailand

Equipment

: Burette

Manufacturer : GLASSCO

Class : A

Capacity : 25 ml

Graduation : 0.1 ml

ID No. : 2212-0344-2

Environment

: Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1008.0 mbar.

Date of Received

: 20 September 2024

Date of Calibration

: 23 September 2024

Date of Issue

: 23 September 2024

Calibrated by

: Arcarat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID.No.

Cert.No.

Due Date

Traceability

241005

67-200210-4

02 Dec 2024

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Toivadec)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-300569-2

Page : 2 of 2

Result of Calibration :

This result of true Volume is referred to standard temperature at 20 °C

UUC Condition As-Received : Good

Delivery Time : 46.13 sec.

Nominal Volume (ml)	Measuring Volume (ml)
5	5.0039
15	14.9824
25	24.9757

Uncertainty of measurement with in ± 0.0066 ml

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

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

- o0o -





Certificate of Calibration

Certificate No. : 67-300569-3

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisatsuknakhon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 Thailand

Equipment : Measuring Pipette

Manufacturer : GLASSCO Class : A

Capacity : 10 ml Graduation : 0.1 ml

ID No. : MP10/01/19

Environment : Ambient Temperature : (20 ± 3) °C
Relative Humidity : (50 ± 10) %
Air Pressure : 1000.8 mbar.

Date of Received : 20 September 2024

Date of Calibration : 23 September 2024

Date of Issue : 23 September 2024

Calibrated by : Areearat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID No. Cert. No. Due Date Traceability:

241005 67-200210-4 02 Dec 2024 National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Toivadee)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-300569-3

Page : 2 of 2

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

UUC Condition As-Received : Good

Delivery Time : 12.20 sec.

Nominal Volume (ml)	Measuring Volume (ml)
2	1.9998
5	4.9871
10	9.9742

Uncertainty of measurement with in ± 0.0039 ml

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

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

- o0o -





Certificate of Calibration

Certificate No. : 67-300569-4

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisutesuknakon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 Thailand

Equipment : Measuring Pipette

Manufacturer : GLASSCO Class : A

Capacity : 25 ml Graduation : 0.1 ml

ID No. : MP25/01/19

Environment : Ambient Temperature : $(20 \pm 3) ^\circ\text{C}$ Relative Humidity : $(50 \pm 10) \%$

Air Pressure : 1000.8 mbar.

Date of Received : 20 September 2024

Date of Calibration : 23 September 2024

Date of Issue : 23 September 2024

Calibrated by : Areerat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID.No. Cert.No.

Traceability

Due Date

2411005 67-200210-4

02 Dec 2024 National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Tovadee)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-300569-4

Page : 2 of 2

Result of Calibration : This result of true Volume is referred to standard temperature at $20 ^\circ\text{C}$

UUC Condition As-Received : Good

Delivery Time : 15.20 sec.

Noninal Volume (ml)	Measuring Volume (ml)
5	5.0302
15	15.0832
25	25.0398

Uncertainty of measurement with in ± 0.0067 ml

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

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

-o0o-





Certificate of Calibration

Certificate No. : 67-300571-1

Submitted by : M Green Group Co., Ltd.

188/46 Wisutesuknakhon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 Thailand

Page : 1 of 2

Equipment

Equipment : Cylinder
Manufacturer : GLASSCO
Capacity : 100 ml
Graduation : 1 ml
ID No. : CY100/01/24
Class : A

Environment

Ambient Temperature : $(20 \pm 3) ^\circ\text{C}$
Relative Humidity : $(50 \pm 10) \%$
Air Pressure : 1003.9 mbar.

Date of Received : 20 September 2024

Date of Calibration : 24 September 2024

Date of Issue : 24 September 2024

Calibrated by : Arcerat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID No. : 241002

Cert.No. : 67-200210-1

Due Date : 02 Dec 2024

Traceability :

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Trivadee)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-300571-1

Result of Calibration : This result of true Volume is referred to standard temperature at $20 ^\circ\text{C}$

UUC Condition As-Received : Good

Page : 2 of 2

Nominal Volume (ml)	Measuring Volume (ml)
50	50.45
100	100.52

Uncertainty of measurement with in ± 0.063 ml

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

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

-o0o-





Certificate of Calibration

Certificate No. : 67-300571-2

Page : 1 of 2

Submitted by

: M Green Group Co., Ltd.

188/46 Wisitsakunkhoh 25, Pracha-Uttd Rd., Thungkri, Bangkok 10140 Thailand

Equipment

: Cylinder

Manufacturer : GLASSCO

Class : A

Capacity : 250 ml

Graduation : 2 ml

ID No. : CY250/01/19

Environment

: Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1004.1 mbar.

