

ภาคผนวก จ

เอกสารสอบเทียบเครื่องมือตรวจวัด



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request No.23-66/0161

MTC.No.23-66/0161

Number of page(s) 2

CALIBRATION CERTIFICATE

Nomenclature : MASS FLOWMETER

Manufacturer : TSI

Serial No.: 41461443012

Model : 4199

Scale range : 0 l/min to 20 l/min

Subdivision : 0.001 l/min

Submitted by : M GREEN GROUP CO.,LTD

188/46, Pracha-Utd Rd.,

Thungkru, Bangkok 10140, Thailand.

Received date : 10 January 2023

Condition of measured item : Normal

Calibration date : 18 January 2023

Standard :

Standard	Certificate No.	Date due	Traceability
RTD Thermometer	PSL-T 643/65	1-Jun-24	TISTR
Molbox/Pressure Transducer/UpStream	MP-0013-21	25-Jan-23	NIMT
Primary Flow Calibrator S/N 117982	MW-0011-21	8-Apr-23	NIMT
Primary Flow Calibrator S/N 119521	MW-0012-21	31-Mar-23	NIMT

Calibrated by :

Approved by :

Director

Mechanical Engineering Standards Laboratory

Ref. 2013266011000059001

Issued Date 18 January 2023

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BLMTC.002 Rev.4

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Fax. (66) 0 2323 9165
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E-mail : sumalee@tistr.or.th

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request No.23-66/0161

2/2

MTC.No.23-66/0161

Calibration point : (0.05, 0.1, 0.2, 0.3, 0.4, 0.5, 1, 2, 3) l/min
Ambient condition : Temperature (23 ± 3) °C , Relative humidity (55 ± 15) %

Atmospheric pressure (1010 ± 13) hPa

Calibration method : The flowmeter (UUC) was calibrated by comparison method with
standard flowmeter according to CP-370.01.

The reported value is the value that converted to value at reference condition
within pressure and temperature of the actual gas entering the UUC

Measurement data :

UUC Value (l/min)	Standard Value (l/min)	Temperature (°C)	Pressure (hPa)	Deviation (%)	Uncertainty (%)
0.054	0.0572	24.920	1008.08	-5.52	1.42
0.105	0.1060	24.903	1008.16	-0.90	1.13
0.204	0.2058	24.897	1008.25	-0.88	1.02
0.304	0.3038	24.922	1008.32	-0.05	1.02
0.402	0.4039	24.937	1008.38	-0.47	1.03
0.504	0.5032	24.919	1008.45	+0.23	1.02
0.999	0.9948	24.906	1008.60	+0.45	0.92
2.003	1.9789	24.922	1009.20	+1.22	0.87
3.007	2.9759	24.923	1009.90	+1.04	0.87

The reported expanded uncertainties are based on standard uncertainties multiplied by
a coverage factor $k=2$, which provides a level of confidence of approximately 95%.

The end of calibration certificate.

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

CAL

Calibratech Co.,Ltd.

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

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



Certificate of Calibration

Certificate No. : 66-200300-1 **Page : 1 of 2**

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

Equipment : 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 : (25.6 to 26.7) °C
Relative Humidity : (54.4 to 56.6) %
Air Pressure : 1010.0 mbar

Date of Received : 20 September 2023

Date of Calibration : 20 September 2023

Date of Issue : 22 September 2023

Calibrated by : Akaradath Thippichai

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

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02222345	10 Nov 2023	National Institute of Metrology (Thailand), (NIMT)

Approved by :

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co.,Ltd.



CAL-F0031-03

CAL

Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 66-200300-1 **Page : 2 of 2**

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

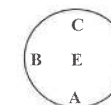
Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty ± (g)
0.001	0.00000	0.000012
0.01	0.00000	0.000013
0.1	0.00000	0.000015
1	0.00000	0.000026
10	0.00000	0.000053
20	-0.00003	0.000071
50	0.00004	0.00011
100	-0.00009	0.00020
150	0.00000	0.00038
200	-0.0001	0.00038

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.15$, providing a level of confidence of approximately 95%

Eccentric error Load test : 50 g
A B C D E
-0.00003 0.00000 0.00000 -0.00005 0.00000 g



Repeatability Load test : 200 g
Stdev. : 0.000048 g

- o0o -



CAL-F0031-03



JIRANATEE ASSOCIATES CO.,LTD

TEST REPORT

CUSTOMER NAME : M GREEN GROUP COMPANY LIMITED

EQUIPMENT NAME : SO₂ Analyzer

MANUFACTURER : HORIBA

MODEL : APSA-370

SERIAL NO : G8KGHRMX

STANDARD GAS CONCENTRATION (PPM) : 53.29 PPM

CYLINDER NO : CC734373

CYLINDER PRESSURE (PSI) : 1,000 PSI

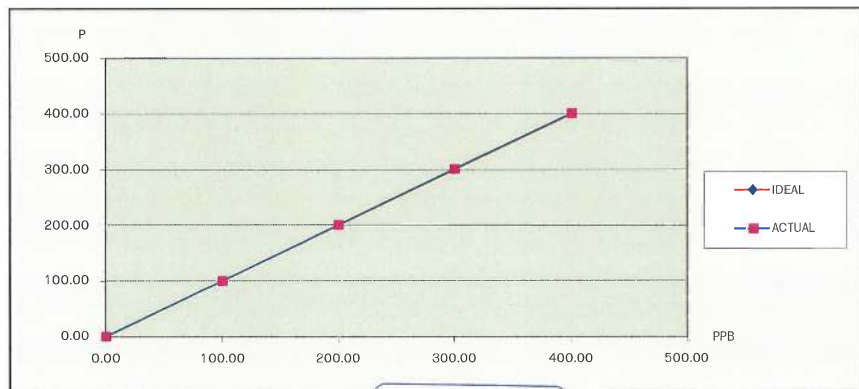
CERTIFIED DATE : 12/05/2020

CERTIFIED BY : AIRGAS

EXPIRED DATE : 12/05/2028

TEST RESULTS

POINT NO	TEST RESULTS			
	IDEAL	ACTUAL	ERROR	%ERROR
ZERO	0.00	0.22	0.22	-
1	100.00	99.88	-0.1	-0.12
2	200.00	200.25	0.3	0.13
3	300.00	300.72	0.7	0.24
4	400.00	400.54	0.5	0.14
AVERAGE (%)				0.10



CALIBRATED BY :

DATE : 18/10/66

CHECKED BY :

DATE : 18/10/66

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 15-16 , E-Mail : Engineer@jiranatee.com

เลขที่ 63/14-15,67/35-36 ถนน ซอยเพชรเกษม 7,7/1 เพชรเกษม แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889

FO-EN-206 R01/22-10-14



JIRANATEE ASSOCIATES CO.,LTD

CHECK LIST

CUSTOMER NAME : M GREEN GROUP COMPANY LIMITED

EQUIPMENT NAME : SO₂ Analyzer

MANUFACTURER : HORIBA

MODEL : APSA-370

SERIAL NO. : G8KGHRMX

TEST VALUES

NO.	Ambient SO ₂ Monitor	UNIT	BEFORE	AFTER
1	SIGNAL	mV (Voltage of the measured SO ₂ Value)	6.50	6.40
2	LAMP	mV (200mV to 1200 mV)	609.00	602.80
3	CELL	°C (Ambient tembient temperature +(5°C to 15°C))	30.70	36.00
4	PUMP	kPa (65 kPa or less)	42.50	43.70
5	AMBIENT	kPa	102.50	101.50
6	SAMPLE	L/min (0.6 L/min to 1.0 L/min)	-	-
7	DC 24 V	V (24 V ± 0.5 V)	23.90	23.90
8	DC 5 V	V (5 V ± 0.5 V)	5.00	5.00
9	SAMPLE SO2 Reading	PPB	1.38	2.06
10	Zero	PPB	-1.12	0.22
11	Span	PPB	472.42	400.54

Remark : Reference EX-EN-019-56 , Ambient SO₂ Monitor APSA-370 Operation Manual Page #78

(Ambient temperature = 5°C to 40°C)

อาการที่ตรวจพบ

- มีน้ำเข้าเครื่อง ทำให้ Cal ไม่ขึ้น , หน้าจอตกไม่ได้

รายละเอียดการดำเนินการ

- ทำการไล่น้ำออกจากเครื่อง , เปลี่ยน Touch Panel ใหม่ , ทำ Calibration Zero/Span , Multipoint

ผลการดำเนินการ

- เรียบร้อยแล้ว เครื่องสามารถดำเนินการตรวจวัดได้ตามปกติ

CALIBRATED BY :

