

ภาคผนวก จ

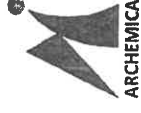
เอกสารรับรองเครื่องมือการตรวจวัด

ใบรับรองการสอบเทียบ “เครื่อง Ion chromatography”

(Calibration Certificate of Ion chromatography)



ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-244



Certificate of Calibration

Aquion: Anion (ID#822)

This certificate is to verify that instrument below are calibrated

by Archemica Lab Co., Ltd.

Aquion S/N: 180344663

For

Emex Association Co., Ltd.



ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-244

Operator Signature: _____

Date: January 10, 2022

(Mr. Thitipong Piromkripuk)

Applications Chemist



Checklist ICS Preventive Maintenance

Dionex Ion Chromatography
Preventive Maintenance Report

Customer Organization:	Name/ Department
Emex Association Co., Ltd.	K Kamchana
Engineer:	Date
Thitipong Piromkriput	10-Jan-2022

Instrument Detail

Instrument Model	Application
Aquion (ID#822, 1st Contract)	Anion
Instrument components	Serial Number
Aquion	180344683

Consumable Detail

Columns	Guard Columns	Suppressors	Concentrators	Etc.
AS22 (4mm)	AG22 (4mm)	AERS 500 (4mm)		

Remark: -

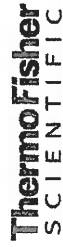


Perform By
Archemica Lab Co., Ltd

บริษัท อีเคมิคัล แล็บ จำกัด
ARCHEMICA LAB CO., LTD

Archemica Lab
10/1/22
Date

Customer
08/02/22
Date




Chromeleon Operational Qualification

General Information

Computer Name Version Number:
DESKTOP-D97001E 7.2.7 Build 10369 (290782)
DESKTOP-D97001E 7.2.7.10369
Client:
Operator: Thitipong Piromkriput

Overall Test Result: **Passed**

Comparison Format:

All Parameters:	Significant Digits: 10
 Environmental and Medical Expert EMEX ASSOCIATION CO., LTD	

ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-244



บริษัท อีเคมิคัล แล็บ จำกัด
ARCHEMICA LAB CO., LTD

10/1/22

Operator's Signature // Date

Reviewer's Signature // Date

PREVENTIVE MAINTENANCE REPORT
ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL
AAAnalyst 200/400

Customer : บริษัท เอ็มเม็กซ์ แอสโซซิเอชัน จำกัด		Date Tested: 08-Mar-2022
Address : 2729 ซอย พระรามที่ 2 ซอย 30 อ.พระราม2 แขวงบางมด เขตหนองแขง กรุงเทพฯ 10150		Recommendation Recertification Period 6 Months
User Name: คุณกาญจนา ชื่นตา		Recertification Due: 08-Sep-2022
Phone: 02-8671128		Date Last Certified: 20-Sep-2021
Fax/Email: emex_envi@yahoo.com		Visit Number: 1 of 2
		PerkinElmer Phone: 02-719-6420 ext 311
		PerkinElmer Fax: 02-319-7900

CONFIGURATION TESTED			
MODEL	SERIAL NUMBER	SOFTWARE	
AAAnalyst 200	20059030303	AA WinLab32 Version 6.5	
TEST STANDARD USED	PART NUMBER	EXPIRATION DATE	
Copper	N930-0183	OCT 30 2022	
GFAAS Mixed	N930-0244	JUN 30 2023	
MG0-141	N101-3000		
MG2-045	N101-3002		



PerkinElmer Ltd. 280 Soi 17 Rama 9 Road, Khwang Bangkepi, Khet Huaykhwang, Bangkok 10310 Thailand

ใบรับรองการสอบเทียบ “เครื่อง Atomic Adsorption Spectrophotometer”
(Calibration Certificate of Atomic Adsorption Spectrophotometer)



เลขทะเบียน ว-244

PREVENTIVE MAINTENANCE REPORT
ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAnalyst 200/400

SERIAL NUMBER	200S9030303	DATE TESTED	08-Mar-2022
1. INSTRUMENT CHECKS			
A. The mirror, prism and lenses condition. Clean if necessary.			
B. Inspect the grating.			
C. Inspect and clean or replace the dust filter.			
D. Clean the burner head, chamber and end cap.			
E. Clean the nebulizer.			
F. Check the condition of the end cap, chamber and nebulizer o-rings.			
G. Clean the drain system.			
H. Clean exterior the instrument.			
2. GAS SYSTEM CHECKS			
A. Leak test all internal and external gas box joints			
B. Inspect the acetylene cartridge filter. (Replacement cartridge filter every 1 year)			
C. Inspect the air cartridge filter. (Replacement cartridge filter every 6 months)			
3. ELECTRICAL			
A. Check incoming AC line voltage for proper levels and grounding.			
B. Check unit's software and firmware revisions and upgrade if necessary.			
4. FIAS CHECKS			
A. Pump and 5 Port Valve			
B. Chemifold and Tubing			
C. Power Supply			
D. Flow meter and Gas system			

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ห้องปฏิบัติการวิเคราะห์ทางเคมี
เลขทะเบียน ว-244
S.P. 0.1.1

PerkinElmer Ltd. 290 Sol 17 Rama 9 Road, Khwang Bangkok, Khet Huay Kwang, Bangkok 10310, Thailand

PREVENTIVE MAINTENANCE REPORT
ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAnalyst 200/400

SERIAL NUMBER	200S9030303	DATE TESTED	08-Mar-2022
5. PERFORMANCE TESTS			
1. Detector-Linearity with Barium (553.55 nm). Neutral Density Filter 0.2 : 0.1903 Abs. \pm 5% 0.1814 Abs. Neutral Density Filter 1.0 : 1.0547 Abs. \pm 5% 1.0373 Abs.			
2. Baseline Noise at 1 Abs with Barium (553.55 nm). (at an integration time of 0.5 seconds and 99 replicates) SD \leq 0.010 Abs. 0.0014 Abs.			
3. AA Baseline with Copper (Cu 324.75 nm). (at an integration time of 0.5 seconds and 99 replicates) SD \leq 0.001 Abs. 0.0002 Abs.			
4. D ₂ Background Compensation (Copper 324.75 nm). with Neutral Density Filter 1.0 Absorbance \leq 0.010 Abs. -0.0100 Abs.			
5. AA-BG Baseline Noise with Copper (324.75 nm). (at an integration time of 2.0 seconds and 99 replicates) SD \leq 0.005 Abs. 0.0008 Abs.			
6. Flame Safety Interlock all Functions. <input type="checkbox"/> OK			

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เลขทะเบียน ว-244
S.P. 0.1.1

PerkinElmer Ltd. 290 Sol 17 Rama 9 Road, Khwang Bangkok, Khet Huay Kwang, Bangkok 10310, Thailand

PREVENTIVE MAINTENANCE REPORT
ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAnalyst 200/400

SERIAL NUMBER	200S9030303	DATE TESTED	08-Mar-2022
PARAMETER	SPECIFICATION	ACTUAL VAULE	
7. Wavelength Accuracy with Nickel (232.00 nm).			
Nickel Prism Position	± 190 steps	0	Steps
Nickel Grating Position	+ 380, - 280 steps	- 48	Steps
3 mg/L Ni Standard Mean Abs	≥ 0.200 Abs.	0.239	Abs.
8. Flame Sensitivity with Copper (324.75 nm).			
Cu Prism Position	± 120 steps	0	Steps
Cu Grating Position	± 380 steps	0	Steps
(2 mg/L Cu Standard at an integration time of 10 seconds and 10 replicates)			
Mean Absorbance	≥ 0.250 Abs.	0.388	Abs.
Capacitance value	≥ 1.0 pF	2.5	pF.

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เลขทะเบียน ว-244

PerkinElmer Ltd. 290 Soi 17 Rama 9 Road, Khwang Bangkepi, Khet Huay Kwang, Bangkok 10310, Thailand

PREVENTIVE MAINTENANCE REPORT
ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAnalyst 200/400

SERIAL NUMBER	200S9030303	DATE TESTED	08-Mar-2022
Remarks :	- Neutral Density Filter refer to data sheet		
This is to certify that the above tests have been performed and the configuration tested			
<input checked="" type="checkbox"/> meets <input type="checkbox"/> does not meet			
the PerkinElmer Specifications listed on this certificate.			
This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.			
Service Department PerkinElmer Ltd.			
Customer Service Engineer:	(ชัยณรงค์ ธารินทร์) Chainarong Tharin Service Engineer		

Environmental
and Medical Expert
EMEX ASSOCIATION CO., LTD.

ห้องปฏิบัติการวิเคราะห์เครื่องมือ
เลขทะเบียน ว-244

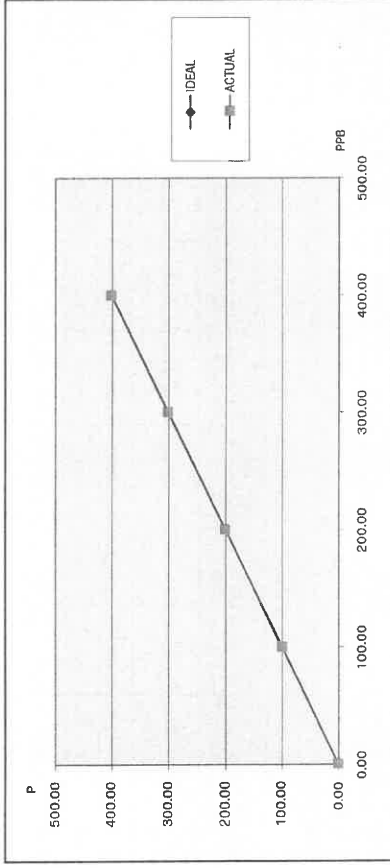
PerkinElmer Ltd. 290 Soi 17 Rama 9 Road, Khwang Bangkepi, Khet Huay Kwang, Bangkok 10310, Thailand

TEST REPORT

CUSTOMER NAME : M GREEN GROUP COMPANY LIMITED			
EQUIPMENT NAME : SO ₂ Analyzer	MODEL : APSA-370	SERIAL NO : G8KGHRMX	
MANUFACTURER : HORIBA		CYLINDER NO : CC734373	
STANDARD GAS CONCENTRATION (PPM) : 53.29 PPM		CERTIFIED DATE : 12/05/2020	
CYLINDER PRESSURE (PSI) : 1,000 PSI		EXPIRED DATE : 12/05/2028	
CERTIFIED BY : AIRGAS			

TEST RESULTS

POINT NO	TEST RESULTS		
	IDEAL	ACTUAL	%ERROR
ZERO	0.00	0.050	0.05
1	100.00	99.010	-1.0
2	200.00	200.420	0.4
3	300.00	300.460	0.5
4	400.00	400.650	0.6
AVERAGE (%)			0.12



CALIBRATED BY : ณัฐกานต์ พลวัญญ์ DATE : 11/10/65
 CHECKED BY : ณัฐกานต์ พลวัญญ์ DATE : 11/10/65

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายปฏิบัติการช่างขาย โทร 02-868-0812 # 15-16 E-Mail : Engineer@janatee.com
 เลขที่ 63/14-15, 67/35-36 ถนน ซอยเพชรเกษม 7/71 เพชรเกษม แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพมหานคร 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889

CHECK LIST

CUSTOMER NAME : M GREEN GROUP COMPANY LIMITED	
EQUIPMENT NAME : SO ₂ 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)	6.40	9.30
2	LAMP	mV (200mV to 1200 mV)	719.10	1001.70
3	CELL	°C (Ambient temblent temperature +5°C to 15°C)	38.90	32.20
4	PUMP	kPa (65 kPa or less)	44.40	46.00
5	AMBIENT	kPa	101.50	101.80
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	3.77	0.41
10	Zero	PPB	0.41	0.05
11	Span	PPB	420.10	400.65

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

(Ambient temperature = 5°C to 40°C)

อาการที่ตรวจพบ

รายละเอียดการดำเนินการ

ผลการดำเนินการ

- ใช้เครื่องมือ เครื่องมือสามารถดำเนินการตรวจสอบได้ตามปกติ



CALIBRATED BY : ณัฐกานต์ พลวัญญ์ DATE : 11/10/65
 CHECKED BY : ณัฐกานต์ พลวัญญ์ DATE : 11/10/65

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายปฏิบัติการช่างขาย โทร 02-868-0812 # 15-16 E-Mail : Engineer@janatee.com

เลขที่ 63/14-15 , 67/35-36 ซอยเพชรเกษม 7/71 เพชรเกษม แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพมหานคร 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889

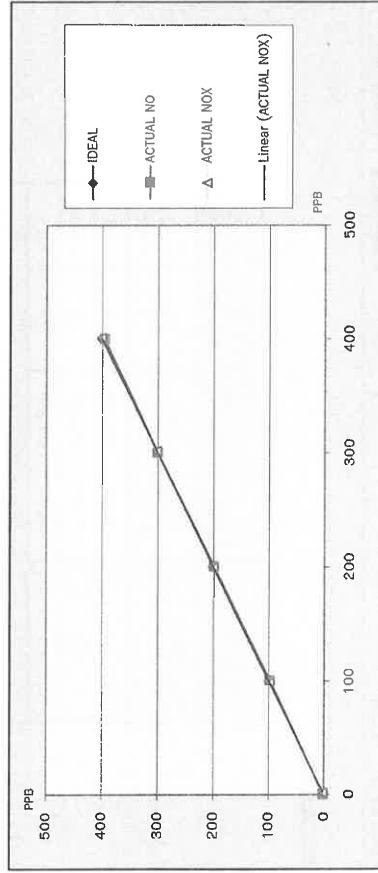


TEST REPORT

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 BY :	AIRGAS			
CERTIFIED DATE	: 12/05/2020			
EXPIRED DATE	: 12/05/2028			

TEST RESULTS

POINT NO	TEST RESULTS					
	IDEAL	ACTUAL NO	ERROR NO	%ERROR NO	ACTUAL NO _x	%ERROR NO _x
ZERO	0.00	-0.43	-0.43	-	-0.13	-
1	100.00	99.54	-0.46	-0.46	99.40	-0.60
2	200.00	198.72	-1.28	-0.64	198.71	-0.64
3	300.00	299.84	-0.16	-0.05	299.91	-0.03
4	400.00	400.27	0.27	0.07	400.12	0.03
AVERAGE (%)						-0.31



CALIBRATED BY :
CHECKED BY :
DATE : 11/10/65
DATE : 11/10/65

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



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	4,300	2,900
2	Signal (NO _x)	mV	15,300	9,700
3	Detector	Temp °C , Standard Value : Ambient temp(5°Cto15°C) Pressure kPa , Standard Value : (Ambient/101.3x100-20)±4kPa	42,900	42,900
4	AMBIENT	kPa	101,500	101,200
5	SAMPLE	L/min (1.1 L/min ± 0.3 L/min)	-	-
6	DC 24 V	V (24 V ± 0.5 V)	23,700	23,900
7	DC 5 V	V (5 V ± 0.5 V)	5,000	5,000
8	Sampling NO Reading	PPB	5,610	3,710
9	Sampling NO ₂ Reading	PPB	15,280	12,560
10	Sampling NO _x Reading	PPB	20,900	16,280
11	Zero (NO)	PPB	0.420	-0.430
12	Span(NO)	PPB	390.120	400.270
13	Zero (NO _x)	PPB	4.150	-0.130
14	Span (NO _x)	PPB	396.410	400.120

Remark : Reference EX-EN-022-56 , "Ambient NO_x Monitor APNA-370 Operation Manual " Page #48
(Ambient temperature = 5°C to 40°C)

อาการที่ตรวจพบ

รายละเอียดการดำเนินการ

ผลการดำเนินการ
- เปรียบเทียบ เครื่องสามารถดำเนินการตรวจวัดได้ตามปกติ



CALIBRATED BY :
CHECKED BY :
DATE : 11/10/65
DATE : 11/10/65

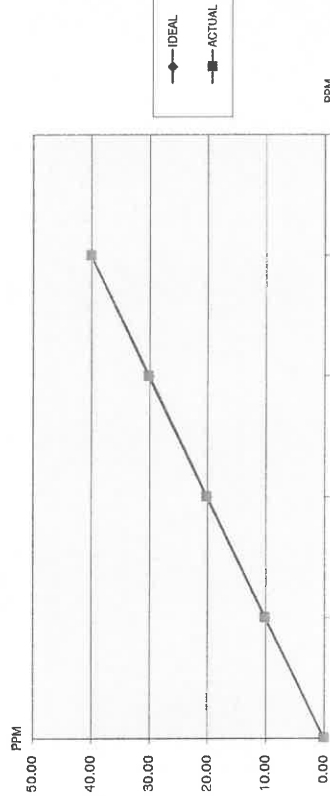
ข้อมูลย้อนหลังทั้งหมดเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 15,16 , E-Mail : Engineer@jiranatee.com
เลขที่ 63/14-15,67/35-36 ขอยแพรรณ 7,7/1 ถนนเพชรเกษม แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889

TEST REPORT

CUSTOMER NAME	: M GREEN GROUP COMPANY LIMITED		
EQUIPMENT NAME	: CO Analyzer		
MANUFACTURER	: HORIBA	MODEL	: APMA-370
STANDARD GAS CONCENTRATION (PPM)	: 4533 PPM		
CYLINDER PRESSURE (PSI)	: 1,000 PSI		
CERTIFIED BY	: AIRGAS		
		CERTIFIED DATE	: 12/05/2020
		EXPIRED DATE	: 12/05/2028

TEST RESULTS

POINT NO	CALIBRATION RESULTS		
	IDEAL	ACTUAL	%ERROR
ZERO	0.00	0.0000	0.00
1	10.00	10.0800	0.1
2	20.00	20.1200	0.1
3	30.00	30.1600	0.2
4	40.00	40.0100	0.0
AVERAGE (%)			0.09



CALIBRATED BY : กฤษณ์ พลารักษ์ DATE : 11/10/65
 CHECKED BY : สจ๊วต มังคะ DATE : 11/10/65

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : กรุณาส่งอีเมลถึงฝ่ายบริการลูกค้า , โทร 02-8681246 , E-Mail : mail.Sales@okla-testing.com
 63/14-15.67/35-36 ซอยเพชรเกษม 7/71 แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 เบอร์โทร 02-8681246 แฟกซ์ 02-8680860

CHECK LIST

CUSTOMER NAME	: M GREEN GROUP COMPANY LIMITED		
EQUIPMENT NAME	: CO Analyzer		
MANUFACTURER	: HORIBA	MODEL	: APMA-370
		SERIAL NO.	: 80XJ1GRC