Date of Received : 20 September 2024

Date of Calibration : 24 September 2024

Date of Issue : 24 September 2024

Calibrated by : Arcsant Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID No. Cert.No.

Due Date

Traceability

241002

67-200210-1

02 Dec 2024

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Toivadee)

Supervisor

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Certificate of Calibration

Certificate No. : 67-300571-2

Page : 2 of 2

Result of Calibration :

This result of true Volume is referred to standard temperature at 20 °C

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
150	151.02
250	251.16

Uncertainty of measurement with in ± 0.087 ml

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

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

-o0o-





Certificate of Calibration

Certificate No. : 67-300571-3

Submitted by : M Green Group Co., Ltd.

188/46 Wisetuknakhot 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 Thailand

Equipment : Cylinder
Manufacturer : GLASSCO
Capacity : 1000 ml
Class : A
Graduation : 10 ml
ID No. : CY1000/01/24

Environment : Ambient Temperature : $(20 \pm 3) ^\circ\text{C}$
Relative Humidity : $(50 \pm 10) \%$
Air Pressure : 1001.7 mbar.

Date of Received : 20 September 2024
Date of Calibration : 24 September 2024
Date of Issue : 24 September 2024
Calibrated by : Arcarat Sornbun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

ID No. : 241002
Cert.No. : 67-200210-1
Due Date : 02 Dec 2024
Traceability : National Institute of Metrology (Thailand) (NIMT)

Approved by :

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-300571-3

Result of Calibration : This result of true Volume is referred to standard temperature at $20 ^\circ\text{C}$

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
500	500.74
1000	1003.10

Uncertainty of measurement with in ± 0.17 ml
This result of calibration was found accurate as shown on date and place of calibration only.
This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%

-o0o-



Certificate of Calibration

Certificate No. : 67-300572-1 Page : 1 of 2

Submitted by : M Green Group Co., Ltd.
188/46 Wisatsukhakhon 25, Pracha-Utth Rd., Thungkru, Bangkok 10140 ThailandEquipment : Imhoff Cone
Manufacturer : VITLAB
Capacity : 1000 ml Graduation : 0.1, 50 ml
ID No. : CY1000/01/22Environment : Ambient Temperature : (20 ± 3) °C
Relative Humidity : (50 ± 10) %
Air Pressure : 1001.5 mbar.Date of Received : 20 September 2024
Date of Calibration : 23 September 2024
Date of Issue : 23 September 2024
Calibrated by : Areearat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-01

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

Electronic Balance
ID No. 2411002 Cert.No. 67-200210-1 Due Date 02 Dec 2024
Traceability National Institute of Metrology (Thailand) (NIMT)Approved by :
(Wipa Teeradee)
SupervisorThe Uncertainties are for a confidence probability of approximately 95%
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Certificate of Calibration

Certificate No. : 67-300572-1 Page : 2 of 2

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

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
500	500.74
1000	1000.16

Uncertainty of measurement with in \pm 0.17 ml
This result of calibration was found accurate as shown on date and place of calibration only.
This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$,
providing a level of confidence of approximately 95%

-o0o-





Certificate of Calibration

Certificate No. : 67-300570-1

Submitted by : M Green Group Co., Ltd.

188/46 Wisutesuknakhon 25, Pracha-Uitd Rd., Thungkru, Bangkok 10140 Thailand

Page : 1 of 2

Equipment : Volumetric Flask

Manufacturer : GLASSCO

Class : A

Capacity : 100 ml

ID No. : VF100/01/19

Environment : Ambient Temperature : $(20 \pm 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 10) \%$

Air Pressure : 1003.9 mbar.

Date of Received : 20 September 2024

Date of Calibration : 24 September 2024

Date of Issue : 24 September 2024

Calibrated by : Areerat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID No. : 241005

Cert. No. : 67-200210-4

Due Date : 02 Dec 2024

Traceability : National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Towatdee)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-300570-1

Result of Calibration : This result of true Volume is referred to standard temperature at $20 ^\circ\text{C}$

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
100	100.063

Uncertainty of measurement with in ± 0.018 ml

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

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

-o0o-





Certificate of Calibration

Certificate No. : 67-300570-2

Page : 1 of 2

Submitted by

: M Green Group Co., Ltd.

188/46 Wisetuekumkarn 25, Prachin-Utd Rd., Thungkru, Bangkok 10140 Thailand

Equipment

: Volumetric Flask

Manufacturer : GLASSCO

Class : A

Capacity : 250 ml

ID No. : VF250/01/19

Environment

: Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1003.8 mbar.