DATE : 18/10/66

CHECKED BY :

DATE : 18/10/66

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 15-16 , E-Mail : Engineer@jiranatee.com

เลขที่ 63/14-15 , 67/35-36 ซอยเพชรเกษม 7,7/1 ถนนเพชรเกษม แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889

FO-EN-207 R01/28-09-14

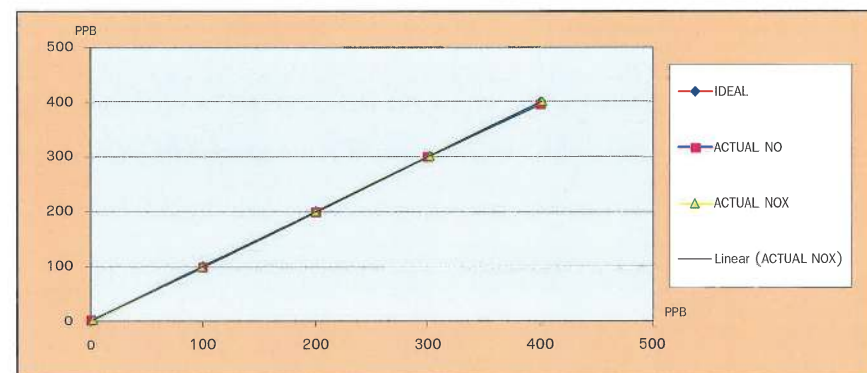


TEST REPORT

CUSTOMER NAME : M GREEN GROUP COMPANY LIMITED			
EQUIPMENT NAME : NO _x Analyzer			
MANUFACTURER : HORIBA		MODEL : APNA-370	SERIAL NO : RSBHK673
STANDARD GAS CONCENTRATION (PPM) : 53.15 PPM			CYLINDER NO : CC734373
CYLINDER PRESSURE (PSI) : 1,000 PSI			CERTIFIED DATE : 12/05/2020
CERTIFIED BY : AIRGAS			EXPIRED DATE : 12/05/2028

TEST RESULTS

POINT NO	TEST RESULTS						
	IDEAL	ACTUAL NO	ERROR NO	%ERROR NO	ACTUAL NO _x	ERROR NO _x	%ERROR NO _x
ZERO	0.00	0.88	0.88	-	1.20	1.20	-
1	100.00	102.49	2.49	2.49	101.79	1.79	1.79
2	200.00	201.84	1.84	0.92	201.89	1.89	0.94
3	300.00	301.20	1.20	0.40	302.15	2.15	0.72
4	400.00	400.51	0.51	0.13	401.16	1.16	0.29
AVERAGE (%)				0.98			0.94



CALIBRATED BY :  DATE : 19/10/66
 CHECKED BY :  DATE : 19/10/66

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 15,16 , E-Mail : Engineer@jiranatee.com
 เลขที่ 63/14-15,67/35-36 ซอยเพชรเกษม 7,7/1 ถนนเพชรเกษม แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889

FO-EN-206 R01/22-10-14



CHECK LIST

CUSTOMER NAME	: M GREEN GROUP COMPANY LIMITED		
EQUIPMENT NAME	: NO _x Analyzer		
MANUFACTURER	: HORIBA	MODEL :	APNA-370
		SERIAL NO. :	RSBHK673

TEST VALUES

NO.	NO _x Analyzer (APNA-370)	UNIT	BEFORE	AFTER
1	Signal (NO)	mV	14.600	2.800
2	Signal (NO _x)	mV	35.400	16.600
3	Detector	Temp °C , Standard Value : Ambient temp+(5°Cto15°C)	42.500	42.900
		Pressure kPa , Standard Value : (Ambient/1013x100-20)±4kPa	79.000	70.500
4	AMBIENT	kPa	102.500	101.500
5	SAMPLE	L/min (1.1 L/min ± 0.3 L/min)	-	-
6	DC 24 V	V (24 V ± 0.5 V)	23.700	23.700
7	DC 5 V	V (5 V ± 0.5 V)	5.000	5.000
8	Sampling NO Reading	PPB	12.940	2.540
9	Sampling NO ₂ Reading	PPB	20.050	21.400
10	Sampling NO _x Reading	PPB	32.990	24.000
11	Zero (NO)	PPB	-0.600	0.880
12	Span(NO)	PPB	364.620	400.510
13	Zero (NO _x)	PPB	-0.410	1.220
14	Span (NO _x)	PPB	357.370	401.160

Remark : Reference EX-EN-022-56 , "Ambient NO_x Monitor APNA-370 Operation Manual " Page #48

(Ambient temperature = 5°C to 40°C)

อาการที่ตรวจพบ

- มีน้ำเข้าเครื่อง ทำให้ Cal ไม่ขึ้น , หน้าจอติดไม่ได้

รายละเอียดการดำเนินการ

- ทำการใส่น้ำออกจากเครื่อง , เปลี่ยน Touch Panel ใหม่ , ทำ Calibration Zero/Span , Multipoint

ผลการดำเนินการ

- เรียบร้อย เครื่องสามารถดำเนินการตรวจวัดได้ตามปกติ

CALIBRATED BY :  DATE : 19/10/66
 CHECKED BY :  DATE : 19/10/66

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 15-16 , E-Mail : Engineer@jiranatee.com
 เลขที่ 63/14-15,67/35-36 ซอยเพชรเกษม 7,7/1 ถนนเพชรเกษม แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889

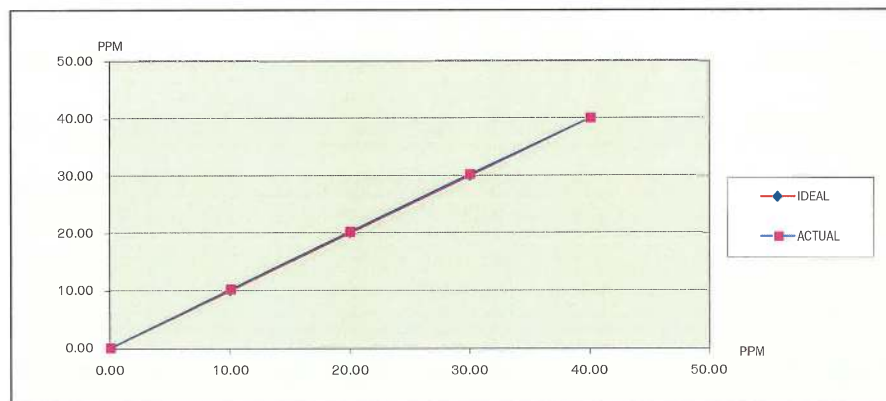
FO-EN-207 R00/01-08-13

TEST REPORT

CUSTOMER NAME : M GREEN GROUP COMPANY LIMITED			
EQUIPMENT NAME : CO Analyzer			
MANUFACTURER : HORIBA	MODEL : APMA-370	SERIAL NO : 84XJ1GRC	
STANDARD GAS CONCENTRATION (PPM) : 4533 PPM		CYLINDER NO : CC734373	
CYLINDER PRESSURE (PSI) : 1,000 PSI		CERTIFIED DATE : 12/05/2020	
CERTIFIED BY : AIRGAS		EXPIRED DATE : 12/05/2028	

TEST RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL	ACTUAL	ERROR	%ERROR
ZERO	0.00	0.00	0.00	-
1	10.00	10.20	0.2	2.00
2	20.00	20.21	0.2	1.05
3	30.00	30.21	0.2	0.70
4	40.00	40.00	0.0	0.00
AVERAGE (%)				0.94



CALIBRATED BY : [REDACTED] DATE : 20/10/66

CHECKED BY : [REDACTED] DATE : 20/10/66

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-8681246 , E-Mail : Sales@okla-testing.com
63/14-15,67/35-36 ซอยเพชรเกษม 7,7/1 แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 เบอร์โทร 02-8681246 แฟกซ์ 02-8680860

FO-EN-206 R01/22-10-14

CHECK LIST

CUSTOMER NAME : M GREEN GROUP COMPANY LIMITED		
EQUIPMENT NAME : CO Analyzer		
MANUFACTURER : HORIBA	MODEL : APMA-370	SERIAL NO. : 84XJ1GRC