TEST VALUES			
NO.	CO Analyzer (APMA-370)	UNIT	
1	Signal (MAIN)	mV	BEFORE AFTER
2	Signal (COMP)	mV	-0.200 4.000
3	CELL	°C , Standard Value : Ambient temperature +45°C to 15°C	0.000 0.200
4	PUMP	kPa	35.600 35.400
5	AMBIENT	kPa	39.600 39.700
6	SAMPLE	L/min (1 L/min to L/min)	101.300 101.500
7	OVER FLOW	L/min (1.2 L/min or more)	- -
8	DC 24 V	V (24 V ± 0.5 V)	0.000 0.000
9	DC 5 V	V (5 V ± 0.5 V)	23.900 23.900
10	Sample Reading	PPM	4.900 4.900
11	Zero	PPM	0.370 0.250
12	Span	PPM	0.370 0.000
		PPM	37.000 40.010

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

อาการที่ตรวจพบ

รายละเอียดการดำเนินการ

- ทำ Check List Analyzer , ทำ Calibration Zero/Span , Multipoint , เช็ค Diagnostics

ผลการดำเนินการ

- เสร็จเรียบร้อย เครื่องสามารถดำเนินการตรวจวัดได้ตามปกติ

CALIBRATED BY : กฤษณ์ พลารักษ์ DATE : 11/10/65
 CHECKED BY : สจ๊วต มังคะ DATE : 11/10/65

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : กรุณาส่งอีเมลถึงฝ่ายบริการลูกค้า , โทร 02-868-0812 # 15-16 , E-Mail : Engineer@iranates.com
 เลขที่ 63/14-15.67/35-36 ซอยเพชรเกษม 7/71 แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889



Certificate of Calibration

Certificate Number : SPR22010388-5 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 : 44

Serial Number : PN2327

ID. Number : N/A

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Received Date : 26 Jan 2022

Relative Humidity : $50\% \pm 15\%$ Calibration Date : 27 Jan 2022

Location of Calibration : In-Lab Recommend Due Date : 27 Jan 2023

Calibration Procedure : SP-CPE-04-01 Date of Issue : 28 Jan 2022

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. Surasak Vajjan

Calibration Officer

Approved by :

(Mr. Worapong Sinthusopa)

Authorized Signatory



Calibration Report

Certificate Number : SPR22010388-5 Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	SC-942	B014059	EELBP_34/1264	22 Dec 2022

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. : SPR22010388-5

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A	Standard Setting	UUC Reading		Error		Uncertainty (±)	Unit : dB
		Fast	Slow	Fast	Slow		
94	94	93.9	94.0	-0.1	0.0	0.15	
114	114	114.1	114.0	0.1	0.0	0.15	

Select C	Standard Setting	UUC Reading		Error		Uncertainty (±)	Unit : dB
		Fast	Slow	Fast	Slow		
94	94	94.0	94.0	0.0	0.0	0.15	
114	114	114.1	114.0	0.1	0.0	0.15	

Select Z	Standard Setting	UUC Reading				Error		Uncertainty (±)	Unit : dB
		UUC Reading		Error					
		Fast	Slow	Fast	Slow				
94	94	94.0	94.0	0.0	0.0			0.15	
114	114	114.1	114.0	0.1	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 : SPR22030006-1

Page : 1 of 3

Customer : M Green Group Co.,Ltd

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

Equipment Name : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 220100171

ID. Number : N/A

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Received Date : 01 Mar 2022

Relative Humidity : $50\% \pm 15\%$ Calibration Date : 02 Mar 2022

Location of Calibration : In-Lab Recommend Due Date : 02 Mar 2023

Calibration Procedure : SP-CPE-04-01 Date of Issue : 03 Mar 2022

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 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. Surasak Vakjan

Approved by :

Calibration Officer

(Mr.Worapong Sinthusopa)

Authorized Signatory

SP-FM-04-15 rev.0



Calibration Report

Certificate Number : SPR22030006-1

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	SC-942	B014059	EEL.BP. 34/1264	22 Dec 2022

Traceability

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

SP-FM-04-15 rev.0



Result of Calibration

Certificate No. : SPR22030006-1

Page : 3 of 3

Range : 94 to 114 dB **Function :** @1kHz

Select A	Standard Setting	UUC Reading		Error		Uncertainty (±)
		Fast	Slow	Fast	Slow	
94		94.0	94.0	0.0	0.0	0.15
114		113.8	113.8	-0.2	-0.2	0.15

Unit : dB

Select C	Standard Setting	UUC Reading		Error		Uncertainty (±)
		Fast	Slow	Fast	Slow	
94		94.0	94.0	0.0	0.0	0.15
114		113.8	113.8	-0.2	-0.2	0.15

Unit : dB

Select Z	Standard Setting	UUC Reading		Error		Uncertainty (±)
		Fast	Slow	Fast	Slow	
94		94.0	94.0	0.0	0.0	0.15
114		113.8	113.8	-0.2	-0.2	0.15

Unit : dB

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 -



กรมการ
มาตรฐาน

NSC-TISTR 1005
CALIBRATION 0015

Request No. 22-65 / 0252

MTC No. PSL-H 0085 / 65

Certificate of Calibration

Customer : M Green Group Co.,Ltd.
188/46, Pracha-Uttd Rd., Thungkru, Bangkok, 10140
Equipment : Thermo-Hygrometer (Thermal Environment Monitor)
Model /Type : QUESTemp[®]32
Serial Number : TPJ070016
Maker : 3M, QUEST Technologies
Date of Request : 20 January 2022
Date of Calibration : 9 February 2022

This certificate is traceable to International System of Units (SI Units) through Photometry and Temperature Standards Laboratory, Industrial Metrology and Testing Service Centre, Thailand Institute of Scientific and Technology Research (TISTR), NSC-ONSC accredited Calibration No. 0015.

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

Calibrated by :

Panit T.

(Ms. Panit Thummasri)

Approved by :

Mr. Kamchai Singhapiwat

(Mr. Kamchai Singhapiwat)

Director

Photometry and Temperature Standards Laboratory

Ref. No : 2012265012000269002

Issued Date : 21 February 2022

Page 1 of 4

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.

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35 Mu. 3 Tambon Khlong Ha, Amphoe Khlong Luang,
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Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chantarak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

FM.BL.MTC.002 Rev.4



กรมการ
มาตรฐาน



NSC-TISTR 1005
CALIBRATION 0015

Request No. 22-65 / 0252

MTC No. PSL-H 0085 / 65

Description of Unit Under Calibration :

Customer : M Green Group Co.,Ltd.
188/46, Pracha-Uttd Rd., Thungkru, Bangkok, 10140
Equipment : Thermo-Hygrometer (Thermal Environment Monitor)
Serial Number : TPJ070016
Calibration Required : Temperature at (30, 35, 40) °C
Ambient Condition : Ambient temperature (23 ± 3) °C
Relative humidity (55 ± 20) %
Laboratory Address : Photometry and Temperature Standards Laboratory
Soi 1, Bangpoo Industrial Estate, Sukhumvit Rd., Samutprakan

Reference Standard :

Digital Thermometer with Sensor, Model : F250H, S/N : 9345 008 2331, Sensor RTD Probe No. RTD-01 and RTD-02 which was calibrated by Industrial Metrology and Testing Service Centre, Certificate No. PSL-T 1081/64.

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

Calibration Procedure :

The certifies the above equipment was calibrated according to procedure no. WI.CP.18.

Support Equipment :

Temperature & Humidity Controlled Chamber, Model : 9145-5116-00AA, S/N : 1403041

Adjustments :

NONE

Page 2 of 4

P.T.

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.

Head Office

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

Office

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Thailand
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Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

FM.BL.MTC.002 Rev.4

Request No. 22-65 / 0252

MTC No. PSL-H 0085 / 65

Results of Calibration :-

Table : Temperature Measurement @ Wet Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	30.2	-0.2	0.50
35.0	35.2	-0.2	0.50
40.0	40.2	-0.2	0.50

Table : Temperature Measurement @ Dry Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	30.1	-0.1	0.50
35.0	35.2	-0.2	0.50
40.0	40.1	-0.1	0.50

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.

Request No. 22-65 / 0252

MTC No. PSL-H 0085 / 65

Results of Calibration :-

Table : Temperature Measurement @ Globe Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
29.9	30.1	-0.2	0.50
35.0	35.0	0.0	0.50
40.0	40.0	0.0	0.50

- Note :**
1. This calibration was done without removing reservoir cover, white plates and blackened copper sphere of the instrument.
 2. The calibration data for instrument in this report is reported within the condition existing at the time of measurement only.

...end of 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.



Certificate of Calibration

Method 5 Pre-Test Console Pulse Calibration - Liters (L)

UUT Meter Console Information

Model #: XD-502-MV
Serial #: A2001103
DGM Model #: AP25EX
DGM Serial #: 20193964

Calibration Conditions

Bar. Pressure (mb): 1010
Ambient Temperature (°C): 25.6
Relative Humidity (%): 70
Altitude (m): 1.8
Bar. Pressure Corr. (mm Hg): 757.4

Factors/Conversions

Std. Temp. (K): 293.15
Std. Press. (mm Hg): 760
K₁ (K/mm Hg): 0.3857

Reference Equipment

Calibration Meter Model: DGMR-200H
Calibration Due Date: 3 Jun 23
Serial No: 0000026
Gamma: 1.0000

UUT Meter (DGM)

Run Time (seconds)	Orifice, ΔH (mm H ₂ O)	Pulse Count			Meter Temperature (°C)		Meter Pressure (in H ₂ O)	Volume (L)			Outlet Temperature (°C)	
		Initial	Final	Total	Initial	Final		Initial	Final	Total	Initial	Final
Θ	P _{ref}	C _{ref}	C _{final}	C _{total}	t _{ref}	t _{mt}	P _w	V _{ref}	V _{mt}	V _w	t _{ref}	t _{mt}
280.62	120.00	0.0	96465	96465	25.0	25.0	-14.0	0.0	165.8	165.8	25.0	25.0
340.80	80.00	0.0	96558	96558	26.0	27.0	-10.0	0.0	164.9	164.9	25.0	25.0
430.75	50.00	0.0	97174	97174	27.0	28.0	-7.0	0.0	165.0	165.0	25.0	25.0
600.38	25.00	0.0	98376	98376	28.0	29.0	-4.0	0.0	161.8	161.8	25.0	25.0
839.89	13.00	0.0	96675	96675	29.0	30.0	-2.0	0.0	162.3	162.3	25.0	25.0

Standardized Data

Scaling Factor

Calibration Results

Reference Meter		Test Meter		Volume Conversion		Correction Factor		ΔH @ (mm H ₂ O)	
Std. Volume	Std. Flow Rate	Totalizer	Counts (std)	Scaling Fac.	Std. Vol.	Value	Variance	0.0212 SCMM	Variance
V _{wstd} (L)	Q _{wstd} (L/min)			Y _{sc}	V _{mstd} (L)	Y	ΔY	ΔH@	ΔΔH@
156.835	33.533	95626	1.64E-03	159.6	0.9825	-0.0175		44.5	0.627
157.620	27.750	94873	1.66E-03	158.4	0.9953	-0.0047		43.8	-0.053
158.844	22.126	94886	1.67E-03	158.4	1.0028	0.0028		43.5	-0.407
156.957	15.686	93568	1.68E-03	156.2	1.0049	0.0049		43.6	-0.229
158.243	11.305	93439	1.69E-03	156.0	1.0145	0.0145		43.9	0.061
				1.67E-03 = Avg.	1.0000 = Y Avg.			43.9	ΔH@ Avg.

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +0.02.

Note: For ΔH_{ref}, orifice pressure differential that equates to 0.0212m³/min at standard temperature and pressure, acceptable tolerance of individual values from the average is +0.2 inches (5.1mm) H₂O.

Pass/Fail Result: **Pass**

Console Input Value: **1.6693** Metric



Calibrate By:

Pattapong P. ... neediss Supply Equipment Co., Ltd.

Date: 31 Aug 22

The instruments listed and described on this certificate have been calibrated against standards traceable to the National Institute of Standards and Technology (NIST) and in reference to EPA Method 5, Section 10.3.1.



Certificate of Calibration - Supplemental

METHOD 5 PRE-TEST CONSOLE CALIBRATION

Nomenclature

P_s - Barometric Pressure
DGM - Dry Gas Meter
K - Constant based on standard temp and press
t - Run time, in minutes
P_{ref} - ΔH (t/eta) - Pressure, gauge
V_w - Volume collected by test meter, corrected for STP
Q_{wstd} - Calculated flow rate of test meter
K₁ - Critical orifice coefficient
P_w - Measured pressure of reference meter
t_w - Temperature measured in reference meter
t_m - Temperature measured in test meter
Y - Ratio of volume collected from test meter and orifice
sc - Scaling Factor
Counts_{std} - Number of pulse counts, standardized
C_{total} - Number of raw pulse counts of a calibration run

Equations

$$V_{w(std)} = Y * K_1 \frac{V_{w} * (P_{bar} + \frac{P_{ref}}{13.6})}{T_w}$$

$$V_{m(std)} = Counts_{std} * Y_{sc(avg)}$$

$$Counts_{std} = K_1 \frac{C_{total} * (P_{bar} + \frac{P_{ref}}{13.6})}{T_m}$$

$$Q_{w(std)} = \frac{V_{w(std)}}{t}$$

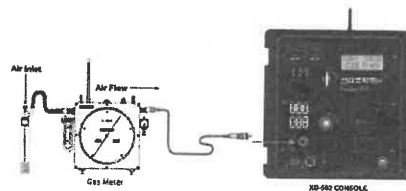
$$Y_{sc} = \frac{V_{w(std)}}{Counts_{std}}$$

$$K_1 = \frac{T_{std}}{P_{std}}$$

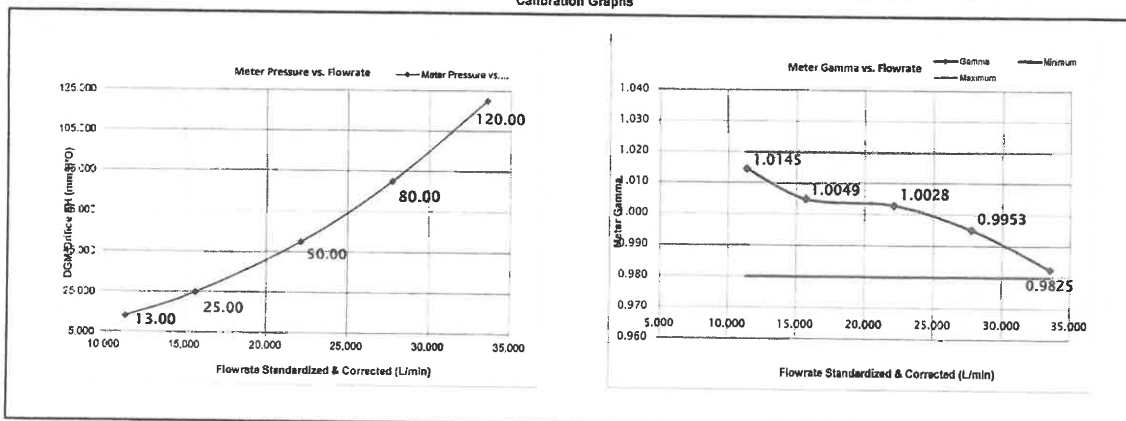
$$Y = \frac{V_{w(std)}}{V_{m(std)}}$$

$$Metric \Delta H_s = \frac{P_{ref} * 0.0011636 * (P_{bar} + \frac{P_{ref}}{13.6})}{T_m} * \left(\frac{T_w * t}{V_w * P_{bar}} \right)^2$$

Calibration Train



Calibration Graphs



Meter Console Information (UUT)
 Model #: XD-502-MV
 Serial #: A2001103
 Units: Metric

Calibration Conditions
 Pbar (mm. Hg): 757.4
 Humidity (%): 70%
 Amb. Temp. (°C): 25.6
 Altitude (m): 1.8

Reference Devices
 TC Calibrator Model: CC-VTR-SH
 TC Calibrator Reference #: 91109269
 Barometer Model: EBARODIALSPE01
 Barometer Serial #: 738930
 Pressure Calibrator Model: 718 30G
 Reference #: 3891001

Audit Data

Reference Point #	Aux °C	Stack °C	Probe °C	Oven °C	Filter	Exit °C	Reference Point Status ¹
1	100	101	101	100	101	101	PASS

Console Barometric Audit

Reference Point #	Reference Bar. Press mm. Hg	Console Bar. Press mm. Hg	Reference Point Status ²
1	757.4	756.6	PASS

Console Vacuum Audit

Reference Point #	Reference Vacuum mm. Hg	Console Vacuum mm. Hg	Reference Point Status ³
1	584.0	583.0	PASS

Calibrate By: Debra J. P. Approved By: John Date: 31 Aug 22

Notes

¹For valid test results, the maximum difference between test and reference readings should be less than 3.4 °F (3 °C) for all thermocouples except for the stack thermocouple which should be less than 1.5% absolute temperature from the reference reading and the exit thermocouple which should be less than 2°F (1 °C) from the reference reading.

²For valid test results, the maximum difference between console and reference barometric pressure readings should be less than 0.1 in. Hg (2.5 mm Hg), (EPA Method 5, Section 8.1.2).

³For valid test results, the maximum difference between console and reference vacuum readings should be less than 0.5 in. Hg (12.5 mm Hg).

I certify that the above Thermocouple, Barometric, and Vacuum Sensors were calibrated and audited in accordance with US EPA Methods, CFR 40 Part 60.