Date of Received

: 20 September 2024

Date of Calibration : 24 September 2024

Date of Issue : 24 September 2024

Calibrated by

: Atccrat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID No.

Cert.No.

Due Date

Traceability

241002

67-200210-1

02 Dec 2024

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Tovadee)

Supervisor

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Certificate of Calibration

Certificate No. : 67-300570-2

Page : 2 of 2

Result of Calibration :

This result of true Volume is referred to standard temperature at 20 °C

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
250	250.04

Uncertainty of measurement with in ± 0.051 ml

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

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

-o0o-





Certificate of Calibration

Certificate No. : 67-300570-3

Submitted by : M Green Group Co., Ltd.

188/46 Wisatsuknakon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 Thailand

Equipment : Volumetric Flask

Manufacturer : GLASSCO **Class :** A

Capacity : 1000 ml

ID No. : VF1000/01/19

Environment : Ambient Temperature : $(20 \pm 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 10) \%$

Air Pressure : 1003.3 mbar.

Date of Received : 20 September 2024

Date of Calibration : 24 September 2024

Date of Issue : 24 September 2024

Calibrated by : Areerat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID No. **Cert. No.** **Due Date** **Traceability**

241002 67-2100210-1 02 Dec 2024 National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Toivadee)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-300570-3

Result of Calibration : This result of true Volume is referred to standard temperature at $20 ^\circ\text{C}$

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
1000	1000.25

Uncertainty of measurement with in ± 0.14 ml

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

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

-o0o-



Certificate of Calibration

Certificate No. : 67-210362-1 Page : 1 of 2

Submitted by : M Green Group Co., Ltd.
188/46 Wisetuknakhon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 Thailand

Equipment : Weight
Manufacturer : N/A Material : Stainless Steel
Weight size : 1 g

ID No. : 63-210391-1
Assumed density of weight : 7950 kg / m³
Assumed Air density : 1.2 kg / m³
Environment : Ambient Temperature : (20 ± 2) °C
Relative Humidity : (50 ± 10) %
Air Pressure : 1005.7 mbar

Date of Received : 20 September 2024
Date of Calibration : 23 September 2024
Date of Issue : 23 September 2024
Calibrated by : Wutichai 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
E221-E2210 MM-0042-22 21 Mar 2025 National Institute of Metrology (Thailand), (NIMT)

Approved by :
(Sarja Sangkhum)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-210362-1 Page : 2 of 2

Result of Calibration : Without Adjustment
UUC Condition As-Received : Good

No.	Nominal Value	Id.Mark	Conventional mass Value	Measuring Uncertainty
1	1 g	none	-0.003 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%

-o0o-





Certificate of Calibration

Certificate No. : 67-210362-2 Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisutesuknakhon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 Thailand

Equipment :

Weight
Manufacturer : N/A Material : Stainless Steel
Weight size : 100 g

ID No. : 63-210391-2

Assumed density of weight : 7950 kg / m³
Assumed Air density : 1.2 kg / m³

Environment :

Ambient Temperature : (20 ± 2) °C
Relative Humidity : (50 ± 10) %
Air Pressure : 1005.7 mbar

Date of Received : 20 September 2024

Date of Calibration : 23 September 2024

Date of Issue : 23 September 2024

Calibrated by : Wuttichai Swapphong

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
E221-E2210	MM4-0042-22	21 Mar 2025	National Institute of Metrology (Thailand), (NIMT)

Approved by

(Saja Sangkhum)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-210362-2 Page : 2 of 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 -0.06 mg	± 0.11 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%

-o0o-





Certificate of Calibration

Certificate No. : 67-210362-3 Page : 1 of 2

Submitted by : M Green Group Co., Ltd.
188/46 Wisatsuknakhon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 ThailandEquipment : Weight
Manufacturer : N/A Material : Stainless Steel
Weight size : 200 gID No. : 63-210391-3
Assumed density of weight : 7950 kg / m³
Assumed Air density : 1.2 kg / m³
Ambient Temperature : (20 ± 2) °C
Relative Humidity : (50 ± 10) %
Air Pressure : 1005.7 mbarDate of Received : 20 September 2024
Date of Calibration : 23 September 2024
Date of Issue : 23 September 2024
Calibrated by : Wuttichai Swaphong
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 UnitsStandard Weights
ID No. E221-E2210
Cert. No. MIM-0042-22
Due Date 21 Mar 2025
Traceability
National Institute of Metrology (Thailand), (NIMT)Approved by :
(Sanja Sangkhum)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-210362-3 Page : 2 of 2