TEST VALUES				
NO.	CO Analyzer (APMA-370)	UNIT	BEFORE	AFTER
1	Signal (MAIN)	mV	9.70	4.40
2	Signal (COMP)	mV	0.30	-4.50
3	CELL	°C , Standard Value : Ambient temperature +(5°Cto15°C)	28.40	32.00
4	PUMP	kPa	40.10	39.20
5	AMBIENT	kPa	102.50	101.50
6	SAMPLE	L/min (1 L/min to L/min)	-	-
7	OVER FLOW	L/min (1.2 L/min or more)	0.00	0.00
8	DC 24 V	V (24 V ± 0.5 V)	23.90	23.90
9	DC 5 V	V (5 V ± 0.5 V)	4.90	4.90
10	Sample Reading	PPM	0.83	0.86
11	Zero	PPM	-1.56	0.00
12	Span	PPM	41.55	40.00

Remark : Reference EX-SM-100-58 , "Ambient CO Monitor APMA-370 Operation Manual" Page #48
(Ambient temperature = 5°C to 40°C)

อาการที่ตรวจพบ

- มีน้ำเข้าเครื่อง ทำให้ Cal ไม่ขึ้น , หน้าจอติดไม่ได้ , Special Oring เสื่อมสภาพ ทำให้ Cal ไม่ขึ้น

รายละเอียดการดำเนินการ

- ทำการไล่ฝ้าออกจากเครื่อง , เปลี่ยน Touch Panel ใหม่ , เปลี่ยน Special Oring ใหม่

ทำ Check List Analyzer , ทำ Calibration Zero/Span , Multipoint

ผลการดำเนินการ

- เรียบร้อย เครื่องสามารถดำเนินการตรวจวัดได้ตามปกติ

CALIBRATED BY : [REDACTED] DATE : 20/10/66

CHECKED BY : [REDACTED] DATE : 20/10/66

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 15-16 , E-Mail : Engineer@jiranatee.com
เลขที่ 63/14-15,67/35-36 ซอยเพชรเกษม 7,7/1 ถนนเพชรเกษม แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889

FO-EN-207 R00/01-08-13



Certificate of Calibration

Certificate Number : SPR23030320-2 Page : 1 of 3
 Customer : M Green Group Co.,Ltd
 188/46, Pracha-Utd Rd., Thungkru, Bangkok 10140, Thailand

Equipment Name : Sound Level Meter
 Manufacturer : Pulsar
 Model : 45
 Serial Number : PN2448
 ID. Number : N/A

Environmental Conditions
 Ambient Temperature : 23 °C ± 3 °C Received Date : 20 Mar 2023
 Relative Humidity : 50 % ± 15 % Calibration Date : 22 Mar 2023
 Location of Calibration : In-Lab Recommend Due Date : 22 Mar 2024
 Calibration Procedure : SP-CPE-04-01 Date of Issue : 23 Mar 2023

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

All calibrations are performed within manufacture's specifications. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by :
 Calibration Officer

Approved by :



Calibration Report

Certificate Number : SPR23030320-2 Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Jan 2024

Traceability

This certification is traceable to the International System of Unit maintained at :
 TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate No. : SPR23030320-2

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A		UUC Reading		Error		Uncertainty (±)
Standard Setting		Fast	Slow	Fast	Slow	
94		93.9	93.9	-0.1	-0.1	0.15
114		113.9	113.9	-0.1	-0.1	0.15

Select C		UUC Reading		Error		Uncertainty (±)
Standard Setting		Fast	Slow	Fast	Slow	
94		94.0	94.0	0.0	0.0	0.15
114		114.0	114.0	0.0	0.0	0.15

Select Z		UUC Reading		Error		Uncertainty (±)
Standard Setting		Fast	Slow	Fast	Slow	
94		94.1	94.1	0.1	0.1	0.15
114		114.0	114.0	0.0	0.0	0.15

Note:

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.
- End of Certificate -



Certificate of Calibration

Certificate Number : SPR23030320-1

Page : 1 of 3

Customer : M Green Group Co.,Ltd

188/46, Pracha-Uttd Rd., Thungkru, Bangkok 10140, Thailand

Equipment Name	: Sound Level Meter		
Manufacturer	: Pulsar		
Model	: 45		
Serial Number	: PN2453		
ID. Number	: N/A		
Environmental Conditions			
Ambient Temperature	: 23 °C ± 3 °C	Received Date	: 20 Mar 2023
Relative Humidity	: 50 % ± 15 %	Calibration Date	: 22 Mar 2023
Location of Calibration	: In-Lab	Recommend Due Date	: 22 Mar 2024
Calibration Procedure	: SP-CPE-04-01	Date of Issue	: 23 Mar 2023

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.
All calibrations are performed within manufacture's specifications. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Chumpon Dokpikul

Approved by

Calibration Officer





Calibration Report

Certificate Number : SPR23030320-1

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Jan 2024

Traceability

This certification is traceable to the International System of Unit maintained at ;
TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate No. : SPR23030320-1

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.8	93.8	-0.2	-0.2	0.15
114	113.7	113.7	-0.3	-0.3	0.15

Select C Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select Z Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Note:

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,

Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280

Tel: +66 2709 4860 Fax: +66 2324 0917



NSC-TISI-TIS 17025
CALIBRATION 0119

Certificate No.: CP20230034EA
Operation No.: CP2023010028

Certificate of Calibration

Equipment: Sound Calibrator
Manufacturer: Scarlet Tech
Model/Type: ST-120
Serial No.: ST120C0247E
ID No.: -
Customer: M Green Group Co.,Ltd.
Address: 188/46, Pracha-Utid Rd.,
Thungkru, Bangkok 10140 Thailand.
Received Date: 12 January 2023
Calibrated Date: 16 January 2023
Issued Date: 18 January 2023
Calibrated by: Ms. Juntaporn Kunhakorn

Approved by:



Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor (k) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230034EA

Calibration Report

Equipment: Sound Calibrator
Manufacturer: Scarlet Tech
Model/Type: ST-120
Serial No.: ST120C0247E
ID No.: -
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa

Method of Calibration :-

IEC 60942:2017

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2661000	AA-1020-22	14 June 2023
2) Waveform Generator	33511B	MY52302264	CK20220058EA	19 June 2023
3) Audio Analyzing DMM	2015-P	4079144	E1U221042	16 March 2023
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P220024 CD20220164EA	17 March 2023 24 July 2023

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

3. This certification is traceable to the international system of unit maintained at :-

Reference standards instrument for Acoustic function

- National Institute of Metrology (Thailand)

Reference standards instrument for Electrical function

- Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

1. Function : Sound pressure level

Nominal Frequency (Hz)	Specified Sound Pressure level (dB)	Measured value (dB)	Deviated value ^[1] (dB)	Acceptance limit ^[3] (dB)
1000	94	94.04	0.04	±0.25
1000	114	114.10	0.10	±0.25

2. Function : Frequency

Normal Sound Pressure level (dB)	Specified Frequency (Hz)	Measured value (Hz)	Deviated value ^[2] (%)	Acceptance limit ^[3] (%)
94	1000	999.5	0.0	±0.7
114	1000	999.6	0.0	±0.7



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230034EA

Calibration Report

3. Function : Total distortion + noise

Nominal Sound Pressure level (dB)	Nominal Frequency (Hz)	Measured value ^[4] (%)	Acceptance limit ^[5] (%)
94	1000	0.5	2.5
114	1000	0.4	2.5

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

- Note:
- [1] The deviated value is the absolute value of the difference between the measured value and the corresponding specified sound pressure level.
 - [2] The deviated value is the absolute value of the difference in percent between the measured value and the corresponding specified frequency.
 - [3] The acceptance limit is for the deviated value.
 - [4] The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.
 - [5] The acceptance limit is for the Measured value.

Remarks: 1. Acceptance limit was IEC 60942:2017 Class 1.
2. The coverage factor $k = 2.00$

-- End of Report --



CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : VIBRATION METER
MANUFACTURER : N/A
MODEL / TYPE : V9000
SERIAL NO. : 2364
CLID. NO. : 252102170
JOB CONTROL NO. : 240109000883
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

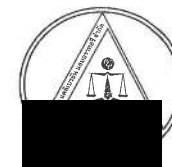
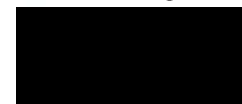
CUSTOMER : M GREEN GROUP COMPANY LIMITED
188/47 PRACHA UTHIT RD., BANG MOT,
THUNG KHURU, BANGKOK 10140

DATE OF RECEIVED : 09 January 2024

DATE OF ISSUED : 11 January 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Suwit Phuanbusabong
Calibration Engineer



Approved By :
Authorized Signatory
11 January 2024

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24000883

F3-011-05/12-23





CALIBRATION LABORATORY Co.,LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : VIBRATION METER
MANUFACTURER : N/A
MODEL / TYPE : V9000
SERIAL NO. : 2364
DATE OF CALIBRATION : 10 January 2024

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$ Relative Humidity : $(55 \pm 15) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. **WI-305-127** based on **ISO 16063-21** as calibration guideline.