Console Information
 Model #: XD-502-MV
 Serial #: A2001103
 Units: Metric

Calibration Conditions
 Pbar (mm. Hg): 757.4
 Humidity (%): 70
 Temp. (°C): 25.6
 Altitude (m): 1.8

Reference Devices
 TC Calibrator Model: CC-VTR-SH
 TC Calibrator Reference #: 91109269
 Barometer Model: EBARODIALSPE01
 Barometer Serial #: 738930

Corr. Pbar (mm. Hg): 756.1

Temperature Sensors Calibration Data

Reference Point #	Reference Temp. °C	Aux °C	Stack °C	Probe °C	Oven °C	Filter °C	Exit °C	Reference Point Status ²
1	-18	-18	-18	-18	-18	-18	-18	PASS/Fail
2	38	38	38	38	38	38	38	PASS
3	93	93	93	93	93	93	93	PASS
4	149	149	149	149	149	149	149	PASS
5	260	259	260	260	260	260	260	PASS
6	371	370	371	371	371	371	371	PASS
7	482	481	482	482	482	482	482	PASS
8	593	592	593	593	593	593	593	PASS
9	816	815	816	816	816	816	816	PASS
10	1038	1037	1038	1038	1038	1038	1038	PASS

TC Sensors Overall Audit Status: **PASS**

NIST Reference Temperature Probe ID: 12702001

Ref Point #	Theoretical Temp °C	Digital Thermocouple Sensor Reading °C	ΔT _{sen} °C
1	0.6	1	0.15%
2	25.6	26	0.08%

Inherent temperature thermocouple is not needed in EPA standards, and should not be used as an official reference for ambient temperature.

Vacuum Gauge Calibration Data

Reference Point #	Reference Vacuum in. Hg	Console Vacuum in. Hg	Reference Point Status ²
1	10.0	10.0	PASS/Fail
2	20.0	20.0	PASS

Dual Inclined/Vertical Manometer

Reference Pressure mm HgO	Pressure with Console System using for Normal Range of 0-50 in. Hg Dual Range of 0-20mm HgO	Pressure with Console System using for Normal Range of 0-50 in. Hg Dual Range of 0-20mm HgO	Reference Point Status ²
0.0	0.0	0.0	PASS/Fail
10.0	10.2	10.0	PASS
25.0	25.2	25.0	PASS
50.0	49.9	48.8	PASS
80.0	80.0	78.9	PASS
100.0	99.4	100.0	PASS
110.0	108.7	109.7	PASS
120.0	119.3	119.4	PASS
130.0	128.7	128.5	PASS
140.0	139.6	139.1	PASS
150.0	146.9	149.3	PASS

UUT Overall Audit Status: **PASS**

Calibrate By: Debra J. P. Approved By: John Date: 31 Aug 21

Notes

¹Temperature, maximum reference points are 0.0 (0°), 25.6 (78°), 50.0 (120°), 100.0 (212°), 150.0 (302°), 200.0 (392°), 250.0 (482°), 300.0 (572°), 350.0 (662°), 400.0 (752°), 450.0 (842°), 500.0 (932°), 550.0 (1022°), 600.0 (1112°), 650.0 (1202°), 700.0 (1292°), 750.0 (1382°), 800.0 (1472°), 850.0 (1562°), 900.0 (1652°), 950.0 (1742°), 1000.0 (1832°), 1050.0 (1922°), 1100.0 (2012°), 1150.0 (2102°), 1200.0 (2192°), 1250.0 (2282°), 1300.0 (2372°), 1350.0 (2462°), 1400.0 (2552°), 1450.0 (2642°), 1500.0 (2732°).

²For valid test results, the maximum difference between temperature and reference readings should be less than 0.5 °F (0.3 °C) for all thermocouples except for the stack thermocouple which should be less than 1.5% absolute temperature from the reference reading and the exit thermocouple which should be less than 2°F (1 °C) from the reference reading.

³For valid test results, the maximum difference between console and reference barometric pressure readings should be less than 0.1 in. Hg (2.5 mm Hg), (EPA Method 5, Section 8.1.2).

⁴For valid test results, the maximum difference between console and reference vacuum readings should be less than 0.5 in. Hg (12.5 mm Hg).

I certify that the above Thermocouple, Barometric, and Vacuum Sensors were calibrated and audited in accordance with US EPA Methods, CFR 40 Part 60.

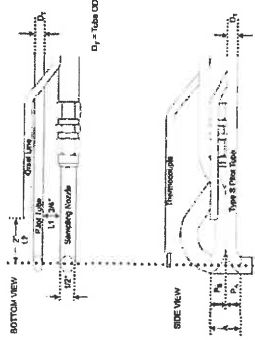
neediss Sampling Probe and Pitot validation

Sampling System Equipment Information		Calibration Conditions and Equipment	
Probe Sheet:	Apex 1 in., 4 ft.	Digital Callipers:	CD-15APX
Probe Number:	W1912459	Reference #	A22070181
Pitot tube Number:	A8997	Digital Inclinator:	BASELINE
Pitot tube Type:	S Type 3/8 In.	Reference #	FEI 12-1057
Validation method:	Standard Probe 1 in. and 1/2 in. Sampling Nozzle	Temperature:	30.0 °C±3
		Barometric Pressure:	760 mm Hg

Sampling Probe Validation with Tune up

(2) Measure and Align with 1/2" Sampling Nozzle (12.7 mm)

Measured	Standard Range
$L_1 = 2.62 \text{ cm.}$	(1.905 cm. or 3/4 in.)
$L_2 = 4.63 \text{ cm.}$	(5.08 cm. or 2.0 in.)
$D_1 = 0.954 \text{ cm.}$	(3/8 in.)
$A = 2.22 \text{ cm.}$	(2.1 $D_1 \leq A \leq 3D_1$)
$AZD_1 = 1.164 \text{ cm.}$	(1.05 $P_A / D_1 \leq A \leq 1.5$)



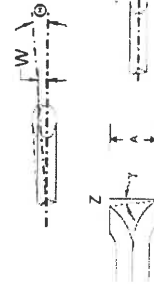
Pitot Tube Validations and Angles measurement Result

☒ : Measure Result after Maintenance and Adjustable

P_A Size	Standard Range
$\alpha_1 = 2.60^\circ$	$\leq 10^\circ$
$\beta_1 = 1.50^\circ$	$\leq 5^\circ$
P_A Size	Standard Range
$\alpha_2 = -0.80^\circ$	$\leq 10^\circ$
$\beta_2 = 1.40^\circ$	$\leq 5^\circ$



Engles measurement	Calculated Result	Standard Range
$W = 3.80^\circ$	0.148 cm.	$W < 0.08 \text{ cm (1/32 in.)}$
$Z = 2.10^\circ$	0.081 cm.	$Z < 0.032 \text{ cm (1/16 in.)}$



Can be use 0.84 for Cp(s) if the type of face-opening misalignment show above with not affect the base line value of Cp(s)
Solving as standard range

Calibrate By: Pattana J. P. Approved By: Pattana J. P. Date: 31 Aug 22

neediss Nozzle Validation

Sampling System Equipment Information		Validation Conditions	
Console Model	XD-502-MV	Digital Callipers	CD-15APX
Console Serial Number	A2001103	Reference #	A22070181
DGM Model	SK-25-EX	Temperature	25 °C±3
DGM Serial Number	20193964	Barometric Pressure	760 mm Hg

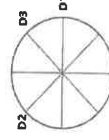
Validation Data		Results	
Nozzle ID	Nozzle Diameter	Different	(D ₁ + D ₂ + D ₃) / 3
Sizes	D ₁ D ₂ D ₃	ΔD	Davg
	mm mm mm	mm	mm
4	3.04 3.06 3.08	0.012	3.067
5	3.86 3.85 3.84	0.010	3.850
6	4.57 4.52 4.50	0.053	4.540
7	5.30 4.58 4.74	0.080	4.657
8	6.22 6.24 6.25	0.006	6.243
9	7.05 7.05 7.05	0.000	7.050
10	7.74 7.72 7.72	0.000	7.720

Where :

D₁, D₂, D₃ = There difference nozzle diameters , mm ; diameter must be within 0.025 mm

ΔD = Maximum difference between any two diameters, must be ≤ 0.100 mm

D avg = (D₁ + D₂ + D₃) / 3



Validate By: Pattana J. P. Approved By: Pattana J. P. Date: 31 Aug 22



Request No. : 22-65 / 0237

MTC No. : PSL-P 065 / 65

CERTIFICATE OF CALIBRATION

Nomenclature : Digital Lux Meter

Serial No. : R.031886

Maker : DIGICON

Model : LX-73

Customer : M GREEN GROUP CO., LTD.

Address : 188/46, Pracha-Ud Rd., Thungkru, Bangkok 10140

Date of receipt : 13 January 2022

Date of calibration : 24 January 2022

Place of calibration : Photometry and Temperature Standards Laboratory, MTC. (Bangpoo)

Basis of calibration : calibration at 0 ~ 5000 lux.

Condition of calibration : - Ambient temperature : (25 ± 2) °C
- Relative humidity : (60 ± 20) %

Reference Standard :

Working Standard Luminous Intensity Lamp, Serial No.: FEL001 and 5002,
can be traceable to international system of units (SI), through calibration certificate
MTC No. PSL-P 183/64 and PSL-P 184/64, date of calibration 30 August 2021.

Traceability :

This certificate is traceable to SI units through the National Institute of Metrology (Thailand).
calibration certificate No. TP-1003-21, TP-1004-21 and TP-1005-21

Support Equipment :

1. Photometric bench, 3.0 meter long
2. DC power supply, Serial No.: BC - 341006035007/2
3. Digital Multimeter, Model : R 6551, S/N : 92041186 and 92041192

Calibration Procedure : The measurement was done in accordance with WLC.P.10.

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

page 1 of 2

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.

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax (66) 0 2577 9009
E-mail : rumpai@tistr.or.th Website: www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

FM.BLMTC.002 Rev.4



Request No. : 22-65 / 0237

MTC No. : PSL-P 065 / 65

Serial No. : R.031886

Results :

UUC Range (lux)	Standard (lux)	*UUC Reading (lux)	Uncertainty of Measurement \pm (lux)
40	10	9.77	0.19
	20	19.43	0.38
	30	28.91	0.57
	39	37.47	0.74
400	100	101.2	2.1
	200	199.9	4.2
	300	297.5	6.3
	390	384.1	8.2
4000	1000	1002	21
	2000	2011	42
	3000	3000	63
	3900	3866	82
40000	4000	4070	80
	5000	5070	110

Note : *UUC = Unit Under Calibration.

...end of certificate...

Calibrated by :

(Mr. Kittipat Wiriyaprasat)

Approved by :

(Mr. Kamolrat Singhapawat)
Director

Photometry and Temperature Standards Laboratory

Ref. : 2012265071500156001

Issued date : 25 January 2022

page 2 of 2

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.

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
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E-mail : rumpai@tistr.or.th Website: www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

FM.BLMTC.002 Rev.4



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



NSI-2709-15 17026
CALIBRATION 0119

Certificate No.: CP20220051EA
Operation No.: CP2022010026

Certificate of Calibration

Equipment: Sound Calibrator

Manufacturer: Scarlet Tech

Model/Type: ST120

Serial No.: ST120C0247E

ID No.: -

Customer: M Green Group Co.,Ltd.

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

Received Date: 26 January 2022

Calibrated Date: 28 January 2022

Issued Date: 2 February 2022

Calibrated by: Ms. Juntaporn Kunhakom

Approved by:

(Mr. Sittichai Swaksuriyawong)
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.



มูลนิธิวิศวกรรมศาสตร์
ELECTRICAL AND ELECTRONICS INSTITUTE

ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20220051EA

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-1010-21	13 June 2022
2) Waveform Generator	33511B	MY52302264	0144RF21	17 June 2022
3) Audio Analyzing DMM	2015-P	000136E	E1U214805	16 November 2022
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P210047 0255TE21	16 June 2022 7 July 2022

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; ONSC 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

Nominal Sound Pressure level (dB)	Specified Frequency (Hz)	Measured value (Hz)	Deviated value ^[2] (%)	Acceptance limit ^[3] (%)
94	1000	1000.0	0.0	±0.7
114	1000	1000.0	0.0	±0.7



Certificate No.: CP20220051EA

Calibration Report

3. Function : Total distortion + noise

Sound Pressure level (dB)	Normal Frequency (Hz)	Measured value ^[4] (%)	Acceptance limit ^[5] (%)
94	1000	0.3	2.5
114	1000	0.2	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. Using the 1/2-inch microphone adaptor -.

2. Acceptance limit was IEC 60942:2017 Class 1.

3. The coverage factor $k = 2.00$

-- End of Report --



36/F CRC Tower All Seasons Place 87/2 Wireless Road, Lumpini, Phatumwan,
Bangkok 10330 Thailand

Tel: (+66)-2-625-3102, (+66)-2-564-7738 (JATC) Fax: (+66)-2-564-7739 (JATC) TAXID 0105561206981

Date: January 25th, 2022

Ref: nk-TF22-0102


UAE-IDEA Advance Analytical Co., Ltd.
3 Soi Udomsuk 41 Sukhumvit Rd.
Bangcaek, Prakhronnong, Bangkok, Thailand

Dear Sirs,

Please be informed that the JEOL GC-MS: JMS-8000D High Resolution Mass Spectrometer, S/N: MS1333000610061, which got the Preventive Maintenance (PM) on January 2022 by our certified engineer, as shown in the Preventive Maintenance Report as attached.

It is confirmed that this system above is working well and ready for analysis the samples at least one year from the Preventive Maintenance.

Yours faithfully,


Phayusak Tangtongkol
Senior Manager

Page 1 of 1



JEOL ASIA (THAILAND) CO., LTD.

CRC Tower All Seasons Place, Unit 1-6 (Room 03)
36th Floor, 872 Wireless Road, Lumpini, Pathumwan,
Bangkok 10330 Thailand
Tel: +662 625 3102
Tax ID: 0105561209981 (Head Office)

SERVICE REPORT

Job No.	JATH_R21057
Date	5 Jan 2022

Customer UAE IDEA Advance Analytical Company Limited.

User's Name	Mr. Wee
Address	86/6 Rama IV Rd., Khlong Toei, Bangkok 10110

Model	JMS-800D	Serial No.	MS13330061
-------	----------	------------	------------

<input type="checkbox"/> Under guarantee	<input checked="" type="checkbox"/> With svc contract	<input type="checkbox"/> Modification	<input type="checkbox"/> Instruction	<input type="checkbox"/> Installation	<input type="checkbox"/> Major overhaul
<input type="checkbox"/> Without guarantee	<input type="checkbox"/> Other	<input type="checkbox"/> Breakdown	<input type="checkbox"/> Other	<input type="checkbox"/> Reinstallation	<input checked="" type="checkbox"/> Minor overhaul
<input type="checkbox"/> Without svc contract					

Customer's Request / Problem

Minor PM for 800D

Service Performed / Solution

Confirmed the resolution more than 10,000.

Cleaned the Ion source and. (Ion source was recently replaced by customer)

Replaced parts according to PO No. 2021-11/0004. (replaced RP Oil using customer stock)

GC consumable parts replacement.

Adjusted the ion optics and performed the auto tuning. Saved as tuning file named in today's date (20220105).

Performed MF and EF calibration, overwrite the previous file.

Check Dioxin standard sample CS1.

Result of measurement has no trouble.

This work has completed.

Duration of Service

[illegible]

Parts Supplied

Parts No.	Description	Type	Qty	Price / pc	Total
780306121	Spillless Liner		1		
780364287	Gold Seal		1		
781010730	RP belt		3		
812246403	Shield Pipe		1		
812281666	Shield plate		1		
	RP Oil	4L	1		(Customer stock)
Based on the following PO. No 2021-11/0004					
			GST		
			Total		

Based on the following PO. No 2021-11/0004

**Customer's
Signature**

Mr. Wee

**JEOL Engineer's
Signature** _____

Name _____

Ogawa / Rawin

เอกสารแม่แบบ

Calibration Certificate

Certificate No.: 2200751-001-01
Client name: UAE-IDEA ADVANCE ANALYTICAL COMPANY LIMITED
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangchak, Phraeknamong, Bangkok 10260

Page 1 of 3

Equipment: Electronic Balance

Manufacturer: AND

Model: EK-4101

Serial No.: Q2602043

ID No.: UZA.2015.002

Order No.: 2200751

Operation No.: 2200751-001

Date of Receipt: 2 December 2021

Date of Calibration: 14 December 2021

Calibrated by Mr. Taveesak Salise
 Scientist

Approved by

(Mr. Phraphat Tungsit)

Manager, Division of Calibration Laboratory
 Responsible for the Technical Management Team

Date of Issue: 15 December 2021

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

FCS-009 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2200751-001-01
Equipment: Electronic Balance
Manufacturer: AND
Model: EK-4101
Resolutions: 0.01 g
Serial No.: Q2602043
ID No.: UZA.2015.002
Capacity: 400 g

Page 2 of 3

Data of Calibration: 14 December 2021
Environment Conditions: Ambient Temperature: 22.8 ± 0.6 °C Relative Humidity: 53 ± 3 %

Place of Calibration: Mass Calibration Laboratory, National Food Institute

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-04-001 In-House Method based on UKAS Lab 14 : 2019

2. Reference Standards:

Reference Standard **Model** **Serial No.** **Calibrated By** **Certificate No.** **Due Date**

Standard Weight Class F1 1-500g 13588 TCS W2111415 18 November 2022

Instrument **Model** **Serial No.** **Calibrated By** **Certificate No.** **Due Date**

Thermo-Hygro Meter 11A1 800.001.003/05 Quality Reborn Q021-0297 15 February 2022

3. This certification is traceable to SI UNIT

4. This certificate is certified only for the instrument we calibrated.

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

Calibration Results

1. Repeatability of Readings:

Nominal Value (g)	Standard Deviation of Reading (g)
200	0.0000
400	0.0032

2. Off-Center Error:

A mass of 100 g was placed and moved to various position on pan.

The balance reading obtained is given in the table.