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 +0.06 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%

-o0o-





CERTIFICATE No : 24T1185
REFERENCE No : 72116-3

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF 160
SERIAL No : D518.0082
ID No : EQ-L-205
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEADAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : CHAICHARN CH
CALIBRATION DATE : 09-Feb-24

APPROVED BY : 
ISSUED DATE : 12-Feb-24
RECEIVED DATE : 09-Feb-24

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

F-G010 REV : 03



CERTIFICATE No : 24T1185

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF 160
ID No : EQ-L-205
RECEIVED DATE : 09-Feb-24
AMBIENT TEMPERATURE : 25 °C ± 1 °C
RELATIVE HUMIDITY : 53 %RH ± 10 %RH
S/N : D518.0082
CALIBRATION DATE : 09-Feb-24

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-30 BY COMPARISON WITH CALIBRATED RTD Pt100 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND PLACED THE NINTH THERMOMETER PROBE WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE CHAMBER. THE UNIFORMITY WAS MEASURED BETWEEN REFERENCE PROBE AND OTHER PROBES AT THE SAME TIME.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT : DATA LOGGER WITH RTD
MODEL : HYDRA 2635A
SERIAL No : 7301307
CERTIFICATE No : 23T6636
DUE DATE : 10-Jul-24

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.

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

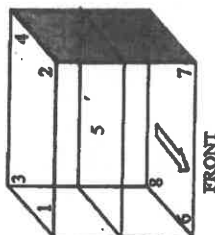
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 1
Overall Line Voltage (V) variation : 3
Instrument Condition : Normal
Chamber Size (W*L*H): 56*40*72 cm



CHAMBER PERFORMANCE

Calibrate Point (°C)	Average All Position Temp. (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	35.03	0.05	0.09	0.16
36.0	36.05	0.07	0.08	0.19
41.5	41.45	0.08	0.13	0.20

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	#6	#7	#8	#9	
35.0	35.0	34.98	35.01	35.00	35.00	35.02	35.08	35.07	35.04	35.10	0.25
36.0	36.0	36.00	36.03	36.03	36.02	36.04	36.09	36.10	36.04	36.12	0.25
41.5	41.5	41.45	41.45	41.39	41.46	41.46	41.47	41.43	41.44	41.49	0.36

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : LOCATION 5 WAS REFERENCE LOCATION.

NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY 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 : 03



QUALITY CALIBRATION CO.,LTD.
235 Petchkasem 63/2 Road, Latsoeng, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584
www.qcalibration.com



ISO 9001:2015
CERTIFIED
CALIBRATION 16949

CERTIFICATE No : 24T1189
REFERENCE No : 72116-7

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : AUTOCLAVE
MANUFACTURER : HIRAYAMA
MODEL : HVE-50
SERIAL No : 30612085166
ID No : EQL-155
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD.,
SAMAEDAM, BANGKHUNTHIAN, BANGKOK
10150

CALIBRATED BY : CHAICHARN CH.
CALIBRATION DATE : 09-Feb-24

APPROVED BY : 
ISSUED DATE : 12-Feb-24
RECEIVED DATE : 09-Feb-24

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

F-0010 REV : 03



QUALITY CALIBRATION CO.,LTD.
235 Petchkasem 63/2 Road, Latsoeng, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584
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CERTIFICATE No : 24T1189

PAGE : 2 OF 2

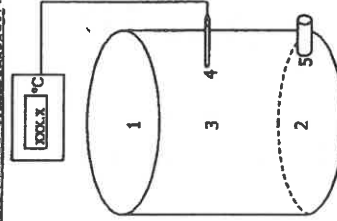
Calibration Report

EQUIPMENT : AUTOCLAVE
MANUFACTURER : HIRAYAMA
MODEL : HVE-50
ID NUMBER : EQL-155
SERIAL NUMBER : 30612085166
RECEIVED DATE : 09-Feb-24
CALIBRATION DATE : 09-Feb-24
AMBIENT TEMPERATURE : 30° C ± 1° C
RELATIVE HUMIDITY : 53 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BASED ON BS 2646-1:2021 BY COMPARISON WITH CALIBRATED RTD DATA LOGGERS UNDER NO LOAD CONDITION. THE SENSORS WERE PLACED ON FIVE LOCATIONS AS SHOWN IN THE PICTURE. THE SENSOR ON LOCATION 1 AND 2 WERE PLACED IN THE UPPER HALF AND LOWER HALF OF CHAMBER FREE SPACE RESPECTIVELY. THE THIRD SENSOR WAS PLACED WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE INSTRUMENT CHAMBER. SENSOR NUMBER 4 WAS ATTACHED TO THE LOAD TEMPERATURE PROBE. IF FITTED, WITHIN 15 mm OF ITS TIP. SENSOR NUMBER 5 WAS PLACED IN THE CHAMBER DRAIN OR VENT WITHIN 100 mm OF ITS CONNECTION TO THE CHAMBER.
2. REFERENCE STANDARD INSTRUMENTS :-
 - 1) DATA LOGGER VALPROBE S350, S367,DV35,DN94
 3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE 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 QUALITY CALIBRATION CO.,LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