The calibration was performed by using Digital Multimeter, Programmable Timer/Counter, Accelerometer and Measuring Amplifier which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

- Digital Multimeter, Hewlett Packard Model 34401A S/N. US36044686.
- Programmable Timer/Counter, Philips Model PM6680B S/N. SM607101.
- Accelerometer with Conditioning Amplifier, Bruel & Kjaer Model 8305, 2626 S/N. 705491, 1741406.

TRACEABILITY :

- The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. EE-0100-23, Due Date 01 December 2024.
- The measurements are traceable to International System of Units (SI), through Aeronautical Radio of Thailand Ltd. Certificate No. 07-0043/23, Due Date 12 April 2024.
- The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. AV-0053-23, Due Date 12 October 2024.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2,00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24000883
F3-011-05/12-23

page 2 of 3



CALIBRATION LABORATORY Co.,LTD.

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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

VELOCITY RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
(mm/s)	(frequency)		(mm/s)	(mm/s)	(mm/s)	\pm (% of rdg.)
10	160 Hz	peak	10.00	10.03	-0.03	1.0
20	160 Hz		20.00	19.72	+0.28	1.0
40	160 Hz		40.00	38.70	+1.30	1.0
60	160 Hz		60.00	57.50	+2.50	1.0
80	160 Hz		80.00	77.12	+2.88	1.0
100	160 Hz		100.00	96.15	+3.85	1.0

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 62 of 138

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q24000883
F3-011-05/12-23

page 3 of 3



ใบรับรองการสอบเทียบ “เครื่อง Gas Chromatography-FID”
(Calibration Certificate of Gas Chromatography-FID)



ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-244

Certificate of System Qualification

GC-OQ

System ID: GC_FID_CN12211142
Organization Name: Emex Association Co.,Ltd.
Organization Location: 29 Rama 2, Soi 30, Bangmod, Jomthong, Bangkok 10150, Thailand

Date: September 12, 2023 1:49:31 PM
EQP Name: AgilentRecommended
EQP Revision: GC.02.51
Overall Qualification Status: Pass

System Inspection and Basic Safety and Operation

Name: 7890
Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Decay

Name: 7890
Front SSL
Setpoint Status: Pass
Pressure: 25.0 psi
Pressure Change: 0.1 psi /5 minutes
Agilent Recommended: ≥ -2.0 and ≤ 0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890
Front SSL

Date: September 12, 2023 1:49:31 PM
System ID: GC_FID_CN12211142



ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-244

Setpoint Status: **Pass**

	Setpoint		Actual	
Inlet Pressure:	25.0	psi	25.1	psi
Accuracy:			0.1	psi
Agilent Recommended:			<= 1.2	

Overall Inlet Pressure Accuracy Test Status
Pass

Detector Flow Accuracy

Name: 7890
Front FID

Setpoint Status: **Pass**

Flow Type: Fuel

Setpoint:	30.0	mL/min	Measured Flow:	29.8	mL/min
Accuracy:		0.2	mL/min		
Agilent Recommended:		<= 10.0	% setpoint	(3.0	mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status: **Pass**

Flow Type: Oxidizer

Setpoint:	400.0	mL/min	Measured Flow:	398	mL/min
Accuracy:		2.0	mL/min		
Agilent Recommended:		<= 10.0	% setpoint	(40.0	mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status: **Pass**

Flow Type: Makeup

Setpoint:	25.0	mL/min	Measured Flow:	24.8	mL/min
Accuracy:		0.2	mL/min		
Agilent Recommended:		<= 10.0	% setpoint	(2.5	mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Date: September 12, 2023 1:49:31 PM
System ID: GC_FID_CN12211142



ห้องปฏิบัติการวิเคราะห์

เลขทะเบียน ว-244

Overall Detector Flow Accuracy Test Status
Pass

GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: **Pass**

Zone: Oven

	Setpoint/Actual	
Temperature:	230.0 231.2	°C
Accuracy:	1.2	°C
Agilent Recommended:	>= -1.0	% setpoint in K (-5.0 °C)
	<= 1.0	% setpoint in K (5.0 °C)

Setpoint Status: **Pass**

Zone: Oven

	Setpoint/Actual	
Temperature:	100.0 100.2	°C
Accuracy:	0.2	°C
Agilent Recommended:	>= -1.0	% setpoint in K (-3.7 °C)
	<= 1.0	% setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status
Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: **Pass**

	Setpoint/Average	
Temperature:	100.0 100.25	°C
Stability:	0.1	°C
Agilent Recommended:	<= -0.5	

Overall GC Oven Temperature Stability Test Status
Pass

Date: September 12, 2023 1:49:31 PM
System ID: GC_FID_CN12211142



ห้องปฏิบัติการวิเคราะห์

เลขทะเบียน ว-244

Scouting Run

Tested Combination1 Front SSL / Front FID
Injection Tower
Name: 7693A

Setpoint Status: Completed

Injection Volume on Column: 1.0 uL

Overall Scouting Run Status
Completed

Noise and Drift

Tested Combination1 Front SSL / Front FID
Name: 7890

Setpoint Status: Pass

Base Signal: 14.4 pA

ASTM Noise

Drift

pA

pA/Hr

0.06

1.38

Agilent Recommended: <= 0.10

<= 2.50

Status: Pass

Pass

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1 Front SSL / Front FID
Name: 7693A

Date: September 12, 2023 1:49:31 PM
System ID: GC_FID_CN12211142



ห้องปฏิบัติการวิเคราะห์

เลขทะเบียน

Setpoint Status: Pass

Injection Volume on Column: 1.0 uL

Area RSD: 0.23 % Retention Time RSD: 0.33 %

Agilent Recommended: <= 3.00 <= 1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination1 Front SSL / Front FID
Injection Tower
Name: 7890

Setpoint Status: Pass

Signal to Noise: 657777

Agilent Recommended: >= 300000

Overall Signal to Noise Test Status

Pass

Date: September 12, 2023 1:49:31 PM
System ID: GC_FID_CN12211142



ห้องปฏิบัติการวิเคราะห์

เลขทะเบียน

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	GC_FID_CN12211142
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination:

Injection Technique	Injection Tower
Inlet	Front
Detector	Front
LFM Included?	No

Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN12290137
Firmware Revision	A.10.08
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10



ห้องปฏิบัติการวิเคราะห์

เลขทะเบียน

Date: September 12, 2023 1:49:31 PM
System ID: GC_FID_CN12211142

Sampler 2

Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN12230009
Firmware Revision	A.10.16
Vial Heater	Not installed

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN12211142
Firmware Revision	A.01.15
Oven Type	Standard

Inlet 1

Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Front
Carrier Gas	Hellum
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1

Manufacturer	Agilent Technologies
Name	7890
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen



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เลขทะเบียน

Date: September 12, 2023 1:48:31 PM
System ID: GC_FID_CN12211142

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and login to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer: Sulkiil Mama
 Logged On User Name: sulkiil.mama@agilent.com
 Signature Creation Date: September 12, 2023
 Reason for Signature: Executed protocol and published this original version of document.

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and Medical Expert
EMEX ASSOCIATION

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เลขทะเบียน ว-

Date: September 12, 2023 1:49:31 PM
 System ID: GC_FID_CN12211142

File Name: su5533.mama System ID: GC_FID_CN12211142
 Report Generated by: sulkiil.mama AG-950203833333 Print Date: September 12, 2023 1:49:31 PM

6006184127_Emex_OQGC_CN12211142 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 12, 2023 10:26:17 AM	Auth	SessionCreated	Session	None
September 12, 2023 10:26:17 AM	Start	Configuration	Session	None
September 12, 2023 10:29:17 AM	Auth	Enrollment	Logging	User is Field Engineer and does not require an unlock code
September 12, 2023 10:46:01 AM	Auth	EqLoaded	Session	EQP details for primary technique [GC] - Flow path: [ProtocolPack\Gcp\Configurations\02.51\GC.02.51.eqp]. EQP File Name: [GC.02.51.eqp]. EQP Name: [Agilent\Agilent\02.51\GC.02.51] Protocol Revision: [GC.02.51]
September 12, 2023 10:49:08 AM	End	Configuration	Session	None
September 12, 2023 10:46:13 AM	Start	Qualification	Session	OQ
September 12, 2023 10:46:13 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No setpoints associated	None
September 12, 2023 10:48:07 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No setpoints associated	Run Count: 1
September 12, 2023 10:48:10 AM	Start	Execution	Inlet Pressure Decay - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None

EMEX Environmental
and Medical Expert
EMEX ASSOCIATION CO.,LTD.