1	2	3	4	5	6	(Maximum Difference)
(g)	(g)	(g)	(g)	(g)	(g)	(g)
100.00	99.99	99.99	100.00	100.00	100.00	0.01

FCS-012 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม



Calibration Report

Certificate No.: 2200751-001-01

Equipment: Electronic Balance

Model: EK-110f

Serial No.: Q2602043

Capacity: 400 g

Manufacturer: AND

Resolution: 0.01 g

ID No.: UFA-2015-002

Date of Calibration: 14 December 2021

Calibration Result (Continued)

Calibration Range: 0-400 g

Calibration Adjustment: External Calibration 200 g

3. Departure from Nominal Value:

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (g)	Coverage Factor (k)
Unlabeled	0.000	0.00	0.00	0.0002	2.00
1	1.000	1.00	0.00	0.0002	2.00
2	2.000	2.00	0.00	0.0002	2.00
5	5.000	5.00	0.00	0.0002	2.00
10	10.000	10.00	0.00	0.0002	2.00
20	20.000	20.00	0.00	0.0002	2.00
30	30.000	30.00	0.00	0.0002	2.00
40	40.000	40.00	0.00	0.0002	2.00
50	50.000	50.00	0.00	0.0002	2.00
70	70.000	70.00	0.00	0.0002	2.00
100	100.000	100.00	0.00	0.0002	2.00
150	150.000	150.00	0.00	0.0002	2.00
200	200.000	200.00	0.00	0.0002	2.00
300	300.000	300.00	0.00	0.0005	2.00
400	400.000	400.00	0.00	0.0005	2.00

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

FCS-012 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม

Certificate No.: 2200751-003-01

Client name: UAE-IDEA ADVANCE ANALYTICAL COMPANY LIMITED

Address: 3 Soi Udomesuk 41, Sukhumvit Road, Bangkok, Phraekhanong, Bangkok 10260

Equipment: Piston pipette

Manufacturer: NICHIRYO

Model: Nichipet EX

Serial No.: K08234671

ID No.: UFA-2015-011

Order No.: 2200751

Operation No.: 2200751-003

Date of Receipt: 2 December 2021

Date of calibration: 14 December 2021

Calibrated by Miss Supawadee Prachachot

Senior Analyst

(Mr. Phraphat Tungsit)

Manager, Division of Calibration Laboratory

Responsible for the Technical Management Team

15 December 2021

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

FCS-008 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2200751-003-01
Equipment: Piston pipette
Range: 10 µl to 100 µl
Manufacturer: NICHIRYO
Resolution: 0.1 µl
Model: Nichipet EX
Serial No.: K09224671
Type: Single channel variable volume air displacement
ID No.: UJA.2015.011
Date of calibration: 14 December 2021

Location: Volumetric Calibration Laboratory, National Food Institute
Environment: Ambient temperature (20 ± 2.5)°C, Relative humidity (50 ± 10)% and Atmospheric pressure (1010 ± 10) mbar.

Condition of this results of calibration

1. Calibration Method NFI. Method W-VO-012 Based on ISO 8655 : 2002 Part 2.6
 2. This certification is traceable to SI UNIT, through the certificate as follow

Instruments	Serial/ID No.	Certificate No.	Calibrated by	TLAS Laboratory Accreditation	Due date
Electronic Balance	B949702814	VO 640350-01	NFI	Calibration No.0061	28 March 2022
Digital Thermometer	NFI.BDT003721	VO 640352-01	NFI	Calibration No.0061	28 February 2022
Thermo Hygrometer	88W.JHL8TH004/59	QR21-2456	REBORN	Calibration No.0292	21 October 2022
Barometric Pressure	NFI.BBR001/21	AD2102-305-0001	NIT	Calibration No.0052	4 March 2022

3. This certificate was certified only for the instrument we calibrated.
 4. This result of calibration was found accurate as shown on date and place of calibration only.

Results of calibration

Calibration results : without adjustment

Test volume (µl)	10	50	100
Setting volume (µl)	10.0	50.0	100.0
Measured volume (µl)	9.735	50.037	100.547
Systematic error (µl)	-0.265	0.037	0.547
Random error (µl)	0.044	0.047	0.054
Error (E) %	-0.26	0.04	0.55
Coefficient of variation (CV) %	0.05	0.05	0.05
Uncertainty of measurement (k=2)	0.068	0.070	0.072
Coverage factor (k)	2.00	2.00	2.00

Pipette Tip of Calibration : Manufacturer : GILSON, Color code : Colorless, Capacity : 200µl
 The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with ISO/TR 24461.

Calibration Certificate

Certificate No.: 2200751-004-01
Client name: UAE-IDEA ADVANCE ANALYTICAL COMPANY LIMITED
Address: 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Equipment: Piston pipette
Manufacturer: NICHIRYO
Model: Nichipet EX
Serial No.: K09315691
ID No.: UJA.2015.012
Order No.: 2200751
Operation No.: 2200751-004

Date of Receipt: 2 December 2021
Date of calibration: 14 December 2021

Calibrated by: Miss Supawadee Prachitsat
Approved by: (Mr. Phraphat Tansitk)
Senior Analyst
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 15 December 2021

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

FCS-009 Revision: 00 Date: 14-12-61

Calibration Report

Certificate No.: 2200751-004-01
Equipment: Piston pipette
Range: 1 ml to 10 ml
Manufacturer: NICHIRYO
Resolutions: 0.01 ml
Model: Nidipat EX
Serial No.: K05915991
Type: Single channel variable volume air displacement
ID No.: UTA-2015-012
Date of calibration: 14 December 2021

Location: Volumetric Calibration Laboratory, National Food Institute
Environment: Ambient temperature (20 ± 2.5)°C, Relative humidity (50 ± 10)% and Atmospheric pressure (101.0 ± 10) mbar.

Condition of this results of calibration

1. Calibration Method NFI Method W-VO-012 Based on ISO 8655 : 2002 Part 2,6
 2. This certification is traceable to SI UNIT, through the certificate as follow
- | Instruments | Serial/ID No. | Certificate No. | Calibrated by | TLAS Laboratory Accreditation | Due date |
|---------------------|------------------|-----------------|---------------|-------------------------------|------------------|
| Electronic Balance | B949702814 | VO 640350-01 | NFI | Calibration No.0061 | 28 March 2022 |
| Digital Thermometer | NFI.807001/21 | VO 640592-01 | NFI | Calibration No.0061 | 28 February 2022 |
| Thermo Hygrometer | san.hum.BTH04/59 | Q821-2456 | REBORN | Calibration No.0092 | 21 October 2022 |
| Barometric Pressure | NFI.88R001/21 | A02103-305-0001 | MIT | Calibration No.0052 | 4 March 2022 |
3. This certificate was certified only for the instrument we calibrated.
 4. This result of calibration was found accurate as shown on date and place of calibration only.

Results of calibration

Calibration results : without adjustment

Test volume (ml)	1	5	10
Settling volume (ml)	1.00	5.00	10.00
Measured volume (ml)	0.98098	4.99742	10.01817
Systematic error (ml)	-0.01902	-0.00258	0.01817
Random error (ml)	0.00034	0.00043	0.00096
Error (E) %	-0.19	-0.03	0.18
Coefficient of variation (CV) %	0.00	0.00	0.01
Uncertainty of measurement (umf)	0.00027	0.00044	0.00091
Coverage factor (k)	2.21	2.05	2.07

Pipette Tip of Calibration: Manufacturer : NICHIRYO, Color code : Colorless, Capacity : 10ml
 The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with ISO/JR 20461.

Calibration Certificate

Certificate No.: 2200751-005-01
Client name: UAE-IDEA ADVANCE ANALYTICAL COMPANY LIMITED
Address: 3 Sol Udomsuk 41, Sukhumvit Road, Bangkok, Phrakhanong, Bangkok 10260

Equipment: Syringes
Manufacturer: HAMILTON
Model: MICROLITER#710
Serial No.: N/A
ID No.: UTA-2015-016
Order No.: 2200751
Operation No.: 2200751-005
Date of Receipt: 2 December 2021
Date of calibration: 14 December 2021

Calibrated by Miss Supawadee Prechachot **Approved by** (Mr. Pherephat Tuanglit)
Senior Analyst Manager, Division of Calibration Laboratory
Date of Issue: 15 December 2021 **Responsible for the Technical Management Team**

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.



Calibration Report

Certificate No.: 2200751-005-01
 Equipment: Syringes
 Manufacturer: HAMILTON
 Model: MICROLITER#710
 Type: N/A
 Date of calibration: 14 December 2021

Location: Volumetric Calibration Laboratory, National Food Institute
 Environment: Ambient temperature (20 ± 2.5°C, Relative humidity (50 ±10)% and Atmospheric pressure (1010 ±10) mbar.

Condition of this results of calibration

1. Calibration Method NFI, Method W-VO-013 Based on OIML R26:1978, Medical Syringes
2. This certification is traceable to SI UNIT, through the certificate as follow

Instruments	Serial/ID No.	Certificate No.	Calibrated by	TLAS Laboratory Accreditation	Due date
Electronic Balance	8849702814	VO 640350-01	NFI	Calibration No.0061	28 March 2022
Digital Thermometer	NFL80T001/21	VO 640592-01	NFI	Calibration No.0061	28 February 2022
Thermo Hygrometer	4844.444.15TH004/59	QR21-2456	REBORN	Calibration No.0292	21 October 2022
Barometric Pressure	NFL888001/21	A02102-305-0001	MIT	Calibration No.0052	4 March 2022

3. This certificate was certified only for this instrument we calibrated.

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

Results of calibration

Calibration results : without adjustment

Test volume	(ul)	50	100
Setting volume	(ul)	50.0	100.0
Measured volume	(ml)	0.05005	0.10036
Systematic error	(ml)	0.00005	0.00036
Random error	(ml)	0.00008	0.00009
Error (E) %		0.05	0.36
Coefficient of variation (CV) %		0.08	0.09
Uncertainty of measurement (±ml)		0.000064	0.000088
Coverage factor (k)		2.05	2.05

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with ISO/TR 20461.



Calibration Certificate

Certificate No.: 2200751-006-01
 Client name: UAE-IDEA ADVANCE ANALYTICAL COMPANY LIMITED
 Address: 3 Soi Udomsuk 41, Sukhumvit Road, Bangkok, Phrakhanong, Bangkok 10260

Equipment: Syringes
 Manufacturer: HAMILTON
 Model: MICROLITER#705
 Serial No.: N/A
 ID No.: UIA-2015.019
 Order No.: 2200751
 Operation No.: 2200751-006
 Date of Receipt: 2 December 2021
 Date of calibration: 14 December 2021

Calibrated by Miss Supawadee Prachachot

Senior Analyst

Approved by (Mr. Phraphat Tuangjit)

Manager, Division of Calibration Laboratory

Responsible for the Technical Management Team

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

National Food Institute, Ministry of Industry, Thailand

2008 Soi 36, Anu Amn Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand.
Tel : +66 (0) 2422 8688 Fax : +66 (0) 2422 8545 Website : www.nfi.go.th E-mail : cal@nfi.go.th

Calibration Report

Certificate No.: 2200751-006-01
Equipment: Syringes
Manufacturer: HAMILTON
Model: MICROLITE#705
Type: N/A
Date of calibration: 14 December 2021
Location: Volumetric Calibration Laboratory, National Food Institute
Environment: Ambient temperature (20 ± 2.5)°C, Relative humidity (50 ± 10)% and atmospheric pressure (1010 ± 10) mbar.
Condition of this results of calibration
1. Calibration Method NPL Method WVO-013 Based on OIML R26:1978, Medical syringes
2. This certification is traceable to SI UNIT, through the certificate as follow

Instruments	Serial/ID No.	Certificate No.	Calibrated by	TLAS Laboratory Accreditation	Due date
Electronic Balance	B949702814	VO 640350-01	NFI	Calibration No.0061	28 March 2022
Digital Thermometer	NFL807001/21	VO 640592-01	NFI	Calibration No.0061	28 February 2022
Thermo Hygrometer	atom.hall.ETH1004/59	QR21-2455	REBORN	Calibration No.0282	21 October 2022
Barometric Pressure	NFL8BR001/21	A02102-305-0001	MIT	Calibration No.0062	4 March 2022

3. This certificate was certified only for the instrument we calibrated.
4. The result of calibration was found accurate as shown on date and place of calibration only.

Results of calibration

Calibration results : without adjustment

Test volume	(µl)	25	50
Setting volume	(µl)	25.00	50.00
Measured volume	(ml)	0.02510	0.05019
Systematic error	(ml)	0.00010	0.00019
Random error	(ml)	0.00003	0.00004
Error (E) %		0.20	0.37
Coefficient of variation (CV) %		0.07	0.09
Uncertainty of measurement (Δm)		0.000065	0.000068
Coverage factor (k)		2.00	2.00

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with ISO/IEC 20461.

เอกสารถือความคุ้มครอง

CERTIFICATE OF CALIBRATION

Date of Issue : 15 December 2021
Order Item No.: 2112014
Certificate Number : QR21-2934
Page : 1 of 2



REBORN
www.qreborn.com
Quality Reborn Co., Ltd.
42/267 Leha Kleng Paecharoen fangane 8/1
Nongkham, Bangkok 10168
Tel : +662-4447-382, Fax: +662-4447-383

NSC-JTSI-TB 17025
CALIBRATION 0252

Customer : UAE-IDEA ADVANCE ANALYTICAL COMPANY LIMITED (UIA)
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Date Received : 03 December 2021
Date of Calibration : 09 December 2021

Instrument : Description : Digital Thermo-Hygrometer
Model : THI-HP
Serial Number : 57211
ID Number : UIA.2015.004
Manufacturer : AS ONE
Site : Quality Reborn Office
Location : Calibration Room 1

Environmental Conditions

Temperature : 25 °C ± 3 °C
Relative Humidity : 55 % ± 25 %

Calibration Method Used

This instrument was calibrated by comparison of indication with the dew point hygrometer with chilled mirror sensor and standard thermometer with PRT in humidity/temperature chamber according to calibration procedure no. CP-H03-01.

Traceability of Measurement

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

Calibrated By : Ms. Nisalak Buranaset

Approved By :

[] Mr. Thanat Sutthinate
[x] Mr. Jatuporn Juijai-ngam

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เอกสารถือความคุ้มครอง



Certificate No.: QR21-2934
Order Item No.: 2112014
Page: 2 of 2

Details of Calibration

1. Reference Standard Equipment Used:

Description	Certificate No.	Due Date
Dew Point Hygrometer GE M2 S/N 3050991 connected with Chilled Mirror Sensor GE D-2-SR S/N 1090900	M-21H021	19 November 2022
Reference Thermometer 1524 S/N 1923168 connected with Fast Response RTD NR-351 S/N 4606903-002 (Channel T1)	H05-21-01	19 November 2022
Fast Response RTD NR-351 S/N 4506346-001 (Channel T2)	H05-21-01	23 February 2022
2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.	H05-21-01	25 February 2022
3. Condition of calibration item: normal condition, no indication find for any damage or malfunction		
4. Uncertainty of humidity measurement was include temperature dependency test at 25 °C ± 0.50 °C		

Result of Calibration i. (Without Adjustment)

Function i. Humidity Measurement at Reference Temperature 25 °C

Standard Humidity (%RH)	UUC* Reading (%RH)	Humidity Correction (%RH)	Uncertainty of Measurement (±%RH)
49.90	44	-5.90	1.2

Result of Calibration ii. (Without Adjustment)

Function ii. Temperature Measurement

Standard Temperature (°C)	UUC* Reading (°C)	Temperature Correction (°C)	Uncertainty of Measurement (±°C)
24.036	25.0	-0.964	0.33

UUC*: Unit Under Calibration

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

-oOo-

เอกสารไม่ควบคุม

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CERTIFICATE OF CALIBRATION

Date of Issue: 15 December 2021
Order Item No.: 2112014
Certificate Number: QR21-2935
Page: 1 of 2



REBORN

www.qreborn.com



Quality Reborn Co., Ltd.
42/267 Leab Klong paricharoen fangane 8/1
Nongkham, Bangkok 10160
Tel: +662-4447-382, Fax: +662-4447-383



NIST-TLS-17025
CALIBRATION 0292

Customer: UAE-IDEA ADVANCE ANALYTICAL COMPANY LIMITED (ULA)
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Pinakhanong, Bangkok 10260

Date Received: 03 December 2021

Date of Calibration: 09 December 2021

Instrument: Description: Data Logger

Model: RC-5

Serial Number: EPE204107403

ID Number: UJA-2020.020

Manufacturer: Elitech

Site: Quality Reborn Office

Location: Calibration Room 1

Environmental Conditions

Temperature: 25 °C ± 3 °C

Relative Humidity: 55 % ± 25 %

Calibration Method Used

This instrument was calibrated by comparison of indication with the standard thermometer with fast response RTD in humidity/temperature chamber according to calibration procedure no. CP-H03-01.

Traceability of Measurement

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

Calibrated By: Ms. Nisalak Buranaset

Approved By: [Signature]

[] Mr. Thanat Sutthinate

[x] Mr. Jatuporn Juijai-ngam



Certificate No.: QR21-2935
Order Item No.: 2112014
Page: 2 of 2

Details of Calibration

1. Reference Standard Equipment Used:

Description

Reference Thermometer 1524 S/N 1923168 connected with
Fast Response RTD NR-351 S/N 4506346-001 (Channel T2)

Certificate No.

H05-21-01

Due Date

25 February 2022

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration
and carry no implication regarding the long-term stability of the instrument.

3. Condition of calibration item: normal condition, no indication find for any damage or malfunction

Result of Calibration: (Without Adjustment)

Function: Temperature Measurement

Standard Temperature (°C)	UUC* Reading (°C)	Temperature Correction (°C)	Uncertainty of Measurement (±°C)
0.009	0.2	-0.191	0.33
9.995	10.1	-0.105	0.19
20.009	20.0	0.009	0.19

UUC*: Unit Under Calibration

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

-oOo-

เอกสารไม่ควบคุม



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Sol 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	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 : Teresak Panna

(Mr. Teresak Panna)

Approved by

(Ms. Kiana Luangthitun)

Director

Mechanical Engineering Standards Laboratory

Ref. 201326601.000059001

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.

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rumpai@tistr.or.th Website: www.tistr.or.th

Office/Laboratory
Sol 1.C. Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office
196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sunalee@tistr.or.th

FM.BLMTC.002 Rev.4

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Sol 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.

78.

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.

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
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E-mail : rumpai@tistr.or.th Website: www.tistr.or.th

Office/Laboratory
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Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office
196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sunalee@tistr.or.th

FM.BLMTC.002 Rev.4



Certificate of Calibration

Certificate No. : 65-200300-1 Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisetuknakhon 25, Pracha-Utd 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 : (26.1 to 26.3) °C

Relative Humidity : (62.1 to 64.5) %

Air Pressure : 1007.0 mbar

Date of Received :

21 September 2022

Date of Calibration :

21 September 2022

Date of Issue :

24 September 2022

Calibrated by :

Akanadath Thippichai

Calibration Method :

In-house method CAL-M2001 based on UKAS Publication ref : LAB 14

Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02213103	18 Nov 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Sirachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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



Certificate of Calibration

Certificate No. : 65-200300-1 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	0.00001	0.000012
0.01	0.00000	0.000014
0.1	0.00001	0.000018
1	0.00000	0.000026
10	0.00000	0.000053
20	-0.00001	0.000071
50	0.00001	0.00011
100	-0.00008	0.00020
150	-0.0001	0.00038
200	-0.0001	0.00038

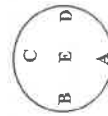
This result of calibration was found accurate as shown on date and place of calibration only.