GENERAL INFORMATION

Overall Ambient Temperature around the Chamber variation : 0.5 °C
Autoclave Condition : Normal
Chamber Size (Diameter*H): 30 * 71 cm

CHAMBER PERFORMANCE

Calibrate Point (°C)	Average all Position (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)	Pressure (MPa)	Holding time (min)	Operating Cycle time (min)
115	115.74	0.09	0.11	0.25	0.090	20	60
121	121.59	0.06	0.21	0.28	0.125	20	60

FRONT

TEMPERATURE MEASUREMENT ACCURACY TEST(°C)

Count Temp		Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
		#1	#2	#3	#4	#5	
115	115	115.72	115.74	115.79	115.71	115.71	0.59
121	121	121.59	121.62	121.56	121.58	121.59	0.59

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT OF TEMPERATURE MEASUREMENT ACCURACY TEST EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : THE STABILITY TERM IN THE UNCERTAINTY BUDGET WAS REPLACED BY THE STANDARD REPEATABILITY.

NOTE 3 : LOCATION 3 WAS REFERENCE LOCATION.

NOTE 4 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY 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-0010 REV : 03

การดูแลบำรุงรักษาเชิงป้องกัน Preventive Maintenance



บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด

ฝ่ายบริการหลังการขาย

โทร 0 2 639 7000 E-mail: service.tec.th@dksh.com

ฝ่ายขายและการตลาด

โทร 0 2 639 7000 E-Mail: marketing.tec.th@dksh.com

Website: www.dksh.co.th/technology/scientific-thailand

เงื่อนไขการให้บริการ Preventive Maintenance

Type text here

บริษัทฯ จะส่งวิศวกรผู้ชำนาญ เพื่อให้บริการตามขอบข่ายของการบริการ เฉพาะ ในวันและเวลา ราชการ หากมีความประสงค์ที่จะรับบริการนอกเหนือจากวัน เวลา ราชการ (วันหยุดเสาร์ – อาทิตย์ หรือวันหยุด นักชดเชย) บริษัทฯ จะคิดค่าบริการเพิ่มเติมตามอัตราที่กฎหมายแรงงานกำหนดไว้

ขอบข่ายการบริการ

- ตรวจสอบสภาพการทำงานต่าง ๆ ของเครื่องมือ
- ทดสอบประสิทธิภาพการทำงานของเครื่องมือ
- รายงานผลการตรวจสอบเครื่องมือ

หมายเหตุ

- ราทานี้ไม่รวมถึงค่าบริการซ่อม หรือ เปลี่ยนอะไหล่ที่ชำรุดเสียหาย หรือหมดสภาพการใช้งาน
- ในกรณีที่ผู้ใช้บริการอยู่นอกเขตพื้นที่ให้บริการ บริษัทฯ จำเป็นต้องคิดค่าใช้จ่ายเพิ่มเติม ได้แก่ ค่าเดินทาง เป็นต้น
- บริษัทฯ ขอสงวนสิทธิ์ ในการเปลี่ยนแปลงราคา โดยไม่แจ้งให้ทราบล่วงหน้า



ช่องทางการติดต่อ

DKSH Technology Limited (บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด)
เลขที่ 2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพฯ 10260
เลขประจำตัวผู้เสียภาษี 010-555-001-4547 (สำนักงานไทย)



Call center 0 2 639 7000



DKSH Scientific



www.dksh.com/scientific-thailand



marketing.tsc.th@dksh.com



@dkshscientific

Preventive Maintenance Contract

จำนวนใบการทำสัญญาบริการ ...1... ครั้ง ต่อปี
ครั้งที่ 1 วันที่ 19/04/2024.....