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เลขทะเบียน ว-

Date: September 12, 2023 1:49:31 PM
 System ID: GC_FID_CN12211142

User Name: gulkidmuna
Report Generated by Username: AD-55727527X9

System ID: GC_FID_CN1221142
Print Date: September 12, 2023 4:49:34 PM

6086184127_Emax_OGGC_CN1221142 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 12, 2023 10:48:33 AM	End	Execution	Inlet Pressure Decay - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: >= 2.0 psi and ≤ 0.5 psi	Run Count: 1
September 12, 2023 10:48:40 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: ≤ 1.2 psi	None
September 12, 2023 10:48:54 AM	End	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: ≤ 1.2 psi	Run Count: 1
September 12, 2023 10:49:01 AM	Start	Execution	Detector Flow Accuracy - Front FID - Type: Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint	None
September 12, 2023 10:49:36 AM	Audit	Data	Detector Flow Accuracy - Front FID - Type: Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint	Manual Data Entry
September 12, 2023 10:49:36 AM	End	Execution	Detector Flow Accuracy - Front FID - Type: Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint	Run Count: 1
September 12, 2023 10:50:29 AM	Start	Execution	Detector Flow Accuracy - Front FID - Type: Oxidizer - S: 400.0 mL/min - L: ≤ 10.0% setpoint	None
September 12, 2023 10:51:06 AM	Audit	Data	Detector Flow Accuracy - Front FID - Type: Oxidizer - S: 400.0 mL/min - L: ≤ 10.0% setpoint	Manual Data Entry
September 12, 2023 10:51:11 AM	End	Execution	Detector Flow Accuracy - Front FID - Type: Oxidizer - S: 400.0 mL/min - L: ≤ 10.0% setpoint	Run Count: 1
September 12, 2023 10:52:15 AM	Start	Execution	Detector Flow Accuracy - Front FID - Type: Makeup - S: 25.0 mL/min - L: ≤ 10.0% setpoint	None

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ห้องปฏิบัติการวิเคราะห์
เลขทะเบียน

Date: September 12, 2023 1:49:31 PM
System ID: GC_FID_CN1221142

Page 10 / 14

User Name: gulkidmuna
Report Generated by Username: AD-55727527X9

System ID: GC_FID_CN1221142
Print Date: September 12, 2023 1:49:33 PM

6086184127_Emax_OGGC_CN1221142 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 12, 2023 10:58:03 AM	Audit	Data	Detector Flow Accuracy - Front FID - Type: Makeup - S: 25.0 mL/min - L: ≤ 10.0% setpoint	Manual Data Entry
September 12, 2023 10:58:07 AM	End	Execution	Detector Flow Accuracy - Front FID - Type: Makeup - S: 25.0 mL/min - L: ≤ 10.0% setpoint	Run Count: 1
September 12, 2023 10:53:10 AM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature Oven - S: 230.0°C - L: >= -1.0 AND ≤ 1.0 % setpoint in K	None
September 12, 2023 10:54:39 AM	Audit	Data	GC Oven Temperature Accuracy - 7890 - Temperature Oven - S: 230.0°C - L: >= -1.0 AND ≤ 1.0 % setpoint in K	Manual Data Entry
September 12, 2023 10:54:41 AM	End	Execution	GC Oven Temperature Accuracy - 7890 - Temperature Oven - S: 230.0°C - L: >= -1.0 AND ≤ 1.0 % setpoint in K	Run Count: 1
September 12, 2023 10:54:46 AM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature Oven - S: 100.0°C - L: >= -1.0 AND ≤ 1.0 % setpoint in K	None
September 12, 2023 11:06:02 AM	Audit	Data	GC Oven Temperature Accuracy - 7890 - Temperature Oven - S: 100.0°C - L: >= -1.0 AND ≤ 1.0 % setpoint in K	Manual Data Entry
September 12, 2023 11:03:04 AM	End	Execution	GC Oven Temperature Accuracy - 7890 - Temperature Oven - S: 100.0°C - L: >= -1.0 AND ≤ 1.0 % setpoint in K	Run Count: 1
September 12, 2023 11:06:07 AM	Start	Execution	GC Oven Temperature Stability - 7890 - Temperature - Oven - S: 100.0°C - L: ≤ 0.5°C	None

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ห้องปฏิบัติการวิเคราะห์
เลขทะเบียน

Date: September 12, 2023 1:49:31 PM
System ID: GC_FID_CN1221142

User Name: culkibhanna
Report Generated by Hostname: AQ-ECG2600XXV

System ID: GC_FID_CN1221142
Print Date: September 12, 2023 1:42:29 PM

6060164127_Emes_DQGC_CN1221142 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 12, 2023 11:40:11 AM	Audit	Start	GC Oven Temperature Stability	Manual Data Entry - 7890 - Temperature : Oven - S: 105.0°C - L: <= 0.5°C
September 12, 2023 11:40:13 AM	End	Execution	GC Oven Temperature Stability	Run Count : 1 - 7890 - Temperature : Oven - S: 105.0°C - L: <= 0.5°C
September 12, 2023 1:22:15 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID - Part of System Preparation - No limits associated	None
September 12, 2023 1:27:32 PM	Audit	AccClosed	Session	None
September 12, 2023 1:28:53 PM	Audit	AccRestored	Session	None
September 12, 2023 1:28:56 PM	Audit	SessionReloaded	Session	None
September 12, 2023 1:29:01 PM	Start	Qualification	Session	QQ
September 12, 2023 1:29:01 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID - Part of System Preparation - No limits associated	None
September 12, 2023 1:31:01 PM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front FID - Part of System Preparation - No limits associated	Data files Path : F:\Data\EMEX\002923_GC-FID 2023-09-12 12-06-24\IP_3_DF\FID1A.ch
September 12, 2023 1:31:49 PM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID - Part of System Preparation - No limits associated	Run Count : 1

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ห้องปฏิบัติการวิเคราะห์

เลขทะเบียน 2

Date: September 12, 2023 1:49:31 PM
System ID: GC_FID_CN1221142

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User Name: culkibhanna
Report Generated by Hostname: AQ-ECG2600XXV

System ID: GC_FID_CN1221142
Print Date: September 12, 2023 1:45:13 PM

6060164127_Emes_DQGC_CN1221142 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 12, 2023 1:31:51 PM	Start	Execution	Noise and Drift - Front FID - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
September 12, 2023 1:32:06 PM	Audit	Data	Noise and Drift - Front FID - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : F:\Data\EMEX\002923_GC-FID 2023-09-12 12-06-24\IP_3_DF\FID1A.ch
September 12, 2023 1:32:40 PM	End	Execution	Noise and Drift - Front FID - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
September 12, 2023 1:32:49 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
September 12, 2023 1:33:08 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\Data\EMEX\002923_GC-FID 2023-09-12 12-06-24\IP_3_DF\FID1A.ch
September 12, 2023 1:33:08 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\Data\EMEX\002923_GC-FID 2023-09-12 12-06-24\IP_3_DF\FID1A.ch
September 12, 2023 1:33:08 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\Data\EMEX\002923_GC-FID 2023-09-12 12-06-24\IP_3_DF\FID1A.ch
September 12, 2023 1:33:09 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\Data\EMEX\002923_GC-FID 2023-09-12 12-06-24\IP_5_DF\FID1A.ch

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ห้องปฏิบัติการวิเคราะห์

เลขทะเบียน 2-24

Date: September 12, 2023 1:49:31 PM
System ID: GC_FID_CN1221142

User Name: wutthilaksana
Report Generated by: wutthilaksana
System ID: GC_FID_CN12211142
Print Date: September 12, 2023 1:49:31 PM

6606184127_Emax_OQGC_CN12211142 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 12, 2023 1:33:35 PM	Audit	Date	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data file Path: F:\Data\EMAX\OQ2023_GC_FID 2023-09-12 12-06-24\IP_6.D\FID1A.ch
September 12, 2023 1:33:08 PM	Audit	Date	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data file Path: F:\Data\EMAX\OQ2023_GC_FID 2023-09-12 12-06-24\IP_7.D\FID1A.ch
September 12, 2023 1:33:32 PM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count: 1
September 12, 2023 1:33:42 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID - Detector FID - L >= 300000	None
September 12, 2023 1:33:54 PM	Audit	Date	Signal to Noise - Injection Tower, Front SSL, Front FID - Detector FID - L >= 300000	Data file Path: F:\Data\EMAX\OQ2023_GC_FID 2023-09-12 12-06-24\SN.D\FID1A.ch
September 12, 2023 1:34:27 PM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID - Detector FID - L >= 300000	Run Count: 1
September 12, 2023 1:34:50 PM	End	Qualification	Session	OQ
September 12, 2023 1:34:50 PM	Start	Reporting	Session	None
September 12, 2023 1:48:10 PM	Audit	Reporting	Session	Report Generated: Certificate
September 12, 2023 1:48:35 PM	Audit	Reporting	Session	Report Generated: Report

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ห้องปฏิบัติการวิเคราะห์

เลขทะเบียน 7-277

Date: September 12, 2023 1:49:31 PM
System ID: GC_FID_CN12211142

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NSC-TIS-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 66-420087-1

Page : 1 of 2

Submitted by : M Green Group Co.,Ltd.