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
0.00001	0.00006	0.00004	-0.00006	0.00000



Repeatability

Load test : 200 g

Sidev. : 0.000053 g

- 0.00 -





Certificate of Calibration

Certificate No. : 65-210457-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisaknakhon25, 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 / m³Assumed Air density : 1.2 kg / m³

Environment :

Ambient Temperature : (20 ± 2) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1001.1 mbar

Date of Received : 21 September 2022

Date of Calibration : 28 September 2022

Date of Issue : 28 September 2022

Calibrated by : Wuttichai 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.

E221-E2210 MM-0042-22

Due Date

21 Mar 2025

Traceability

National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 65-210457-1

Page : 2 of 2

Result of Callibration : Without Adjustment

UUC Condition As-Received : Good

No.	Nominal Value	Id.Mark	Conventional mass Value	Measuring Uncertainty
1	1 g	none	1 g -0.016 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%

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Certificate of Calibration

Certificate No. : 65-210457-2 Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisasukrakhon25, Pracha-Uttd Rd., Thungkrn, 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 / m³Assumed Air density : 1.2 kg / m³

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

Relative Humidity : (50 ± 10) %

Air Pressure : 1001.8 mbar

Date of Received : 21 September 2022

Date of Calibration : 28 September 2022

Date of Issue : 28 September 2022

Calibrated by : Wuttichai 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 :

(Surachai Promthong)
Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 65-210457-2 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 -0.17 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%

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Certificate of Calibration

Certificate No. :

65-210457-3

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisasuknakhon25, Pracha-Ud Rd., Thungkru, Bangkok 10140 Thailand

Equipment :

Weight

Manufacturer : N/A

Material : Stainless Steel

Weight size : 200 g

ID No. : 63-210391-3

Assumed density of weight : 7950 kg / m³Assumed Air density : 1.2 kg / m³

Environment :

Ambient Temperature : (20 ± 2) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1001.8 mbar

Date of Received : 21 September 2022

Date of Calibration : 28 September 2022

Date of Issue : 28 September 2022

Calibrated by : Wuttichai 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.

E221-E2210 MM-0042-22

Due Date

21 Mar 2025

Traceability

National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. :

65-210457-3

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 +0.09 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%

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ห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์ Blue Consultant Limited Partnership

32/751 ถนนประชาอุทิศ แขวงทุ่งครุ เขตทุ่งครุ กรุงเทพฯ 10140

โทร. 0-2873-6045-6 โทรสาร 0-2873-6046

ห้องปฏิบัติการวิเคราะห์เพื่อคุณภาพตามวันที่ 14 สิงหาคม 2563

CALIBRATION REPORT

Equipment : SO₂ Analyzer Brand/Model: Teledyne-API/IT100, Thermo/43C

Serial No. : 1544, 1625, 1626, 43C/F 56056-306

Date of Calibrate : December 1, 2022

Reference Standard Cylinder No.: EB0128767

Certification Date: October 29, 2019 Expiry Date: October 29, 2027

Component: SO₂: 55.62 ppm, NO: 57.21 ppm, CO: 4.551 ppm

Calibration Check (Before adjust)					
Serial No.	Zero			Span	
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Drift (ppb)
1544	-0.1	0	-0.1	400.7	400
1625	0.3	0	0.3	397.6	400
1626	-0.2	0	-0.2	398.3	400
43C/F 56056-306	0.2	0	0.2	400.8	400

Calibration Check (After adjust)					
Serial No.	Zero			Span	
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Drift (ppb)
1544	0	0	0	400	400
1625	0	0	0	400	400
1626	0	0	0	400	400
43C/F 56056-306	0	0	0	400	400

ห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์
 ในนามห้องปฏิบัติการห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์
 Blue Consultant Limited Partnership

.....
 (นางสาวนิดา อนันต์สุวรรณชัย)
 ผู้จัดการห้องปฏิบัติการ

ห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์ Blue Consultant Limited Partnership

32/751 ถนนประชาอุทิศ แขวงทุ่งครุ เขตทุ่งครุ กรุงเทพฯ 10140

โทร. 0-2873-6045-6 โทรสาร 0-2873-6046

ห้องปฏิบัติการวิเคราะห์เพื่อคุณภาพตามวันที่ 14 สิงหาคม 2563

CALIBRATION REPORT

Equipment : NOx Analyzer Brand/Model: API/200A, Teledyne-API/IT200, Thermo/17C

Serial No. : 875, 99, 374, 17C-68153-359

Date of Calibrate : December 1, 2022

Reference Standard Cylinder No.: EB0128767

Certification Date: October 29, 2019 Expiry Date: October 29, 2027

Component: SO₂: 55.62 ppm, NO: 57.21 ppm, CO: 4.551 ppm

Calibration Check (Before adjust)					
Serial No.	Zero			Span	
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Drift (ppb)
875	NO/NO ₂ /NOx	NO/NO ₂ /NOx	NO/NO ₂ /NOx	NO/NO ₂ /NOx	NO/NO ₂ /NOx
99	2.7/-1.3/1.4	0/0/0	2.7/-1.3/1.4	398.8/2.0/400.8	400/0/400
374	4.7/2.3/7.0	0/0/0	4.7/2.3/7.0	395.8/4.3/400.1	400/0/400
17C-68153-359	3.1/2.1/5.2	0/0/0	3.1/2.1/5.2	397.5/3.0/400.5	400/0/400
	4.4/1.7/6.1	0/0/0	4.4/1.7/6.1	401.4/4.0/405.4	400/0/400

Calibration Check (After adjust)					
Serial No.	Zero			Span	
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Drift (ppb)
875	NO/NO ₂ /NOx	NO/NO ₂ /NOx	NO/NO ₂ /NOx	NO/NO ₂ /NOx	NO/NO ₂ /NOx
99	0/0/0	0/0/0	0/0/0	400/0/400	400/0/400
374	0/0/0	0/0/0	0/0/0	400/0/400	400/0/400
17C-68153-359	0/0/0	0/0/0	0/0/0	400/0/400	400/0/400

ห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์
 ในนามห้องปฏิบัติการห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์
 Blue Consultant Limited Partnership

.....
 (นางสาวนิดา อนันต์สุวรรณชัย)
 ผู้จัดการห้องปฏิบัติการ

ห้องปฏิบัติการวิเคราะห์เอกสารโบราณ วันที่ 14 สิงหาคม 2563

Certification Date: October 29, 2019
Expiry Date: October 29, 2027
Component: SO2: 55.62 ppm, NO: 57.21 ppm, CO : 4,551 ppm

Calibration Check (Before adjust)					
Serial No.	Zero			Span	
	Reading Value (ppm)	Expected Value (ppm)	Drift (ppm)	Reading Value (ppm)	Expected Value (ppm)
1119	0.1	0	0.1	39.8	40
131	0.2	0	0.2	39.6	40
678	0.2	0	0.2	39.7	40
3445	0.3	0	0.3	40.2	40

Calibration Check (After adjust)					
Serial No.	Zero			Span	
	Reading Value (ppm)	Expected Value (ppm)	Drift (ppm)	Reading Value (ppm)	Expected Value (ppm)
1119	0	0	0	40	40
131	0	0	0	40	40
678	0	0	0	40	40
3445	0	0	0	40	40

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: CN10630014
Organization Name: S.P.S. Consulting Service Co., Ltd.
Organization Location: 7 Soi Paholyothin 24 Bangkok 10900
Date: September 8, 2021 11:48:04 AM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.51, GCMS.02.51
Overall Qualification Status: Pass

System Inspection and Basic Safety and Operation

Name: 6890
Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Decay

Name: 6890 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: 6890 Front SSL

Date: September 8, 2021 11:48:04 AM
System ID: CN10630014

Setpoint Status: Pass
Inlet Pressure: 25.0 psi Actual 24.9 psi
Accuracy: 0.1 psi
Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Inlet Pressure Accuracy

Name: 6890 Back SSL

Setpoint Status: Pass
Inlet Pressure: 25.0 psi Actual 25.0 psi
Accuracy: 0.0 psi
Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 6890 Front FID

Setpoint Status: Pass
Flow Type: Fuel
Setpoint: 30.0 mL/min Measured Flow: 30.8 mL/min
Accuracy: 0.8 mL/min
Agilent Recommended: ≤ 10.0 % setpoint (3.0 mL/min)
Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Date: September 8, 2021 11:48:04 AM
System ID: CN10630014

Setpoint Status: Pass

Flow Type: Oxidizer

Setpoint: 400.0 mL/min Measured Flow: 401.6 mL/min

Accuracy: 1.6 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: 25.7 mL/min

Accuracy: 0.7 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (2.5 mL/min)

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

Overall Detector Flow Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 6890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual: 230.0 230.5 °C

Temperature: 230.0 230.5 °C

Accuracy: 0.5 °C

Agilent Recommended: ≥ -1.0 % setpoint in K (-5.0 °C)

≤ 1.0 % setpoint in K (5.0 °C)

Date: September 8, 2021 11:48:04 AM
System ID: CN10630014

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual: 100.0 100.1 °C

Temperature: 100.0 100.1 °C

Accuracy: 0.1 °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: 6890

Setpoint Status: Pass

Temperature: 100.0 100.1 °C

Setpoint/Average: 100.0 100.1 °C

Stability: 0.0 °C

Agilent Recommended: ≤ 0.5 °C

Overall GC Oven Temperature Stability Test Status

Pass

Scouting Run

Tested Combination1: Front SSL / Front FID

Injection Tower

Name: 7683B

Setpoint Status: Completed

Injection Volume on Column: 1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination1: Front SSL / Front FID

Date: September 8, 2021 11:48:04 AM
System ID: CN10630014

Name: 6890

Setpoint Status: Pass

Base Signal: 20.2 pA

Drift

counts

185.20

counts/HR

19200.00

Agilent Recommended:

Status: Pass

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1

Name: 7683B

Setpoint Status: Pass

Injection Volume on Column:

1.0 μ L

Area RSD:

0.41 %

Agilent Recommended:

<= 3.00

Retention Time RSD:

0.13 %

Agilent Recommended:

<= 1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination1

Name: 6890

Setpoint Status: Pass

Signal to Noise:

1019653

Agilent Recommended:

>= 300000

Date: September 8, 2021 11:48:04 AM
System ID: CN10630014

Overall Signal to Noise Test Status

Pass

Log Amp

Tested Combination2

Name: Back

Setpoint Status: Pass

SSL

5975C

External

SQ

Overall Log Amp Test Status

Pass

RPFA

Tested Combination2

Name: Back

Setpoint Status: Pass

SSL

5975C

External

SQ

Drift After Five Minutes:

10 mV

Agilent Recommended:

>= -100 and <= 100

RPFA Voltage:

498 mV

Agilent Recommended:

<= 1100

Overall RPFA Test Status

Pass

Tune EI

Tested Combination2

Name: Back

Setpoint Status: Pass

SSL

5975C

External

SQ

Filament:

1

Setpoint Status: Pass

Filament:

2

Overall Tune EI Test Status

Pass

Date: September 8, 2021 11:48:04 AM
System ID: CN10630014

Signal to Noise EI

Tested Combination2	Back	SSL	/ External	SQ
Name:	5975C			
Source:	EI - Inert	Filament:	1	
Setpoint Status:	Pass			
Signal to Noise:		609		
Agilent Recommended:		>= 160		
Source:	EI - Inert	Filament:	2	
Setpoint Status:	Pass			
Signal to Noise:		286		
Agilent Recommended:		>= 160		

This test's 0 comment(s) and 2 deviation(s) are available in the Attachments section.

Overall Signal to Noise EI Test Status

Pass

Instrument Details

Purpose
This section describes the as found system configuration.

Details

System	System ID	CN10630014
Manufacturer	Manufacturer	Agilent Technologies
Name	Name	6890
Flow Data Input	Flow Data Input	Manual Data
Temperature Data Input	Temperature Data Input	Manual Data or Other Data Logging
Tested Combination1	Injection Technique	Injection Tower
Inlet	Inlet	Front
Detector	Detector	Front
LTM Included?	LTM Included?	No
Tested Combination2	Injection Technique	Manual Injection
Inlet	Inlet	Back
Detector	Detector	External
LTM Included?	LTM Included?	No
Sampler 1	Manufacturer	Agilent Technologies
Type	Type	Injection Tower
Name	Name	7683B
Model Number	Model Number	G2913A
Serial Number	Serial Number	CN64136101
Usage	Usage	Sample Injection
Location	Location	Front
Syringe Volume (µL)	Syringe Volume (µL)	10

Sampler 2

Manufacturer	Agilent Technologies
Type	Manual Injection
Usage	Sample Injection
Syringe Volume (µL)	10

Mainframe 1

Manufacturer	Agilent Technologies
Name	6890
Model Number	G1530N
Serial Number	CN10630014
Firmware Revision	N.02.01
Oven Type	Standard

Inlet 1

Manufacturer	Agilent Technologies
Name	6890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Inlet 2

Manufacturer	Agilent Technologies
Name	6890
Type	SSL
Location	Back
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

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Agilent CrossLab Compliance Services

Detector 1

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Detector 2

Manufacturer	Agilent Technologies
Name	6890
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5975C
Serial Number	US61633454
Firmware Revision	5.02.04
High Vacuum System	Turbo Pump
Scouting Run Standard	OFN Std
MS EI Source 1	
Manufacturer	Agilent Technologies
Source Type	EI - Inert
Number of filaments	2

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: Adirek Ratanawijit
Logged On User Name: adirek.ratanawijit@non.agilent.com
Signature Creation Date: September 8, 2021
Reason for Signature: Executed protocol and published this original version of document

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User Name: adirek.ratanawijit
Hostname: DESKTOP-98M7VE6
SPS_QQCMS Transaction log :

System ID: CN10630014
Print Date: September 8, 2021 11:48:08 AM

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 7, 2021 2:28:20 PM	Audit	Session Created	Session	None
September 7, 2021 2:28:30 PM	Start	Configuration	Session	None
September 7, 2021 2:28:20 PM	Audit	Enrollment	Licensing	User is Field Engineer and does not require an unlock code
September 7, 2021 3:12:19 PM	Audit	Exp loaded	Session	EQP details for primary technique (Gc) - File path: [ProtocolPacks\Gc\Configurations\02.51\Gc.02.51.enp], EQP File Name: [Gc.02.51.enp], EQP Name: [AgilentRecommended] EQP details for hyphenated technique (GcMe) - File path: [ProtocolPacks\GcMe\Configurations\02.51\GcMe.02.51.enp], EQP File Name: [GcMe.02.51.enp], EQP Name: [AgilentRecommended]
September 7, 2021 3:12:25 PM	End	Configuration	Session	None
September 7, 2021 3:12:30 PM	Start	Qualification	Session	OQ
September 7, 2021 3:12:30 PM	Start	Execution	System Inspection and Basic Safety and Operation - 68900 - Qualitative Test - No setpoints associated	None

User Name: admin@ratanawijit
Host Name: DESKTOP-85M7YB6
SFS_OGCMIS Transaction log :

System ID: CN10630014
Print Date: September 8, 2021 11:48:04 AM

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 7, 2021 3:12:48 PM	End	Execution	System Inspection and Basic Safety and Operation - 8890: - Qualitative Test - No setpoints associated	Run Count : 1
September 7, 2021 3:13:47 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
September 7, 2021 3:40:16 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
September 7, 2021 3:40:29 PM	Start	Execution	Inlet Pressure Decay - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: >= 2.0 psi and <= 0.5 psi	None
September 7, 2021 3:40:39 PM	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 7, 2021 3:40:41 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
September 7, 2021 3:40:45 PM	End	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
September 7, 2021 3:40:49 PM	Start	Execution	Inlet Pressure Accuracy - Back SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
September 7, 2021 3:40:53 PM	End	Execution	Inlet Pressure Accuracy - Back SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1

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Date: September 8, 2021 11:48:04 AM
System ID: CN10630014

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User Name: admin@ratanawijit
Host Name: DESKTOP-85M7YB6
SFS_OGCMIS Transaction log :

System ID: CN10630014
Print Date: September 8, 2021 11:48:08 AM

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 7, 2021 3:40:55 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type: Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None
September 7, 2021 3:41:11 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type: Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
September 7, 2021 3:41:12 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type: Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
September 7, 2021 3:41:14 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type: Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
September 7, 2021 3:41:34 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type: Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
September 7, 2021 3:41:36 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type: Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
September 7, 2021 3:41:38 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type: Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
September 7, 2021 3:41:50 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type: Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
September 7, 2021 3:41:52 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type: Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
September 7, 2021 3:41:54 PM	Start	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None

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Date: September 8, 2021 11:48:04 AM
System ID: CN10630014

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User Name: adirek.ratanawijit Hostname: DESKTOP-SMT7V68 SPS_OQGCMS Transaction log :					System ID: CN10630014 Print Date: September 8, 2021 11:48:06 AM	
Time	Transaction State	Activity Performed	Type of Transaction	Optional Information		
September 7, 2021 3:42:09 PM	Audit	Data	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % seipoint in K	Manual Data Entry		
September 7, 2021 3:42:11 PM	End	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % seipoint in K	Run Count : 1		
September 7, 2021 3:42:13 PM	Start	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % seipoint in K	None		
September 7, 2021 3:42:34 PM	Audit	Data	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % seipoint in K	Manual Data Entry		
September 7, 2021 3:42:38 PM	End	Execution	GC Oven Temperature Accuracy - 6890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % seipoint in K	Run Count : 1		
September 7, 2021 3:42:38 PM	Start	Execution	GC Oven Temperature Stability - 6890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None		
September 7, 2021 3:43:24 PM	Audit	Data	GC Oven Temperature Stability - 6890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry		
September 7, 2021 3:43:27 PM	End	Execution	GC Oven Temperature Stability - 6890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1		
September 7, 2021 3:43:33 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None		