รายละเอียดผู้รับบริการ

หน่วยงาน	บริษัท เทคที เพค จำกัด
ที่อยู่	30,32 ซอยพระรามที่ 2 ซอย 63 ถนนพระรามที่ 2 แขวงแสมดำ เขตบางขุนเทียน กรุงเทพมหานคร 10150
โทรศัพท์	0-2893-4211-7 แฟกซ์ 0-2893-4218

ผู้ติดต่อ

ชื่อ - นามสกุล	คุณกรรณก จุฬพิทักษ์
ตำแหน่ง	หัวหน้าส่วน
โทรศัพท์	087 398 9274 เบอร์ติดต่อ - แฟกซ์ -
E-mail	lab_center@testtech.co.th

รายละเอียดผู้ให้บริการ

บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด (ฝ่ายบริการหลังการขาย) (สำนักงานใหญ่) เลขที่ 2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพฯ 10260 โทรศัพท์ 0 2 693 7000 Email: marketing.tsc.th@dksh.com เจ้าหน้าที่ประสานงาน : คุณสุดารัตน์ ศิริรัตน์ โทรศัพท์ 090 678 6925	
เจ้าหน้าที่ผู้ให้บริการ	นายธีรานุ สดอาด
ตำแหน่ง	Specialist, Technical Service
โทรศัพท์	0938138736 แฟกซ์ -
E-mail	jirayut.is@dksh.com

ลงนามผู้รับบริการ	ลงนามผู้ให้บริการ
ตัวจริง	ตัวจริง
ตำแหน่ง	ตำแหน่ง
วันที่ / ประทับตราบริษัท	วันที่ / ประทับตราบริษัท

(ลงนามและประทับตรา)
ลงนามและประทับตรา

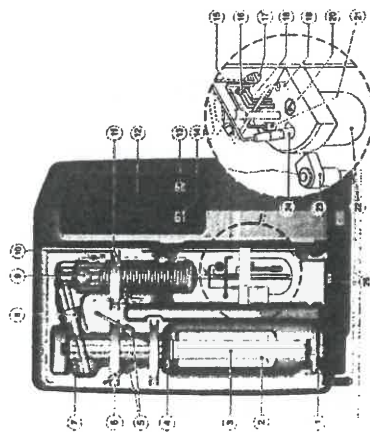
(นาย ธีรานุ สดอาด)
Specialist, Technical Service
19/04/2024

JOB No: LSR2402440.....MODEL:VAP300.....S/N: GER5300210095

Operational Qualification (OQ)

ตรวจสอบคุณภาพ

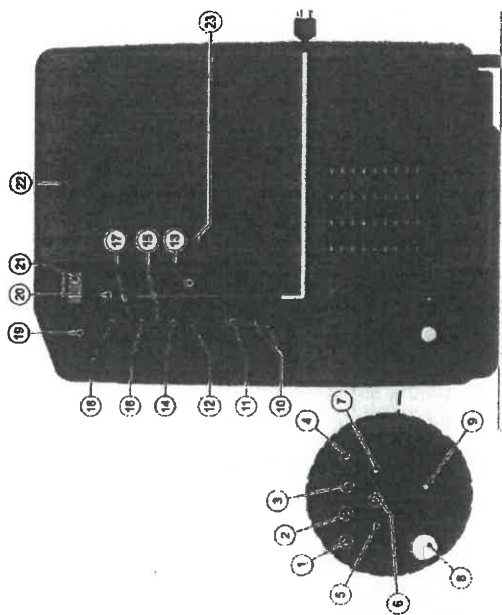
FRONT



No		PASS	FAIL	N/A
1	Quick clamping device with clamping block	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Digestion tube 250/300 ml	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	PTFE steam inlet tubing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Connection stopper, Viton	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Screw cap GL18	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	PTFE-inlet tubing NaOH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Distribution head made of glass	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Screw cap GL32	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Distillation condenser made of glass	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Screw cap GL14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Ventilation valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Control panel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Operating Button	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	USB interface (with protective cap)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Silicone tubing 8/10 for distillate discharge **	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Verprene tubing 4/8, receiver suction **	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Cable duct for electrode cable + titration tube**	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Silicone tubing 4/7, boric acid inlet**	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Sensor for level monitoring including connector**	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Agitator motor with propeller**	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Titration acid inlet tube **	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Receiver glass**	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Holder for pH electrode, removable**	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	pH electrode (combined electrode)**	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	Drip tray PP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