188/46 Wisatesukhakhon 25, Pracha-Uttd Rd., Thungkru Bangkok 10140 Thailand

Equipment : pH Meter with electrode
pH meter

Manufacturer : Eutech Model : pH 700
Range : N/A pH Resolution : 0.01 pH
Serial No. : 2884323 ID No. : N/A

Electrode
Model : N/A Serial No. : 01X099320

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

Ambient Temperature : (25.0 to 25.5)°C

Relative Humidity : (45 to 50) %

Date of Received : 20 September 2023

Date of Calibration : 20 September 2023

Date of Issue : 25 September 2023

Calibrated by : Permpon Chanpu

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	61270213	915161	19 Jul 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.985	61275614	898428	28 May 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
9.997	61281073	915163	19 Jul 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approve

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-420087-1

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	0.1	-0.1	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	0.010
	6.985	7.00	-0.01	0.011
	9.997	10.01	-0.01	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. : 66-400519-1

Page : 1 of 2

Submitted by :

M Green Group Co.,Ltd.

188/46 Wisatesukhakhon 25, Pracha-Uttd Rd., Thungkru Bangkok 10140 Thailand

Equipment :

Digital Thermometer with Thermistor probe

Temperature Indicator

Manufacturer : Eutech

Model : pH 700

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 2884323

ID No. : N/A

Thermistor probe

Model : N/A

Sheath Material : Stainless

Diameter : 3.2 mm.

Length : 100 mm.

Serial No. : PH5TEMB01P

ID No. : N/A

Environment :

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

Ambient Temperature : (25.0 to 26.0) °C

Relative Humidity : (56 to 60) %

Line Voltage : (224.0 to 225.2) VAC

Date of Received : 20 September 2023

Date of Calibration : 20 September 2023

Date of Issue : 25 September 2023

Calibrated by : Permpon Chanpu

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-0074-22	20 Jun 2024	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400033	22E569	22 Feb 2024	National Institute of Metrology Thailand (NIMT)

Approved by

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03



CAL-F0031-03

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Certificate of Calibration

Certificate No. : 66-400519

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)
100	25.006	24.9	0.1	0.19

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%

- o0o -

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Certificate of Calibration

Certificate No. : 66-200300-1

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

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

Equipment : 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 : (25.6 to 26.7) °C

Relative Humidity : (54.4 to 56.6) %

Air Pressure : 1010.0 mbar

Date of Received : 20 September 2023

Date of Calibration : 20 September 2023

Date of Issue : 22 September 2023

Calibrated by : Akaradath Thippichai

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

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02222345	10 Nov 2023	National Institute of Metrology (Thailand), (NIMT)

Approved by

Laboratory Manager

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CAL-F0031-03



CAL-F0031-03

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Certificate of Calibration

Certificate No. : 66-200300-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.001	0.00000	0.000012
0.01	0.00000	0.000013
0.1	0.00000	0.000015
1	0.00000	0.000026
10	0.00000	0.000053
20	-0.00003	0.000071
50	0.00004	0.00011
100	-0.00009	0.00020
150	0.00000	0.00038
200	-0.0001	0.00038

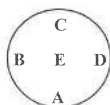
This result of calibration was found accurate as shown on date and place of calibration only.

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.15$, providing a level of confidence of approximately 95%

Eccentric error Load test : 50 g

A	B	C	D	E
-0.00003	0.00000	0.00000	-0.00005	0.00000

g



Repeatability Load test : 200 g

Stdev. : 0.000048 g

- o O o -



CAL-F0031-03

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Certificate of Calibration

Certificate No. : 66-400531-1

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.
188/46 Wisatesuknakhon 25, Pracha-Uttd 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 : 21 September 2023

Date of Calibration : 23 September to 26 September 2023

Date of Issue : 26 September 2022

Calibrated by : Chortip Samchusri

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	Traceability
400001	TT-0016-22	07 Feb 2024	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400003	23E1866	01 Jun 2025	National Institute of Metrology Thailand (NIMT)
400004	23E1866	01 Jun 2025	National Institute of Metrology Thailand (NIMT)

Approved by

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03

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Certificate of Calibration

Certificate No. : 66-400531-1

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 0.0352 °C

Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
39.7228	40	-0.3	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%

- ๐๐๐ -

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NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 66-400520-1

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisatesukhakhon 25, Pracha-Uttd Rd., Thungkru Bangkok 10140 Thailand

Equipment : Air Chamber (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 : (25.0 to 26.0) °C

Relative Humidity : (40 to 50) %

Line Voltage : (226.0 to 230.0) V

Date of Received : 20 September 2023

Date of Calibration : 20 September 2023

Date of Issue : 25 September 2023

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

ID No.

Cert. No.

Due Date

Traceability

400046 & 400042 66-400453-1

31 Jan 2024

National Institute of Metrology Thailand (NIMT)

Approved by

Laboratory Manager

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Certificate of Calibration

Certificate No. : 66-400520-1

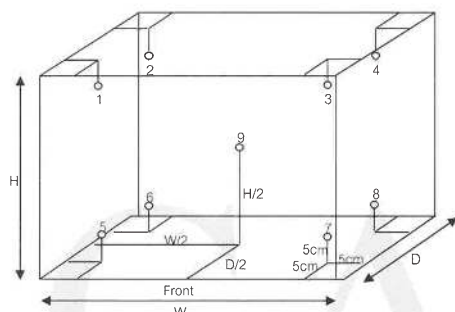
Page : 2 of 2

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.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
4.0	2.0	2.0	4.05	4.04	4.27	4.89	4.10	4.05	4.92	4.37	4.43	0.46

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
4.0	2.0	2.0	0.60	0.21	1.2

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%

- o0o -



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Certificate of Calibration

Certificate No. : 66-400520-2

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisatesukhakhon 25, Pracha-Utid Rd., Thungkru Bangkok 10140 Thailand

Equipment : Air Chamber (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 : (25.0 to 26.0) °C

Relative Humidity : (40 to 50) %

Line Voltage : (226.0 to 230.0) V

Date of Received : 20 September 2023

Date of Calibration : 20 September 2023

Date of Issue : 25 September 2023

Calibrated by : Permpoon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with Thermocouple probe

ID No.

Cert. No.

Due Date

Traceability

400046 & 400028 66-400184-3

04 Oct 2023

National Institute of Metrology Thailand (NIMT)

Approved

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03



CAL-F0031-03

CAL

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

Certificate of Calibration

Certificate No. : 66-400520-2

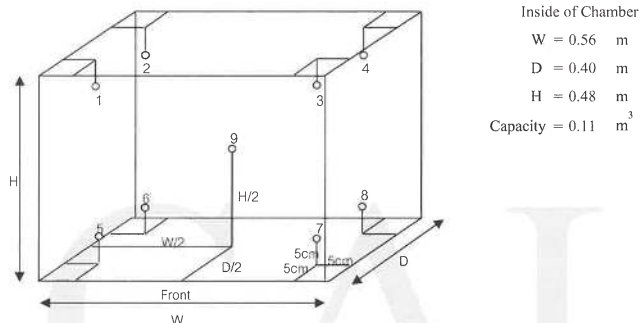
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber
W = 0.56 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) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
103.0	103.0	103.0	103.3	103.0	103.7	103.3	103.1	103.0	103.8	102.7	103.3	0.69
105.0	105.0	105.0	105.3	105.0	105.7	105.3	105.2	105.0	105.8	104.6	105.3	0.71
180.0	180.0	180.0	180.4	180.1	181.2	180.4	180.3	180.0	181.4	179.0	180.5	0.95