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User Name: adirek.ratanawijit Hostname: DESKTOP-SMT7V68 SPS_OQGCMS Transaction log :					System ID: CN10630014 Print Date: September 8, 2021 11:48:08 AM	
Time	Transaction State	Activity Performed	Type of Transaction	Optional Information		
September 7, 2021 3:46:05 PM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Data file Path: K:\SPS\OQCP\2021\NS\OUT1		
September 7, 2021 3:46:28 PM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Run Count: 1		
September 7, 2021 3:46:41 PM	Start	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None		
September 7, 2021 3:47:00 PM	Audit	Data	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data file Path: K:\SPS\OQCP\2021\NS\NSD REF01.D\FID1A.CH		
September 7, 2021 3:47:51 PM	End	Qualification	Session	OQ		
September 7, 2021 3:47:51 PM	Start	Configuration	Session	None		
September 7, 2021 3:48:45 PM	End	Configuration	Session	None		
September 7, 2021 3:48:46 PM	Start	Qualification	Session	OQ		
September 7, 2021 3:48:46 PM	Start	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None		
September 7, 2021 3:48:02 PM	End	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count: 1		

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User Name: admin@crosslab.com
Host Name: DESKTOP-4687756
System ID: CN10630014
Print Date: September 8, 2021 11:48:04 AM

SPS_OQGCMS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 7, 2021 3:48:28 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Rel. Time): <= 1.00%	None
September 7, 2021 3:48:22 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Rel. Time): <= 1.00%	Data files Path : K:\SPS\OQPV\2021\INJPREC 06.D\FID1A.CH
September 7, 2021 3:48:22 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Rel. Time): <= 1.00%	Data files Path : K:\SPS\OQPV\2021\INJPREC 06.D\FID1A.CH
September 7, 2021 3:48:22 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Rel. Time): <= 1.00%	Data files Path : K:\SPS\OQPV\2021\INJPREC 04.D\FID1A.CH
September 7, 2021 3:48:22 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Rel. Time): <= 1.00%	Data files Path : K:\SPS\OQPV\2021\INJPREC 05.D\FID1A.CH
September 7, 2021 3:48:22 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Rel. Time): <= 1.00%	Data files Path : K:\SPS\OQPV\2021\INJPREC 06.D\FID1A.CH
September 7, 2021 3:48:22 PM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area): <= 3.00% - L (Rel. Time): <= 1.00%	Run Count: 1

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Date: September 8, 2021 11:48:04 AM
System ID: CN10630014

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User Name: admin@crosslab.com
Host Name: DESKTOP-4687756
System ID: CN10630014
Print Date: September 8, 2021 11:48:08 AM

SPS_OQGCMS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 7, 2021 3:48:51 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID - Detector FID - L: >= 300000	None
September 7, 2021 3:50:06 PM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front FID - Detector FID - L: >= 300000	Data files Path : K:\SPS\OQPV\2021\ISIGTON 01.D\FID1A.CH
September 7, 2021 3:50:22 PM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID - Detector FID - L: >= 300000	Run Count: 1
September 7, 2021 3:50:32 PM	Start	Execution	Log Amp - 8975C SQ - Source: EI - Inert	None
September 7, 2021 3:50:54 PM	End	Execution	Log Amp - 8975C SQ - Source: EI - Inert	Run Count: 1
September 7, 2021 3:50:58 PM	Start	Execution	RPPA - 8975C SQ - Source: EI - Inert	None
September 7, 2021 3:55:05 PM	End	Qualification	Session	OQ
September 7, 2021 3:55:05 PM	Start	Configuration	Session	None
September 7, 2021 3:57:26 PM	End	Configuration	Session	None
September 7, 2021 3:57:28 PM	Start	Qualification	Session	OQ
September 7, 2021 3:57:28 PM	Start	Execution	RPPA - 8975C SQ - Source: EI - Inert	None
September 7, 2021 3:58:40 PM	End	Execution	RPPA - 8975C SQ - Source: EI - Inert	Run Count: 1
September 7, 2021 3:58:54 PM	Start	Execution	Tune EI - 8975C SQ - Source: EI - Inert EI - Inert Filament 2 (Qualitative - No setpoints associated)	None

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Date: September 8, 2021 11:48:04 AM
System ID: CN10630014

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User Name: adirek.rattanawijit Hostname: DESKTOP-86M7VB6 SP8_OQGCMS Transaction log :		System Id: CN10630014 Print Date: September 8, 2021 11:48:08 AM	
Time	Transaction State	Activity Performed	Optional Information
September 7, 2021 4:00:10 PM	Start	Execution	Tune EI - 9975C SQ - Source: - None EI - Inert Filament 1 (Qualitative) - No setpoints associated)
September 7, 2021 4:00:20 PM	End	Execution	Tune EI - 9975C SQ - Source: - None EI - Inert Filament 1 (Qualitative) - No setpoints associated)
September 7, 2021 4:00:22 PM	Start	Execution	Tune EI - 9975C SQ - Source: - None EI - Inert Filament 2 (Qualitative) - No setpoints associated)
September 7, 2021 4:00:23 PM	End	Execution	Tune EI - 9975C SQ - Source: - None EI - Inert Filament 2 (Qualitative) - No setpoints associated)
September 7, 2021 4:00:36 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160
September 7, 2021 4:01:05 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160
September 7, 2021 4:03:33 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160
September 7, 2021 4:03:44 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 2 - L: >= 160
September 7, 2021 4:03:48 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 2 - L: >= 160

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User Name: adirek.rattanawijit Hostname: DESKTOP-86M7VB6 SP8_OQGCMS Transaction log :		System Id: CN10630014 Print Date: September 8, 2021 11:48:08 AM	
Time	Transaction State	Activity Performed	Optional Information
September 7, 2021 4:05:58 PM	End	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 2 - L: >= 160
September 7, 2021 4:06:02 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160
September 7, 2021 4:06:09 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160
September 7, 2021 4:13:01 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160
September 7, 2021 4:13:28 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160
September 7, 2021 4:15:40 PM	Audit	AsxClosed	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160
September 7, 2021 4:16:47 PM	Audit	AsxCleaned	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160
September 7, 2021 4:16:48 PM	Audit	SessionReloaded	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160
September 7, 2021 4:16:53 PM	Start	Qualification	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160
September 7, 2021 4:16:53 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160

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User Name: adirek.rattanawijit
Hostname: DESKTOP-98M7V96

System ID: CN10630014
Print Date: September 8, 2021 11:48:04 AM

SPS_OQCMS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 7, 2021 4:17:12 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	Data file Path : K:\SPS\OQPV2021\SN_F1_02.D\DATA.MS
September 7, 2021 4:17:21 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	Data file Path : K:\SPS\OQPV2021\SN_F1_01.D\DATA.MS
September 7, 2021 4:17:28 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	Data file Path : K:\SPS\OQPV2021\SN_F1_01.D\DATA.MS
September 7, 2021 4:19:10 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	Data file Path : K:\SPS\SN_F1_001.D\DATA.MS
September 7, 2021 4:20:24 PM	End	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	Run Count : 1
September 7, 2021 4:20:42 PM	Audit	Test/Unlocked	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	Deviation filed for Run Count : 1
September 7, 2021 4:20:42 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	None
September 7, 2021 4:20:53 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	Data file Path : K:\SPS\SN_F1_001.D\DATA.MS

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Date: September 8, 2021 11:48:04 AM
System ID: CN10630014

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User Name: adirek.rattanawijit

Hostname: DESKTOP-98M7V98

System ID: CN10630014
Print Date: September 8, 2021 11:48:08 AM

SPS_OQCMS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 7, 2021 4:21:20 PM	End	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	Run Count : 2
September 7, 2021 4:21:38 PM	Audit	Test/Unlocked	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	Deviation filed for Run Count : 2
September 7, 2021 4:21:38 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	None
September 7, 2021 4:21:45 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	Data file Path : K:\SPS\SN_F1_001.D\DATA.MS
September 7, 2021 4:22:25 PM	Audit	AcqClosed	Session	None
September 7, 2021 4:23:57 PM	Audit	AcqRestarted	Session	None
September 7, 2021 4:23:58 PM	Audit	Session/Released	Session	None
September 7, 2021 4:24:03 PM	Start	Qualification	Session	OQ
September 7, 2021 4:24:03 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	None
September 7, 2021 4:26:28 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ - Source: EI - Inert using Filament 1 - L: >= 160	Data file Path : K:\SPS\SN_001.D\DATA.MS

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Date: September 8, 2021 11:48:04 AM
System ID: CN10630014

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User Name: adheh.rattanawijit

Hostname: DESKTOP-86H7V86

SPS_QCQCNS Transaction log :

System Id: CN10630014

Print Date: September 8, 2021 11:48:08 AM

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 7, 2021 4:27:55 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 180	Data files Path : K:\SPS\OPEN_SN\F1_001.D\ DATA\MS
September 7, 2021 4:30:00 PM	End	Execution	Signal to Noise EI - Liquid Injection, Back SSL, SQ: - Source: EI - Inert using Filament 1 - L: >= 180	Run Count: 3
September 7, 2021 4:30:10 PM	Audit	AccClosed	Session	None
September 8, 2021 11:31:05 AM	Audit	AccRestarted	Session	None
September 8, 2021 11:31:07 AM	Audit	SessionReloaded	Session	None
September 8, 2021 11:31:15 AM	Start	Qualification	Session	OQ
September 8, 2021 11:31:32 AM	End	Qualification	Session	OQ
September 8, 2021 11:31:32 AM	Start	Reporting	Session	None
September 8, 2021 11:46:01 AM	Audit	Reporting	Session	Report Generated : Certificate

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REPORT OF CALIBRATION

Certificate No. : SP22-016

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Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
420	0.0000	0.0000	0.0000	0.0028	2.00
	0.5787	0.5755	0.0032	0.0031	2.00
	1.0490	1.0436	0.0054	0.0029	2.00
	2.1900	2.1847	0.0053	0.0075	2.00
440	0.0000	0.0000	0.0000	0.0028	2.00
	0.5607	0.5588	0.0019	0.0034	2.00
	1.0247	1.0232	0.0015	0.0035	2.00
	2.1229	2.1211	0.0018	0.0082	2.00
465	0.0000	0.0000	0.0000	0.0028	2.00
	0.5236	0.5197	0.0039	0.0029	2.00
	0.9634	0.9625	0.0009	0.0028	2.00
	1.9763	1.9752	0.0011	0.0070	2.00
546.1	0.0000	-0.0001	0.0001	0.0028	2.00
	0.5191	0.5171	0.0020	0.0031	2.00
	1.0003	0.9984	0.0019	0.0033	2.00
	1.9987	1.9946	0.0041	0.0084	2.00
590	0.0000	0.0000	0.0000	0.0028	2.00
	0.5523	0.5509	0.0014	0.0030	2.00
	1.0809	1.0799	0.0010	0.0029	2.00
	2.0391	2.0329	0.0062	0.0080	2.00
635	0.0000	0.0000	0.0000	0.0028	2.00
	0.5601	0.5584	0.0017	0.0031	2.00
	1.0512	1.0498	0.0014	0.0029	2.00
	1.9294	1.9265	0.0029	0.0082	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021



REPORT OF CALIBRATION

Certificate No. : SP22-016


Page 4 of 5

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
235	0.0000	0.0001	-0.0001	0.0050	2.00
	0.7478	0.7421	0.0057	0.0056	2.00
257	0.0000	0.0000	0.0000	0.0050	2.00
	0.8686	0.8619	0.0067	0.0059	2.00
313	0.0000	0.0000	0.0000	0.0050	2.00
	0.2912	0.2896	0.0016	0.0051	2.00
350	0.0000	0.0000	0.0000	0.0050	2.00
	0.6448	0.6403	0.0045	0.0055	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

<p>DQE Services DQE Services Co., Ltd. 32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230 Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com</p>					
<p align="center">REPORT OF CALIBRATION</p>					<p align="right">Page 5 of 5</p>
<p>Certificate No. : SP22-016</p>					
<p>Wavelength Accuracy :</p>					
CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k	
241.72	242.0	-0.28	0.18	2.00	
279.45	279.5	-0.05	0.18	2.00	
287.81	287.5	0.31	0.18	2.00	
334.06	333.5	0.56	0.18	2.00	
360.93	360.5	0.43	0.18	2.00	
418.59	418.0	0.59	0.18	2.00	
445.94	445.4	0.54	0.18	2.00	
453.66	453.2	0.46	0.18	2.00	
460.02	459.7	0.32	0.18	2.00	
536.59	536.2	0.39	0.18	2.00	
637.98	638.3	-0.32	0.18	2.00	
431.38	431.0	0.38	0.18	2.00	
472.50	472.5	0.00	0.18	2.00	
513.47	513.5	-0.03	0.18	2.00	
528.88	528.5	0.38	0.18	2.00	
573.17	573.0	0.17	0.18	2.00	
585.35	585.0	0.35	0.20	2.00	
684.40	684.7	-0.30	0.18	2.00	
740.72	740.8	-0.08	0.20	2.00	
748.55	748.5	0.05	0.18	2.00	
807.03	807.3	-0.27	0.18	2.00	
879.28	879.0	0.28	0.18	2.00	

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k,

which for a normal distribution corresponds to a coverage probability of approximately 95%

- * Indicates non TISI accredited

- End of Certificate -

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PM-705-02-R01 1/1/2021

Request No. 25-65 / 0398

MTC. ACL.No. 486 / 65

CALIBRATION CERTIFICATE

NOMENCLATURE : 1. Atomic Absorption Spectrophotometer "Agilent Technologies"

Model AA240FS, Serial No. MV13160001

2. Working standard solution "Inorganic Ventures"

Multi Analyte Custom Grade Solution, Lot No. P2-MEB675610

SUBMITTED BY : United Analyst and Engineering Consultant Co., Ltd.

3 Soi Udomsuk41, Sukhumvit Road, Bangchak, Prakanong, Bangkok 10260

CALIBRATION PROCEDURE : 1. Performance Verification of Atomic Absorption Spectrophotometer (WI-500-02-30)

2. Estimation Uncertainty of Measurement in Analytical Chemistry (QP-513)

REFERENCE MATERIAL : Traceable to NIST "Agilent Technologies", "Carlo Erba"

Cadmium Lot No. 0108047046, Chromium Lot No. 0106315418, Copper Lot No. 0107480530, Iron Lot No. 0104697566,

Lead Lot No. 0104659973, Manganese Lot No. T109228A, Nickel Lot No. 0104978044, Zinc Lot No. 0100792297

CALIBRATION RANGE: 0.02,0.10,0.30,0.50,0.70 mg/l at 228.8 nm.Cd, 0.10,0.20,0.30,0.50,0.70 mg/l at 357.9 nm.Cr,

0.05,0.10,0.30,0.50,0.70 mg/l at 324.7 nm.Cu, 0.10,0.30,0.50,0.70,1.00 mg/l at 248.3 nm.Fe, 0.20,0.50,0.70,1.00,1.50 mg/l

at 217.0 nm.Pb, 0.05,0.10,0.30,0.50,0.70 mg/l at 279.5 nm.Mn, 0.10,0.30,0.50,0.70,1.00 mg/l at 232.0 nm.Ni,

0.05,0.10,0.30,0.50,0.70 mg/l at 213.9 nm.Zn

AMBIENT CONDITIONS : Temperature 22 °C Relative humidity 60 %

The Atomic Absorption Spectrophotometer set has been calibrated against Reference Material traceable to National Institute of Standards and Technology (NIST) by The Analytical Chemistry Laboratory. The results are attached herewith.

Calibrated by *Dani* (Mr. Danai Srithongkum)

Approved by *Suk* (Mrs. Thippaya Juvave Fortune)

Director of Analytical Chemistry Laboratory

Ref. 2025265020400522001

Calibration Date : 3 February 2022

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.BL.MTC.002 Rev.4

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73-TISTR

Request No. 25-65 / 0398

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MTC. ACL. No. 486 / 65

CALIBRATION DATA

1. Noise Level in term of standard deviation

Element	Cd	Cr	Cu	Fe	Pb	Mn	Ni	Zn
	-0.0004	0.0002	0.0007	0.0002	-0.0016	-0.0001	-0.0004	-0.0001
	0.0002	-0.0005	0.0010	0.0007	0.0000	-0.0003	0.0007	-0.0014
	-0.0002	0.0001	0.0008	0.0000	-0.0001	-0.0003	-0.0012	-0.0006
	0.0000	-0.0007	0.0007	0.0000	-0.0005	-0.0004	-0.0004	-0.0012
	0.0001	0.0004	0.0013	0.0014	-0.0001	-0.0001	0.0003	-0.0008
	0.0000	-0.0004	0.0003	-0.0012	-0.0005	-0.0007	-0.0004	-0.0008
	0.0000	-0.0009	0.0009	-0.0002	-0.0010	-0.0008	0.0007	-0.0003
	-0.0004	-0.0003	0.0015	0.0010	-0.0005	-0.0003	-0.0002	-0.0004
	0.0004	0.0008	0.0014	-0.0004	-0.0014	-0.0005	-0.0006	-0.0003
	-0.0006	-0.0013	0.0012	-0.0006	-0.0006	-0.0006	-0.0007	-0.0007
	0.0005	-0.0003	0.0014	-0.0004	-0.0008	-0.0003	-0.0006	-0.0011
	-0.0007	-0.0014	0.0004	-0.0001	-0.0001	0.0000	0.0000	-0.0003
	0.0008	0.0004	0.0005	-0.0006	-0.0008	0.0000	-0.0005	-0.0009
	0.0011	0.0002	0.0005	0.0017	-0.0016	-0.0008	0.0004	-0.0005
	0.0002	0.0010	0.0014	-0.0002	-0.0010	-0.0010	0.0002	-0.0001
	0.0001	-0.0011	0.0011	-0.0003	-0.0011	-0.0003	-0.0008	-0.0012
	0.0000	-0.0015	0.0009	-0.0010	-0.0011	-0.0013	0.0000	-0.0004
	0.0015	-0.0012	0.0005	0.0002	-0.0017	-0.0001	0.0005	-0.0002
	0.0006	0.0014	0.0010	0.0002	-0.0003	0.0001	-0.0006	-0.0010
	0.0001	0.0003	0.0003	-0.0001	-0.0004	-0.0002	-0.0001	-0.0001
Average Absorbance	0.000	0.000	0.001	0.000	-0.001	0.000	0.000	-0.001
Standard Deviation	0.0005	0.0008	0.0004	0.0007	0.0005	0.0004	0.0005	0.0004

Continue 2 / 5

INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

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.