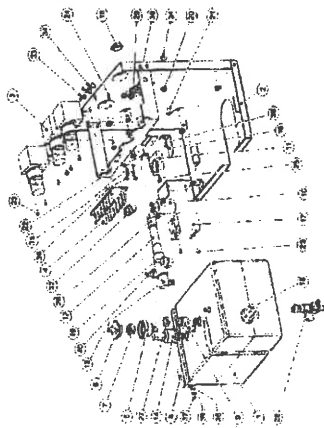
** only VAP 450

REAR



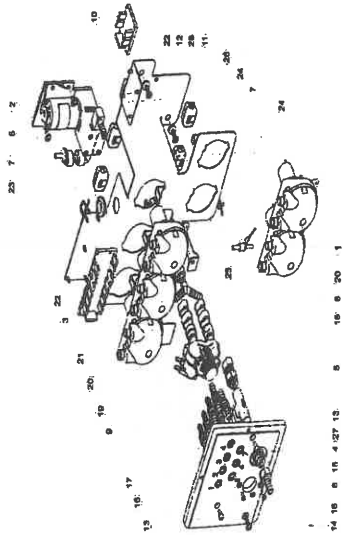
No		PASS	FAIL	N/A
1	Tube connection for sample H3BO3 supply	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Tube connection for sample H2O supply	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Tube connection for steam generator H2O supply	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Tube connection for NaOH supply	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Tube connection for receiver glass extraction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Tube connection for sample waste extraction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Tube connection, overpressure steam outlet	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Connection for cooling water supply (with cleaning sieve)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Tube connection for cooling water outlet	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	4 X USB interface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	1 X RS-232 Interface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	LAN interface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Screw cap for Perspex cover	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Connection socket for sample waste tank level monitoring	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Connection (not used)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
16	Connection socket for H2O tank level monitoring	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Connection socket for H3BO3 tank level monitoring	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Connection socket for NaOH tank level monitoring	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Overcurrent circuit breaker	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Apparatus socket (main cable connection)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Rating plate with serial number	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Exhaust air fan	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Excess temperature switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Inside Steam generator



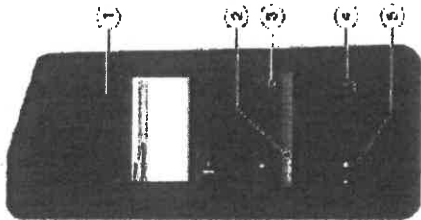
No		PASS	FAIL	N/A
1	Steam generator	<input checked="" type="checkbox"/>	<input type="checkbox"/>	N/A
2	Steam generator traverse	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Pinch valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Circuit board distributor	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Valve tubing connection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Housing safety valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Safety valve SKT	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Excess temperature protection, steam generator	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Safety valve G 1/8 0.5 bar	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Ventilation glass pinch valve VAPODEST	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Hose clamp for ventilation clamp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Distributor PP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Angle connection PP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Pressure transmitter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Level switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Fixing bracket steam generator	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Relay HT+	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	VA Hexagon nut 1/2"	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Angle connection 1/8"	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Bushing nipple 6-10-14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	VA Lens head screw M5 X 10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Grounding connection, 2-pole	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	VA Lens head screw M4 X 6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	Spacer bolt 5 mm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	VA Lens head screw M4 X 10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	Tubing connection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	Hose clamp 14.5 mm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	Module ball valve with nozzles	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	Cross manifold with spout	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30	Seal copper G 1/8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31	Locking screw 1/8"	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32	Pin strip	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33	Bundle clamp 12 H 4500	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34	Bundle clamp 12 H 4502	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35	Temperature switch 80°C	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36	VA Lens head screw M3 X 6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37	VA Hexagon nut M4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38	Lins head screw M4 X 8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39	VA Spring washer	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40	Angle connection, reduced, 1/8" PP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Module Pump holder VAP200 - 450 V3



No		PASS	FAIL	N/A
1	Peristaltic pump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Diaphragm pump NaOH, with non return valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Circuit board	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Tubing connection module	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Flow controller	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Lens head screw M5 x 10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Bushing nozzle	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Screw in socket	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Magnetic valve 2/2 way	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Circuit board distributor	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Bushing nozzle	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Screw 5 x 25	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Cylinder screw	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Screw 5 x 20	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Seal EPDM 15 x 4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Tubing connection piece 51x10x6.5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Tubing connection piece 51x10x10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Screw M4x10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Clamp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Clamp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Y-tube connector	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Spacer bolt 5 mm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Bundle clamp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	Bundle clamp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	Retrofit earthing pumpv	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	Snap ferrite	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	Nut G 3/8"	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	Pump holder plate	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Control panel



No		PASS	FAIL
1	Title bar	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Status bar	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Navigation button	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Smart switch with multiple functions	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	USB interface	<input checked="" type="checkbox"/>	<input type="checkbox"/>