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
103.0	103.0	103.0	0.8	0.1	1.3
105.0	105.0	105.0	0.9	0.1	1.4
180.0	180.0	180.0	1.7	0.2	2.7

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%

- o0o -

CAL

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NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 66-400520-3

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisatesukhakhon 25, Pracha-Uttd Rd., Thungkru 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 : (25.0 to 26.0) °C

Relative Humidity : (40 to 50) %

Line Voltage : (226.0 to 230.0) V

Date of Received : 20 September 2023

Date of Calibration : 20 September 2023

Date of Issue : 25 September 2023

Calibrated by : Permpon 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 66-400184-2

06 Oct 2023

National Institute of Metrology Thailand (NIMT)

Approve

Laboratory Manager

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Certificate of Calibration

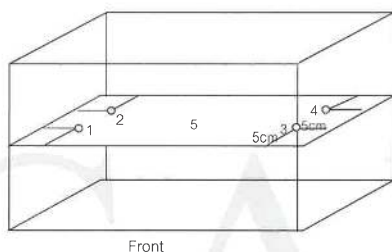
Certificate No. : 66-400520-3

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.					Uncertainty (± °C)	Measured Uniformity (°C)	Measured Stability (°C)
			1	2	3	4	5			
85.0	85.0	85.0	85.08	85.04	84.98	85.17	85.02	0.18	0.2	0.05

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%

- o0o -

CAL

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NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 66-400520-4

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisatesukhakhon 25, Pracha-Uttd Rd., Thungkru Bangkok 10140 Thailand

Equipment : Air Chamber (Incubator)

Manufacturer : Biobase

Model : Biochemistry Incubator

Range : 0 °C to 65 °C

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 : (25.0 to 25.5) °C

Relative Humidity : (45 to 50) %

Line Voltage : (226.0 to 230.0) V

Date of Received : 20 September 2023

Date of Calibration : 20 September 2023

Date of Issue : 25 September 2023

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

ID No.

Cert. No.

Due Date

Traceability

400029 & 400043 66-400226-1

27 Oct 2023

National Institute of Metrology Thailand (NIMT)

Approved by

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03



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Certificate of Calibration

Certificate No. : 66-400520-4

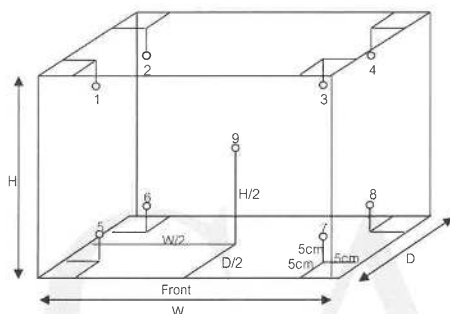
Page : 2 of 2

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 = 0.45 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	20.0	20.0	20.14	20.04	19.91	19.97	20.03	19.96	19.91	19.96	19.92	0.70

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.0	20.0	0.28	0.37	0.8

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%

- o0o -



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Certificate of Calibration

Certificate No. : 66-300589-7

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisatesuknakhon 25, Pracha-Uttd 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 : 1006.7 mbar.

Date of Received : 20 September 2023

Date of Calibration : 27 September 2023

Date of Issue : 27 September 2023

Calibrated by : Wipa Tovadee

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.

241003

Cert. No.

66-200196-2

Due Date

02 Dec 2023

Traceability

National Institute of Metrology (Thailand) (NIMT)

Approved by :



Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03



CAL-F0031-03

CAL

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Certificate of Calibration

Certificate No. : 66-300589-7

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 : 21.33 sec.

Nominal Volume (ml)	Measuring Volume (ml)
10	9.9913

Uncertainty of measurement with in \pm 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%

- o O o -

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NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 66-300589-8

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisatesuknakhon 25, Pracha-Uttd 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 : 1006.7 mbar.

Date of Received : 20 September 2023

Date of Calibration : 27 September 2023

Date of Issue : 27 September 2023

Calibrated by : Wipa Tovadee

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.	Cert. No.	Due Date	Traceability
241003	66-200196-2	02 Dec 2023	National Institute of Metrology (Thailand) (NIMT)

Approved by :

Supervisor



CAL-F0031-03



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CAL-F0031-03

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Certificate of Calibration

Certificate No. : 66-300589-8

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 : 46.01 sec.

Nominal Volume (ml)	Measuring Volume (ml)
25	24.9741

Uncertainty of measurement with in \pm 0.0066 ml

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

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

-oOo-

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Certificate of Calibration

Certificate No. : 66-300590-1

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

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

Equipment : Imhoff Cone

Manufacturer : VITLAB

Capacity : 1000 ml Graduation : 50 ml

ID No. : CY1000/01/22

Environment : Ambient Temperature : (20 \pm 3) °C

Relative Humidity : (50 \pm 10) %

Air Pressure : 1005.4 mbar.

Date of Received : 20 September 2023

Date of Calibration : 26 September 2023

Date of Issue : 26 September 2023

Calibrated by : Areerat 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.	Cert. No.	Due Date	Traceability
241002	66-200196-1	02 Dec 2023	National Institute of Metrology (Thailand) (NIMT)

Approved by :

Supervisor



CAL-F0031-03

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Certificate of Calibration

Certificate No. : 66-300590-1

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	501.19
1000	1010.67

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 -

๗15

ใบรับรองการทวนสอบ "เครื่องกลั่นไนโตรเจน"

(Calibration Certificate of Distillation Unit VAPODEST

VAP20, VAP30s)



การดูแลบำรุงรักษาเชิงป้องกัน

Preventive Maintenance



บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด

ฝ่ายบริการหลังการขาย

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

ฝ่ายขายและการตลาด

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

เงื่อนไขการให้บริการ Preventive Maintenance

บริษัทฯ จะส่งวิศวกรผู้ชำนาญ เพื่อให้บริการตามขอบข่ายของการบริการ เฉพาะ ในวันและเวลา ราชการ หากมี
ความประสงค์ที่จะรับบริการนอกเหนือจากวัน เวลา ราชการ (วันหยุดเสาร์ – อาทิตย์ หรือวันหยุดนักขัตฤกษ์) บริษัทฯ
จะคิดค่าบริการเพิ่มเติมตามอัตราที่กฎหมายแรงงานกำหนดไว้

ขอบข่ายการบริการ

- ตรวจสอบสภาพการทำงานต่าง ๆ ของเครื่องมือ
- ทดสอบประสิทธิภาพการทำงานของเครื่องมือ
- รายการผลการตรวจสอบเครื่องมือ

หมายเหตุ

- ราคานี้ไม่รวมถึงค่าบริการซ่อม หรือ เปลี่ยนอะไหล่ที่ชำรุดเสียหาย หรือหมดสภาพการใช้งาน
- ในกรณีที่ผู้รับบริการอยู่นอกเขตพื้นที่ให้บริการ บริษัทฯ จำเป็นต้องคิดค่าใช้จ่ายเพิ่มเติม ได้แก่ ค่าเดินทาง
เป็นต้น
- บริษัทฯ ขอสงวนสิทธิ์ในการเปลี่ยนแปลงราคา โดยไม่แจ้งให้ทราบล่วงหน้า



ช่องทางการติดต่อ

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



Call center 0 2 639 7000



DKSH Scientific



www.dksh.com/scientific-thailand



marketing.tec.th@dksh.com



@dkshscientific

Preventive Maintenance Contract

จำนวนในการทำสัญญาบริการ 1 ครั้ง ต่อ ปี

ครั้งที่ 1 / วันที่ 28 Mar 2023

รายละเอียดผู้รับบริการ

หน่วยงาน	บริษัท เทสท์ เทคโนโลยี จำกัด		
ที่อยู่	30,32 ซอยพระรามที่ 2 ซอย 63 ถนนพระรามที่ 2 แขวงสามยุค เขตบางขุนเทียน กรุงเทพมหานคร 10150		
โทรศัพท์	0-2893-4211-7	แฟกซ์	0-2893-4218

ผู้ติดต่อ

ชื่อ - นามสกุล	คุณมริสา วิเศษสังข์		
ตำแหน่ง	หัวหน้าส่วน		
โทรศัพท์	0-2893-4211-7	เบอร์ติดต่อ	แฟกซ์ 0-2893-4218
E-mail	Lab_center@testtech.co.th		