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FM.BI.MTC.002 Rev.4



73-TISTR

Request No. 25-65 / 0398

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MTC. ACL. No. 486 / 65

2. Precision

Element	Conc. (mg/l)	Absorbance										Ave. Abs.	SD	%RSD
Cd	0.02	0.0074	0.0062	0.0065	0.0062	0.0070	0.0068	0.0070	0.0065	0.0065	0.0069	0.0007	0.0004	5.76
	0.30	0.0952	0.0959	0.0951	0.0957	0.0952	0.0950	0.0952	0.0948	0.0956	0.0943	0.0095	0.0005	0.49
	0.70	0.2213	0.2180	0.2203	0.2208	0.2234	0.2211	0.2196	0.2219	0.2201	0.2194	0.0221	0.0015	0.67
Cr	0.10	0.0096	0.0098	0.0097	0.0102	0.0106	0.0097	0.0098	0.0099	0.0103	0.0093	0.010	0.0004	3.83
	0.30	0.0309	0.0302	0.0300	0.0316	0.0306	0.0299	0.0309	0.0297	0.0311	0.0296	0.030	0.0007	2.20
	0.70	0.0659	0.0667	0.0664	0.0648	0.0656	0.0662	0.0658	0.0638	0.0638	0.0669	0.066	0.0011	1.70
Cu	0.05	0.0080	0.0075	0.0078	0.0075	0.0077	0.0081	0.0080	0.0075	0.0074	0.0076	0.008	0.0003	3.26
	0.30	0.0417	0.0419	0.0412	0.0421	0.0424	0.0420	0.0423	0.0403	0.0418	0.0415	0.042	0.0006	1.47
	0.70	0.0969	0.0965	0.0972	0.0957	0.0961	0.0958	0.0961	0.0963	0.0959	0.0972	0.096	0.0006	0.58
Fe	0.10	0.0090	0.0105	0.0078	0.0099	0.0091	0.0093	0.0096	0.0094	0.0093	0.0084	0.009	0.0007	8.11
	0.50	0.0462	0.0470	0.0464	0.0464	0.0467	0.0462	0.0467	0.0460	0.0468	0.0466	0.047	0.0003	0.67
	1.00	0.0867	0.0886	0.0910	0.0892	0.0897	0.0873	0.0892	0.0885	0.0888	0.0874	0.089	0.0013	1.43
Pb	0.20	0.0091	0.0095	0.0088	0.0087	0.0082	0.0094	0.0090	0.0087	0.0082	0.0090	0.009	0.0004	4.94
	0.70	0.0322	0.0321	0.0324	0.0318	0.0335	0.0326	0.0327	0.0315	0.0336	0.0321	0.032	0.0007	2.09
	1.50	0.0653	0.0645	0.0663	0.0664	0.0652	0.0671	0.0662	0.0666	0.0657	0.0648	0.066	0.0008	1.28
Mn	0.05	0.0092	0.0092	0.0097	0.0087	0.0085	0.0079	0.0096	0.0085	0.0084	0.0099	0.009	0.0007	7.33
	0.30	0.0616	0.0630	0.0632	0.0633	0.0634	0.0628	0.0640	0.0633	0.0640	0.0629	0.063	0.0007	1.08
	0.70	0.1396	0.1366	0.1386	0.1377	0.1386	0.1386	0.1396	0.1380	0.1374	0.1383	0.138	0.0009	0.67
Ni	0.10	0.0102	0.0092	0.0097	0.0104	0.0091	0.0105	0.0105	0.0096	0.0098	0.0102	0.010	0.0005	5.22
	0.50	0.0488	0.0489	0.0489	0.0495	0.0484	0.0490	0.0481	0.0492	0.0495	0.0492	0.049	0.0004	0.91
	1.00	0.0976	0.0979	0.0975	0.0992	0.0977	0.0973	0.0986	0.0962	0.0985	0.0982	0.098	0.0008	0.85
Zn	0.05	0.0340	0.0349	0.0340	0.0352	0.0337	0.0351	0.0344	0.0346	0.0349	0.0343	0.035	0.0005	1.49
	0.30	0.1669	0.1653	0.1628	0.1642	0.1657	0.1637	0.1659	0.1652	0.1654	0.1657	0.165	0.0012	0.72
	0.70	0.3456	0.3467	0.3445	0.3430	0.3422	0.3444	0.3437	0.3438	0.3435	0.3438	0.344	0.0013	0.37

Continue 3 / 5

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FM.BI.MTC.002 Rev.4



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Request No. 25-65 / 0398

3 / 5

MTC. ACL. No. 486 / 65

3. Trueness

3.1 Reading on wavelength- Cadmium(Cd) at 228.8 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Cd	0.02004	0.019	-0.001	5.19	± 0.004
	0.30060	0.291	-0.010	3.19	± 0.006
	0.70140	0.678	-0.023	3.34	± 0.012

3.2 Reading on wavelength- Chromium (Cr) at 357.9 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Cr	0.1002	0.101	0.001	0.80	± 0.007
	0.3006	0.298	-0.003	0.86	± 0.012
	0.7014	0.635	-0.066	9.47	± 0.023

3.3 Reading on wavelength- Copper (Cu) at 324.7 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Cu	0.0502	0.046	-0.004	8.37	± 0.004
	0.3012	0.295	-0.006	2.06	± 0.010
	0.7028	0.694	-0.009	1.25	± 0.021

Continue 4 / 5

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Request No. 25-65 / 0398

4 / 5

MTC. ACL. No. 486 / 65

3.4 Reading on wavelength- Iron (Fe) at 248.3 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Fe	0.1003	0.106	0.006	5.68	± 0.008
	0.5015	0.522	0.021	4.09	± 0.017
	1.0030	0.993	-0.010	1.00	± 0.032

3.5 Reading on wavelength- Lead (Pb) at 217.0 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Pb	0.1988	0.197	-0.002	0.91	± 0.014
	0.6958	0.722	0.026	3.77	± 0.022
	1.4910	1.463	-0.028	1.88	± 0.041

3.6 Reading on wavelength- Manganese (Mn) at 279.5 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Mn	0.04955	0.054	0.004	8.98	± 0.004
	0.29730	0.317	0.0197	6.63	± 0.006
	0.69370	0.682	-0.0117	1.69	± 0.012

Continue 5 / 5

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Request No. 25-65 / 0398

5 / 5

MTC. ACL. No. 486 / 65

3.7 Reading on wavelength- Nickel (Ni) at 232.0 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Ni	0.099	0.102	0.003	3.03	± 0.007
	0.495	0.489	-0.006	1.21	± 0.010
	0.990	0.975	-0.015	1.52	± 0.020

3.8 Reading on wavelength- Zinc (Zn) at 213.9 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Zn	0.050	0.050	0.000	0.00	± 0.012
	0.300	0.307	0.007	2.33	± 0.011
	0.700	0.660	-0.040	5.71	± 0.015

Remark : The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 ($k = 2$) which gives a level of confidence of approximately 95%

Calibrated by Dani Sathongkum
(Mr. Danai Sathongkum)

Approved by Sir D. Thippaya Junvee Fortune
Director of Analytical Chemistry Laboratory
Calibration date : 3 February 2022

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FM.BL.MTC.002 Rev.4

SPA001-001 Milestone DMA-80 Service Protocol

DMA-80 Direct Mercury Analyzer SERVICE PROTOCOL REPORT

To be filled in before service visit (1st page)

Customer information:

Company: บริษัท อุตสาหกรรมพลาสติก จำกัด
Department: Lab
Person in charge: นาย อดิศักดิ์
Address: 3 หมู่ 10 ตำบล 441 อ.บ.บ.
Tel.:
E-mail:

Technical data:

Unit Serial Number: 11020982
Terminal type or USB-640 Gateway: Terminal 640
Software, type and revision: Easy control
Air Compressor (if present): SN 1012000001
Gas system pump (if present): Rev. 02. D
Installation and last maintenance dates: SN
Inst. on: SN
Maint. on: SN
NOTE: after achievement of the following protocol a filled and signed copy of this report has to be sent to Milestone srl at: service@milestonesrl.com

For the best result of the test below we recommended to use the Milestone DMA-80 Service Kit (PN DMA-SKIT).

เอกสารไม่ควบคุม

1. VISUAL INSPECTION

	Good	Damaged	Corroded/Dirty
External chassis	✓		
Inside	✓		
Electric parts	✓		
Screws	✓		

2. ELECTRICAL SAFETY TEST

Using a suitable testing device check the below reported parameters and take note of the results.

Parameter	Result	OK	Not OK
Insulating resistance: $R_{iso} \geq 0.5 M\Omega$	Actual value: 0.01 MΩ	✓	
Grounding resistance: $R_{gs} \leq 100 m\Omega$	Actual value: 0.6 MΩ		✓

3. PRESSURE CHECK

Gas carrier	Oxygen (purity $O_2 > 99.95\%$)	Milestone air compressor
	Purity: 0.001	

The pressure at the supply source manometer should be approx. 4.0 bar
The flow rate depends by type of cuvette installed on the DMA-80 unit.

	Correct value	Final value	Correct value	Actual value	Correct value	Final value	Actual value	Final value
Inlet pressure	3.1 bar	-	3.1 bar	-	3.1 bar	3.1 bar	3.1 bar	Pass
Flow rate	10-12 l/h	-	8-10 l/h	-	6-8 l/h	7 l/h	7 l/h	Pass

Check all possible leakage points and their conditions:

	Good	Damaged	Corroded
Tubing	✓		
Silicon joints	✓		
O-rings	✓		
Cuvette sealing O-rings	✓		
Gas connections	✓		
Valves	✓		
Sample boat carrier	✓		
Catalyst flange	✓		

4. AUTOSAMPLER SYSTEM

	OK	Not OK	Re-Adjusted
Calibration of autosampler motor	✓		
Cylinders alignment	✓		

	Fast	Slow	Normal
Speed of pneumatic cylinders			✓

Using the maintenance grease, periodically lightly lubricate all exposed steel rods of the horizontal and vertical cylinders.

5. COMPONENTS CHECK

Conditions of the different parts used/installed on DMA unit:



	OK	Not OK	Replaced	Cleaned
Catalyst tube	✓			
Amalgamator	✓			
Quartz boats	✓			
Nickel boats	-			
Autosampler plate	✓			
Gas kit accessories	-			

6. TEMPERATURES

	Correct value	Actual value	Final value
Drying/ Decomposition furnace	If controlled by Infrared sensor $850^\circ C \pm 10^\circ C$	-	-
Catalyst furnace	If controlled by thermocouple $650^\circ C \pm 10^\circ C$	550 °C	Pass
Amalgamator stand by temperature	$65^\circ C \pm 10^\circ C$	55 °C	Pass
Amalgamator heating temperature	$170^\circ C \pm 10^\circ C$	170 °C	Pass
Cuvette	$850^\circ C \pm 10^\circ C$	750 °C	Pass
	$125^\circ C \pm 5^\circ C$	125 °C	Pass

7. SPECTROMETER

The spectrometer can be equipped with a single beam system (ducon lamp) or with a dual beam system (tricon lamp)

Old cuvette type		Actual cuvette type	
			
Gain		Offset	
Correct value	Actual value	Correct value	Actual value
3.9VDC	-	0.015VDC	0.015VDC
		0.005VDC	0.005VDC
		3.9VDC	3.9VDC
		3.96VDC	3.96VDC
Dualcell system			
Tricell system*			

(*)The recommended Hg lamp operating signal should be around 3.96VDC (for detector 2) and 3.93VDC (for detector 1).

Conditions of the spectrometer system	
Alignment between lamp, cuvette and detector	OK
Cuvette cleaning (glass windows, sealing O-rings...)	OK
Lamp intensity	OK
Operation of the mechanical shutter (if present)	OK

8. MILESTONE AIR COMPRESSOR

N.A.

Maintenance	
Drain (compressor)	OK
Replacing air filters (air filter)	
Check sealing connections	

9. PARTS TO BE REPLACED

PN	DESCRIPTION	Replaced	Not
----	-------------	----------	-----

4

เอกสารไม่ควบคุม

Catalyst tube:		Not Replaced	
DMA8133	6 months if the unit runs daily, 1 year if the unit is used rarely. In case of analyse of sample with high organic concentration the lifetime of the catalyst can be less than 6 months.		
DMA8134	Amalgamator: 6 months if the unit runs daily 1 year if the unit is used rarely		
DMA8195A	Hg lamp tri-cell (model 2011) (for kit p/n DMA8355): 2 years		
DMA8137	Hg lamp dual-cell: 2 years		
70200	Hg trap 1 year		
DMA8058/B	Amalgamator coil 1 year or as soon as the heating is not more homogeneous		
DMA8142	Nickel sample boats (set of 40pcs) 2 years		
DMA8347	Quartz sample boats (set of 10pcs) 4 years		
DMA8335	Metal sample boat carrier 2 years		
SL0108	PU-tube diam. 8/4 mm for internal Oz/air supply 2 years		
SO0376D	Heating coil for drying/decomposition 2 years		

10. TESTING PROCEDURE

It consists to run some measurements for the evaluation of the analytical performance of the unit, like: absorbance, peaks shape, temperatures, lamp signal and verify the proper working of whole system.

- Run minimum 2 blanks on the same sample boat (quartz if possible) in manner to clean it
- Run blanks until absorbance value (Height) decrease under 0.0020
- Set a fresh and stabilized 100µg/L Hg standard according to the prescriptions reported on the DMA80 User Manual. The quality of the used standard is fundamental for the success of the entire procedure
- Weight approximately 100µg of the fresh 100µg/L – Standard (10ng) and start the analysis as a single measurement mode
- Repeat five times the test
- Run again two blanks measurements

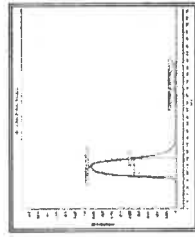
5

เอกสารไม่ควบคุม

File	Sample Name	Amount	Unit	Link	Calibr.	Math.	Sample	System
1	clear 532	0.1000	mm					
2	clear 532	0.1000	mm					
3	122 395	0.1000	mm					
4	122 395	0.1000	mm					
5	122 395	0.1000	mm					
6	122 395	0.1000	mm					
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53	122 395	0.1000	mm					
54	122 395	0.1000	mm					
55	122 395	0.1000	mm					
56	122 395	0.1000	mm					

Now, it is possible to evaluate:

- Peaks



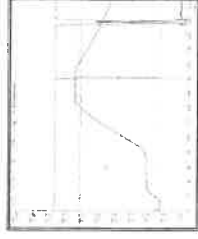
- The shape of the peak must be regular.
- The distance between Peak Cell 1 and Peak Cell 2 must be between 11 to 15 seconds.

Results



- The obtained absorbance (height) of the Blank must be < 0.0020 .
- The obtained absorbance (height) must be > 0.42 for each 100ppb analysis (0.22 with cuvette installed until December 2005, DNA s/n 05120292.)
- The relative standard deviation (rsd) must be $< 1.5\%$.
- After two blanks (after 10mg measurements), the absorbance is < 0.0020 .

-Temperatures & signal profiles



- The Hg lamp signal must be between 3.8 and 4.5V and stable. A few minutes after the start of the analysis the lamp does switch off because of the zero detection but then it instantly returns to the original condition. In case of Tricell configuration two green colour graphics are reported. After the zero shuttering the time necessary to return to full signal is longer on Tricell compare to Ducon lamp.
- During the run the catalyst oven temperature must be stable around to 615°C.
- The drying and ashing furnace must follow the set temperature method.
- During the run the Amalgamator furnace temperature must be stable at the stand by temperature (170°C). Then at the release step it must raise up to 850/900°C.
- The Curvette temperature must be stable at approximately 125°C.
- The Hg absorbance peaks must be correctly detected and reported.

11. FINAL REPORT

All screws inserted and tightened	Pass
All tubing sealing connections checked, cleaned or replaced and tightened	Pass
All heating elements are working	Pass
Sensors installed, checked and tightened	Pass
Safety devices (thermo switch) fully checked	Pass
All exhaust and cooling fans are functioning	Pass
Testing procedure successfully passed	Pass
Necessary tools available at customer's site	Pass
Last revision of User Manual available at customer's site	Pass
Advised customer about care and maintenance instructions	Pass

Remarks:

GAS CHROMATOGRAPH MASS SPECTROMETER

Customer: United Analyst and Engineering Consultant Co., Ltd.
Address: 3 Soi Udomsuk 41 Sukhumvit Rd. Bangchak
 Phrakhanong Bangkok Thailand 10260

Instruments Model:	MS Scion-SQ	S/N
	GC 451-GC	S/N
	AUTO SAMPLER CP8400	S/N

Standard Reference Number: 393065201
Procedure Document Number: 394207000

PM perform and Diagnostic Test	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
Air Water Check Test	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
Tune Test EI	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
Signal to Noise Test (EI) SCAN	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
Injection EI Area Precision Test	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
Injection EI RT Precision Test	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
User Demonstration	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

Engineer Somchai P.
Somchai Pohtongkam

Date 19 May 2022

SCION™

Operational Qualification Protocol

For SCION Instrument
Name and Model:

Serial Number:

System ID Number:

Publication no. 394207000
Revision A
November 2011

Contact

Scion Customer Service and Support uses a Customer Relationship Management (CRM) system. The interaction with this system offers the Customer immediate benefits including the contact center or help desk.

Scion worldwide service & support offices can be found from Scion website:



www.scion.com/support.html

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2.0 Qualification Representative and Reviewer Details


2.1 Qualification Representative Details

Each person responsible for executing any part of this Protocol must complete the table below, providing a sample of their signature and initials, and recording the date the Qualification was performed.

Qualification representatives are nominated to execute and verify the completeness of the test protocol and correctness of all entries.

All testing must be performed in accordance with procedures outlined in this manual. The representative must be trained and qualified to perform the procedures outlined in this document.

A copy of their appropriate qualifications is to be inserted into "Qualification Representative Details" on page 30.

Name (Print)	SOMCHAI PONTONGKAM
Title	ENGINEER
Signature	
Initials	SOMCHAI
Date	11 MAY 22

Name (Print)	
Title	
Signature	
Initials	
Date	

1.0 Revision History

This qualification protocol is updated as necessary, which includes the event of any regulatory changes to Title 21 of the Code of Federal Regulations (21 CFR) Parts 210 and 211 (if applicable), any software or hardware changes, or updates that may impact on regulatory compliance.

Issue Number	Date	Comments

2.2 Reviewer Details

Each representative responsible for reviewing any part of this protocol must record their details in the following tables, providing a sample of their signature and initials, and recording the date the qualification was performed.