- รายละเอียดการตรวจสอบ
- ขั้นตอนการบริการ
- ตรวจสอบระบบไฟฟ้า (Electrical Test)
- ความดันตามทางไฟฟ้าของเครื่องกับกราฟ
 - กระแสไฟฟ้าที่ใช้งาน
- ตรวจสอบสภาพเครื่อง (Optical Test)
- Main cable
 - Electric wiring
 - Pumps
 - Distribution Head
 - Condensor
 - Steam generator
 - Tubing
 - Viton cone
- ตรวจสอบ Function การทำงาน (The Function Test)
- ระบบรีฟิวและความดันของ Steam
 - ระบบการเติมน้ำเข้า Sample Tube
 - ระบบการเติม Na OH
 - ระบบการเติม H3BO3

รายงานผลการให้บริการ

1. TECHNICAL DATA

Main Supply 220 volt + 10% 50 Hz with ground
Nominal current

Pass ☒ Fail ☐ N/A ☐
Remark

1.1 COOLING WATER BATH

Temperature 15-20 °C
Cooling Water Outlet
Control Temperature

Pass ☒ Fail ☐ N/A ☐
Remark

1.2 OPTICAL TESTYAP300

Screw cap GL14
Screw cap GL18
Screw cap GL32
Distillation Head
Condensor
Viton Cone
Ventilation Valve BV
Micro Switch Sample
Agitator motor for propeller

Pass ☒ Fail ☐ N/A ☐
Remark

2. SYSTEM COOLING WATER INLET

Cooling Water Inlet
Cooling Water Outlet
Flow control valve

Pass ☒ Fail ☐ N/A ☐
Remark

3.SYSTEM CONTROL

Display
Program
Adding NaOH
Adding H2O
Adding H3BO3
Suction Sample
Suction Receiver

Pass ☒ Fail ☐ N/A ☐
Remark

4.SYSTEM DISTILLATION

Boiler
Level Sensor
Novopen
Solenoid Valve Shut-Off
Solenoid Valve Steam
Solenoid Valve soft steam
Ventilation Valve Premount
Excess Pressure Detector
Heating Element

Pass ☒ Fail ☐ N/A ☐
Remark

5. PUMP

Pump H₂O Steam
- Non-Return Valve
Pump H₂O Sample
- Non-Return Valve
Pump NaOH
- Non-Return Valve
Pump H3BO3
- Non-Return Valve
Pump suction
Pump suction receiver

Pass ☒ Fail ☐ N/A ☐
Remark

6. The Following Program Run :

Addition H2O 0-999 ml
Addition NaOH 0-999 ml
Addition H3BO3 0-999 ml
Reaction Time 0-108 min
Distillation Time 0-108 min
Steam Capacity 10%-100%
Suction Sample
Suction Receiver

Pass ☒ Fail ☐ N/A ☐
Remark

7. Measured pumps

Pump NaOH
Pump H2O
Pump H3BO3

Volume :ml
Volume :ml
Volume :ml
Remark

Remark :

ข้อมูลสนับสนุนด้านเทคนิค (General Technical Support) การบำรุงรักษาทั่วไป (Basic maintenance)

Cleaning program

Clean parts are those that do not need any further cleaning analysis in order to avoid carrying out replacement.

The following settings are recommended for this:

Parameter	Value
WFO solution	100 ml
WFO2 solution	0 ml
Distillation time	7 min
Distillation power	100 %
Preheating time	0 s
Soaking sample	20 s

→ Insert a digestion tube (without sample) and start the program.

- All liquid carrying parts are cleaned. In the case of strong carrying agents, it is not of sufficient and can also be added to the digestion tube.

General error message

Check the following:

- Check water level
- Check water level
- Check water level

Program continues automatically once water has been added.

- Insert sample into

Continue program as usual.

- Check production line.

Program continues automatically once water has been added.

- Pre digestion test.

Check correct setting of the external sensor.

The testing program can be continued after verification of the test.

- Check sample water level.

Check correct setting of the external sensor.

The testing program can be continued after verification of the test.

Analytical errors

Program results too high

- The standards used are not clean.
- Calibration of the standard.
- Program has exceeded its memory.
- Decrease of the water solution's viscosity.

Water solution in the digestion tube, which is not completely digested

- Improvement of the digestion.

Check bridge of the standard in the digestion tube, which is not completely digested

- Check digestion tube in advance with other water.

Calculated of amounts from the previous sample.

- Insert sample into.

Program results too low or no result

- Check digestion tube in advance with other water.

Calculated of amounts from the previous sample.

- Insert sample into.

Program results too high

- The standards used are not clean.
- Calibration of the standard.
- Program has exceeded its memory.
- Decrease of the water solution's viscosity.

Water solution in the digestion tube, which is not completely digested

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