รายละเอียดผู้ให้บริการ

บริษัท ดีเทคเอส เทคโนโลยี จำกัด (ฝ่ายบริการหลังการขาย) (สำนักงานใหญ่) เลขที่ 2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพฯ 10260 โทรศัพท์ 0 2 693 7000 Email: siriporn_sy@dksh.com Line ID : siripon3007 เจ้าหน้าที่ประสานงาน : คุณศิริพร อยู่ทองอยู่ โทรศัพท์ 090 678 6924 , 02 301 7467	
เจ้าหน้าที่ผู้ให้บริการ	นายจิรายุทธ สกลอด
ตำแหน่ง	Specialist, Technical Service.
โทรศัพท์	0938138736 แฟกซ์ -
E-mail	Jirayut.js@dksh.com

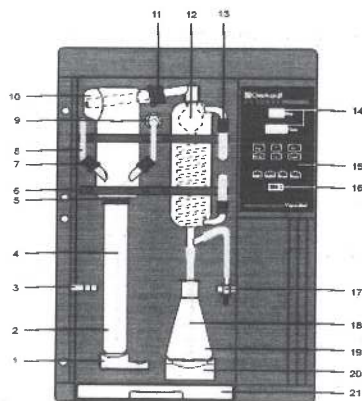
ลงนามผู้รับบริการ		ลงนามผู้ให้บริการ	
ตัวบรรจง	(.....)	ตัวบรรจง	
ตำแหน่ง		ตำแหน่ง	Specialist, Technical Service
วันที่ / ประทับตราบริษัท		วันที่ / ประทับตราบริษัท	28/3/2023

JOB No: Lspr2302591 MODEL: Vap30 S/N: 003718

Part : Operational Qualification (OQ)

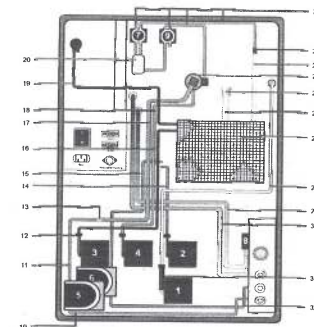
ตรวจสอบสภาพเครื่อง

FRONT



	Pass	Fail	N/A	Remark
1. Quick clamping device with wedge	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Kjeldatherm digestion tube	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Holder for steam inlet tubing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. PTFP-Inlet tubing, steam	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Viton-cone	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Clamping for glassware	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Screw cap GL18 with silicone seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. PTFP-Inlet tubing, NaOH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. PP-Distributor with PP-threaded joint	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Distribution head, glass	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Screw cap GL32 with silicone seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Distillation condenser	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Screw cap GL14 with plastic screw connection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Keyboard, chemical-resistant	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Main switch, green	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Ventilation valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Distillate outlet tubing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Erlenmeyer flask	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Platform	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Drip tray	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

REAR



	Pass	Fail	N/A	Remark
1. Diaphragm pump NaOH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Diaphragm pump H ₃ BO ₃	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	vap 40 only
3. Diaphragm pump H ₂ O for steam generator	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Diaphragm pump H ₂ O for sample	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	vap 30,40 only
5. Peristaltic pump for suction sample	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	vap 30,40 only
6. Peristaltic pump for suction receiver	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	option
7. Pinch-solenoid valve, steam	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Magnetic valve with pressure control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Pinch-solenoid valve, shut-off	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Verprene-tubing 4x8 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Verprene-tubing 4x8 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	vap 30,40 only
12. Non-return valve for diaphragm pumps	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Tubing reduction PP 51x10x5 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	vap 30,40 only
14. Silicone tubing 4x7 mm.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	vap 40 only
15. Silicone tubing 4x7 mm.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	option
16. Silicone -tubing 4x7 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Verprene-tubing 8x12 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	vap 30,40 only
18. Verprene tubing 4x7 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	vap 30,40 only
19. Silicone tubing 4x7 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Ventilation glass	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Novoprene-tubing 4.8x8 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Tubing reduction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Silicone tubing 6x10 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. PP-distributor with PP-thread	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. SKT-valve (built in with brass fitting)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Silicone tubing 8x16x80 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Steam generator	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. PTFE-inlet tubing NaOH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Silicone tubing 8x16 for cooling water inlet	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Silicone tubing 8x16 for cooling water outlet	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Viton-tubing 6x12*50 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Silicone tubing 4x7 mm.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	option

รายละเอียดการตรวจสอบ

ขั้นตอนการบริการ

ตรวจสอบระบบไฟฟ้า (Electrical Test)

- ความต้านทานทางไฟฟ้าของเครื่องกับกราวด์
- กระแสไฟฟ้าใช้งาน

ตรวจสอบสภาพเครื่อง (Optical Test)

- Main cable
- Electric wiring
- Pumps
- Distribution Head
- Condensor
- Steam generator
- Tubing
- Viton cone

ตรวจสอบ Function การทำงาน (The Function Test)

- ระบบสร้างและควบคุมความดันของ Steam
- ระบบการเติมน้ำเข้า Sample Tube
- ระบบการเติม Na OH
- ระบบการ Suction ตั้ง Sample Tube และ Receiver

รายงานผลการให้บริการ

1. TECHNICAL DATA

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

Pass	Fail	N/A	Remark
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6 a.....

1.1 COOLING WATER BATH

Temperature 15-20 °C

Cooling Water Outlet

Control Temperature

Pass	Fail	N/A	Remark
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1.2 OPTICAL TEST VAP..30..

Screw cap GL14

Screw cap GL18

Screw cap GL32

Distillation Head

Condensor

Viton Cone

Ventilation Valve

Micro Switch Sample

Pass	Fail	N/A	Remark
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. SYSTEM COOLING WATER INLET

Cooling Water Inlet

Cooling Water Outlet

Magnetic valve

Pass	Fail	N/A	Remark
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.SYSTEM CONTROL

Key Board

Display

Program

Adding H₂O

Adding NaOH

Adding H₃BO₃

Suction Sample

Pass	Fail	N/A	Remark
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	vap 30,40 only
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	vap 40 only
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	vap 30,40 only

4.SYSTEM DISTILLATION

Boiler

Level Sensor

Novoprene-Tubing

Solenoid Valve Shut-Off

Solenoid Valve Steam

Excess Pressure Detector

Ventilation Valve

Heater

Pass	Fail	N/A	Remark
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. PUMP

	Pass	Fail	N/A	Remark
Pump H ₂ O Steam	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Non-Return Valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pump H ₂ O Sample	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Non-Return Valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pump NaOH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Non-Return Valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pump H ₃ BO ₃	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
- Non-Return Valve	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pump Suction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. The Following Program Run :

	Pass	Fail	N/A	Remark
Addition H ₂ O 0-99 sec.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Addition NaOH 0-99 sec.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Addition H ₃ BO ₃ 0-99 sec.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Reaction Time 0-99 min.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Distillation Time 0-99 min	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steam Capacity 30%-100%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Suction Time 0-99 sec.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The Instrument is in perfect technical shape	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Remark :

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Part : ข้อมูลสนับสนุนด้านเทคนิค (General Technical Support)

การบำรุงรักษาทั่วไป (Basic maintenance)

Cleaning

Glass parts and suction pump should be cleaned before long periods of non-usage (i.e. holidays). This way blockages caused by crystalline deposits are avoided.

The following program should be run:





Addition H ₃ BO ₃	0	s
Addition H ₂ O:	13	s
Addition NaOH:	0	s
Reaction time:	0	s
Distillation time:	7	min.
Steam capacity:	100	%
Suction time:	20	s

Place an empty digestion tube and an Erlenmeyer flask into position, and start the program.

In case of extreme deposits in the glassware you can clean the system by putting about 10 ml of sulphuric acid into the digestion tube.

Error Code


The micro-processor continually surveys all the functions of the distillation system. As soon as an error arises it is shown on the display and accompanied by an acoustic signal.

Error message	Measures
No tap water	Check cooling water inlet for blockages. Ensure the tap is turned on → 
No sample tube	Insert tube → 
Check chemicals	Check set of tanks → 
Low water Press Enter	Check the water inlet distilled H ₂ O → 
↓ Filling Steam generator	This message disappears as soon as steam generator is filled

After the above mentioned errors are corrected, the following message is displayed.

Error message	Measures
Stop Prog. No. x Continue=Enter	Enter = continue of interrupted program Reset = Standby-mode

Other error messages

Error message	Measures
Wait for steam	Message disappears as soon as stand-by is reached
Add sol. > 1min Continue=Enter	Check programming Enter=continue of interrupted program Reset=Standby-mode
Program undefined	Check programming → 
Excess steam pressure	Switch the system off and call service
Sensor error	Switch the system off and call service