An employee or designee of the company operating the instrument must review these qualification procedures. All calculations and data will be checked by the reviewer. Data review must be performed in accordance with the qualification guidelines "Qualification Guidelines and GMP Documentation" on page 10 and in compliance with current Good Manufacturing Practice (cGMP) as specified by 21 CFR Parts 210 and 211.

Documentation supporting training in the area of data review and cGMP must be carefully maintained and reviewed by the instrument owner.

Reviewer representatives are responsible for reviewing the completeness of the qualification protocol and accuracy of all entries.

Name (Print)	CHANA CHANSRI
Title	ENGINEER
Signature	
Initials	
Date	19 MAY 2022

Name (Print)	
Title	
Signature	
Initials	
Date	

2.3 Quality Assurance/Control Details

As Quality Assurance/Control (QA/QC), who is empowered to approve instrument compliance documents, I approve the procedures in the SCION Operational Qualification Protocol, which I may have amended, I accept the qualification of the Qualification Representative, and I will review and initial the results.

Name (Print)	
Title	
Signature	
Initials	
Date	

Name (Print)	
Title	
Signature	
Initials	
Date	

3.0 Customer Responsibilities

The customer shall ensure that the Preventive Maintenance (PM) or Installation Qualification (IQ) up to point 9.11 is completed. A customer representative should be available at all times during the Operational Qualification Protocol.

Note The Operational Qualification Protocol test procedure should be performed after significant repairs, and at least once a year.

Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date
	19 MAY 22	

4.0 Qualification Guidelines and GMP Documentation

4.1 Qualification Summary

At the end of qualification execution, all tables and data entry fields must be completed and all test results, where specified, must be printed and attached to the protocol.

The Qualification Representative and the Reviewer must sign (signature or initials) and date each page that has a signature field. This represents agreement and acceptance of all data and information on the signed page.

Note Scion does not provide instructions for full Qualification of the personal computer (PC) used to operate the SCION. If further qualification of the PC is required the end-user must contact the PC manufacturer.

Note Scion does not provide full qualification instructions for non-Scion manufactured accessories. Limited instructions may be supplied. If qualification of a non-Scion accessory is required, the end user must contact the accessory manufacturer.

4.2 Qualification Guidelines

The following are general guidelines for performing the qualification tests in accordance with cGMP for the Manufacturing, Processing, Packaging, or Holding of Drugs per 21CFR Parts 210 and 211. Additional local requirements may also apply.

- Read the guidelines before starting the qualification.
- Perform all tests exactly as written.
- Use a pen with permanent blue or black ink unless otherwise specified by company policy.
- Neatly strike out any incorrect words or numbers, made while writing comments or recording results, information or data within this Protocol, with a single line. The word(s) crossed out must remain legible. Write the correction as close as possible to the original entry. Write a brief description of the error. For example, write 'Transcription error' or 'Re-written for clarity'. Initial and date the change.
- Entering initials where a signature is requested, and vice versa is permitted. The exception to this is in 2.0 : Qualification Representative and Reviewer Details on page 6, where examples of each person's signature and initials are required.
- Use the date format dd Mon yyyy (e.g. 08 Mar 2011) unless otherwise specified by company policy.

- Complete all tables and data fields to comply with this protocol. Blank fields are not permitted. For items that are not applicable, draw a line through the field, and write 'N/A' (Not Applicable). If entire tables or sections of tables are not applicable, strike a line either through the entire table or the specific area and enter 'N/A'. Complete the signature fields on the page.
- Write 'Pass', 'Fail' or 'N/A' as applicable to the test requirement or outcome.
- Ensure that results and/or specific documents are printed and attached to the specified appendix.
- The Qualification Representative and Reviewer must both sign (signature or initials) and date the signature fields on each page. This represents agreement and acceptance of all data and information on the page.

4.3 Page Numbering of Appendices

Each page that is inserted after the appendix is numbered with the letter of the appendix and a sequential number. The appendix page number must be initialed and dated by both the Qualification Representative and the Reviewer.

For example, pages inserted after Appendix C are numbered

C-1, C-2, C-3...etc. along with the initials and date.

If the reverse of each appendix page is left blank, it should be marked 'N/A' and signed and dated.

When the IQ is complete the total number of pages inserted after each appendix is written on the front page of the respective appendix sheet.

Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date
19 MAY 22	19 MAY 22	

4.4 Exception Reports

An exception to the protocol occurs when the observed result differs from the acceptance criteria or expected result.

All exceptions to the protocol must be documented in the Exception Report. The Exception Report includes a detailed description of the exception and resolution by the Qualification Representative.

Each Exception Report shall be issued with a unique identification number in the form ERID-XX-X. This number is generated by the page number on which the exception occurred followed by a sequential number indicating each exception found on the page.

For example, if an exception occurs on page 34, the Exception Report shall be identified as 'ERID-34-1'. If another exception occurs on page 34, the second report shall be identified as 'ERID-34-2'. This identification number should be recorded in the 'Pass / Fail / N/A' field after each test.

Each Exception Report must be signed by the Qualification Representative and the Reviewer as evidence of approval.

The Exception Report is inserted in the appropriately named appendix and numbered as per Section 4.3 of this protocol.

Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date
19 MAY 22	19 MAY 22	

4.5 Reference Documents

The following documents are relevant to this Qualification:

- Installation Qualification Protocol
- Completed service report from Preventative Maintenance (PM) schedule

Qualification Rep. Initials	Sachin D	Reviewer Initials		QA/QC Initials	
Date	19 May 99	Date		Date	

4.6 Required Materials

The following stock solutions are required:

- 100 fg/ μ L OFN 394204200
- 1 pg/ μ L OFN 393065201
- 100 pg/ μ L OFN 393110101
- 10 pg/ μ L BZP 93065301
- 100 pg/ μ L BZP 394206200

The above solutions will be used to prepare the following working solutions which will be required to execute this OQ:

Note Refer to Appendix 1 for the preparation of the standard solutions.

Qualification Rep. Initials	Sachin P.	Reviewer Initials		QA/QC Initials	
Date	19 May 99	Date		Date	

4.7 General Guidelines

The following are general cGMP guidelines.

- Perform each procedure exactly as written.
- Fill in each item on the form or mark it Not Applicable (N/A).
- If an item is marked N/A, initial it and date it.
- The Reviewer reviews and initials all entries recorded by the Qualification Representative.
- Keep all raw data. The Qualification Representative and the Reviewer will initial it, and date it.
- Do not destroy raw data.
- Attach raw data from an instrument, such as the SCION, as an Addendum using the instructions in the following Addendums section.
- If several instruments are qualified simultaneously, reference shared information, such as standard preparation and chemical information, to the document containing the original information by its model and instrument identification number.
- Label all reference standards as required by local regulations.
- Record the time each reference standard was opened.
- Use reference standards within 24 hours of preparation.

Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date
19 MAY 22	19 MAY 22	

4.8 Specific Instructions for Documentation

The Reviewer designates specific documentation instructions as follows.

Permanent Ink Color	Blue
Preferred Date Format	19 MAY 22

If more instructions are required: Use an addendum sheet, write the addendum number, and a brief description.

Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date
19 MAY 22		

4.9 Documentation Corrections

Note All original entries must remain legible after corrections are made.

1. Draw a line through the incorrect information.
2. Write the correction as close as possible to the original entry, or enter a footnote.
3. Write a brief description of the error. For example, write "transcription error," "rewritten for clarity," or "correcting wrong entry".
4. Initial and date the change.

Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date
19 MAY 22		

4.10 Marking Procedures Not Applicable

Some sections may not be relevant for the qualification. To indicate that a procedure or part of a form is unnecessary and that it was not forgotten or inadvertently overlooked:

1. Draw a line through the portion that is not applicable. Write the letters N/A (for not applicable), your initials, and the date near the diagonal line.
2. If a procedural step is unnecessary, select N/A if it is indicated, or write a comment in an Addendum. The Qualification Representative and the Reviewer enter their initials and the date near the line.

Note The Qualification Representative and Reviewer must sign and date all forms, even when part or all of the form is marked N/A.

Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date
19 MAY 22		

4.11 Addendums

The following are reasons to complete an addendum sheet:

- A deviation needs documentation.
- Additional information or data needs to be recorded.
- Insufficient space to include the correction on the sheet where the error was made.

Qualification Rep. Initials	Sachin P.	Reviewer Initials		QA/QC Initials	
Date	19 MAY 22	Date		Date	

4.12 Addendum Example

The following is an example of using an addendum sheet to document a deviation.

If some of the items on the sales order were not present, you could do the following:

1. Use an addendum sheet.
2. Write Instrument Delivery on the Procedure line.
3. Write the addendum page number followed by a letter. For example: page 12A, where 12 is the page and A represents the first addendum on that page.
4. Write the plan to obtain the missing items, which may be the following:
 - Scion notified that Part Number XXXXX and XXXX are missing.
 - Scion replied that the parts are in stock and will be sent overnight. While
 - waiting for the parts to arrive, I will continue to set up the instrument.
5. Review the plan with the Reviewer and make the necessary modifications.
6. Document the arrival of the parts and write that this addendum is resolved. Attach a copy of delivery documents and create addendum pages as required.

Qualification Rep. Initials	Sachin P.	Reviewer Initials		QA/QC Initials	
Date	19 MAY 22	Date		Date	

5.0 Operational Qualification

This chapter contains the tests to be completed to perform an Operational Qualification for the SCION.

5.1 OQ Preparation

The following must be done before starting the OQ:

1. Preventative Maintenance must have been completed and signed off by the Qualification Representative, Reviewer, and QA/QC person, and attach a copy of the service report and add an addendum number.

Addendum P.M. Protocol

Qualification Rep. Initials	Sachin P.	Reviewer Initials		QA/QC Initials	
Date	19 MAY 22	Date		Date	

2. OQ must have been completed and signed off by the Qualification Representative, Reviewer, and QA/QC person.

Qualification Rep. Initials	Sachin P.	Reviewer Initials		QA/QC Initials	
Date	19 MAY 22	Date		Date	

3. The QA/QC person must review, approve, append (if necessary), and sign the Pre-execution Approval.

Qualification Rep. Initials	Sachin P.	Reviewer Initials		QA/QC Initials	
Date	19 MAY 22	Date		Date	

5.2 System Description

5.2.1 SCION Description

Installation Date:	2015	Principal Operator:	Phone Number:
Company Information			
Company: United Analyst and Engineering Installation Site LA B			
Name: Building:			
Address: 3 Soi Womruk 41 Address/Location: Sukhumvit Rd.			
City, State: Bangkok, Bangkok City, State: Bangkok			
Zip/Country: Thailand Zip/Country: 10260			
System Description			
SCION SA Serial Number: GQS 1203F021			
Sales Order Number: Sales Order Addendum			
GC			
Module Type: Scion 151 Serial Number: BR 1203M099			
AutoSampler			
Module Type: dp 8400 Serial Number: BR 1203M331			
MS Workstation			
Version: MSWS 8.2.1 Serial Number: 01106-6711-BBQ-1502			
Computer Operating System			
Operating System: Windows 7 Version: Pro Serial Number: Service -			
Computer			
Make: Dell Model: optiplex Serial Number: Hard Drive 1TB			
Addendum Number(s): 2. System description			

Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date
	19 MAY 22	

4. The Qualification Representative and the Reviewer must sign and date the Pre-execution Approval.

Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date
	19 MAY 22	

5.3 Data Sheet Specifications

Run these tests after the instrument has pumped down and is leak free. Use the factory methods. Follow the Installation Procedure; complete this section and the appropriate line of the OQ Summary. Print out the methods and results and attach as addendums. Use the factory test column Br-5ms 15m X 250im X 0.25im.

Table 5-1 TQ Specification

Mode	Concentration	Scan Range	Result †	N/A	Pass	Fail	Addendum
EI Full Scan	1 pg OFN	50-300	S/N ≥500:1				
EI MRM	100 fg OFN	272-222	S/N ≥5000:1				
PCI Full Scan‡	10 pg BZP	80-230	S/N ≥50:1				
NCI Full Scan‡	1 pg OFN	200-300	S/N ≥4000:1				

† The Signal-to-Noise ratio S/N values are based on RMS noise figure.

‡ CI tests use methane gas as reagent gas.

For any tests that did not pass, complete an Addendum for each, write the Addendum number and a brief description.

Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date

Table 5-2 SQ Specification

Mode	Concentration	Scan Range	Result †	N/A	Pass	Fail	Addendum
EI Full Scan	1 pg OFN	50-300	S/N ≥600:1				
PCI Full Scan‡	100 pg BZP	80-230	S/N ≥600:1				
NCI Full Scan‡	200 fg OFN	200-300	S/N ≥1000:1				

Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date

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5.4 EI Precision Test IQ

The following precision tests are for systems with autosamplers only. The test solution is 1 pg/μL OFN test mix part number 393065201.

The following is the required precision for 10 consecutive injections:

Injection	Retention Time	Peak Area
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
% RSD		

As an alternative, a % RSD summary report from MSWS can be added as an addendum.

Addendum	N/A	N/A	Pass	Fail	Addendum
Observed Mass is between 271.6 m/z to 272.4 m/z, which is ± 0.4 of the expected m/z.		✓			
Retention Time ≤ 1% Relative Standard Deviation (RSD).		✓			
Peak Area ≤ 10% Relative Standard Deviation (RSD).		✓			

To complete this section use the factory MRM method on the system CD. Print a copy of the method and add as an addendum.

Addendum N/A

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If the hardware is not the same as the factory method, then note this in the addendum and how the hardware available has been configured to compensate. The most common variation here is the sampler, where the Combi Pal has been used instead of the 8400. This will have no impact on results and can be tracked and recorded in the addendum.

5.5 EI Precision Test SQ

The following precision tests are for systems with autosamplers only. The test solution is 1 pg/μL OFN test mix part number 393065201.

The following is the required precision for 10 consecutive injections:

Injection	Retention Time	Peak Area
1	3.670	71230
2	3.668	80453
3	3.669	78432
4	3.667	75823
5	3.668	79060
6	3.669	81481
7	3.670	81684
8	3.671	72531
9	3.670	79852
10	3.668	81366
% RSD	0.03	1.16

As an alternative, a % RSD summary report from MSWS can be added as an addendum.

Addendum

	N/A	Pass	Fail	Addendum
Observed Mass is between 271.6 m/z to 272.4 m/z, which is ± 0.4 of the expected m/z.		✓		
Retention Time ≤ 1% Relative Standard Deviation (RSD):		✓		
Peak Area ≤ 10% Relative Standard Deviation (RSD):		✓		

To complete this section use the factory Scan method on the system CD. Print a copy of the method and add as an addendum.

Addendum N/A

If the hardware is not the same as the factory method, then note this in the addendum and how the hardware available has been configured to compensate. The most common variation here is the sampler, where the Combi Pal has been used instead of the 8400. This will have no impact on results and can be tracked and recorded in the addendum.

Addendum N/A

5.6 Final Evaluation

		N/A	Pass	Fail	Addendum
Is the equipment in normal operation condition?					
Have all of the OQ requirements been completed?					
Qualification Rep. Initials	Reviewer Initials	QA/QC Initials			
Date	Date	Date			
	19 MAY 22				

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6.0 Protocol Approval

6.1 Protocol Acceptance / Approval by Customer

I agree that the procedures and information referenced in this document are applicable.

Instrument(s): Scion 451 SQ with DP8400

Serial Number(s): GQS1903F024

Sales Order Number:

Company Name: United Analyst and Engineering Consultant Co., Ltd.

I agree that the Operational Qualification Protocol has been satisfactorily completed.	<input checked="" type="checkbox"/>
I confirm that the Operational Qualification Protocol has not been completed, because of these failed (non-passed) items	<input type="checkbox"/>

Authorized Customer Representative

Name (Print)	
Title	
Signature	
Initials	
Date	

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6.2 Operational Qualification Protocol Assignment

This Operational Qualification Protocol document is used for:

Operational Qualification Protocol as final test at Scion	<input type="checkbox"/>
Operational Qualification Protocol after Installation Qualification	<input type="checkbox"/>
Operational Qualification Protocol after Preventive Maintenance and OQ completion.	<input checked="" type="checkbox"/>

6.3 Protocol Acceptance / Protocol Approval by Scion

I agree that the procedures and information referenced in this document are applicable.

Instrument(s): Scion 451 SQ with EPS400

Serial Number(s): GA51203F21

Sales Order Number:

Company Name: United analyst and Engineering Consultant Co Ltd.

Scion Certified Engineer

Name (Print)	SOMCHAI POHTONGKAM
Title	ENGINEER
Signature	<i>Somchai P.</i>
Initials	SOMCHA I
Date	

6.4 Remarks

Appendices

Each page that is inserted after the appendix is numbered with the letter of the appendix and a sequential number. The appendix page number must be initialed and dated by both the Qualification Representative and the Reviewer.

For example, pages inserted after Appendix C are numbered C-1, C-2, C-3....etc along with the initials and date.

If the reverse of each appendix page is left blank it should be marked NA and signed and dated.

When the OQ is complete the total number of pages inserted after each appendix is written on the front page of the respective appendix sheet.

A.1 Qualification Representative Details

The Qualification Representative is to insert a copy of their appropriate qualification(s) after this page.

No. of Pages Inserted

This area is intentionally left blank.

B.1 Exceptions

Each Exception Report shall be issued with a unique identification number in the form of ERID-XX-X. This number is generated by the page number on which the exception occurred followed by a sequential number indicating each exception found on the page.

For example, if an exception occurs on page 34, it shall be identified as Exception Report 'ERID-34-1'. If another exception occurs on page 34, the second exception shall be identified as 'ERID-34-2'. This identification number should be recorded in the pass/fail field after each test.

Insert Exception Reports (if any) after this page.

No. of Pages Inserted

N/A

This area is intentionally left blank.

 	
<p>It is hereby certified that</p> <p>Mr. Somchai Pohtongkam</p> <p>Has successfully completed the Service & Application Training for</p> <p>Scion Chromatography Products</p> <p>Training Contents were:</p> <p>Hardware Operation, Software operation, Data analysis and Installation, & Troubleshooting of Model:</p> <p>SCION GC, GCMS SQ, GCMS TQ</p> <p>At Techcomp Singapore</p> <p>By Mr. Michael Mei (Service Manager)</p> <p>On 11th~15th July 2016</p>	
 <p>Hans van den Heuvel Commercial Director Scion Instruments</p>	<p>Date: 19 July 2016</p> <p>Cert. No.: TSG-SCIONGC-15011602</p>

Addendum Procedure: P.M. Protocol Page Number: 1

TH บริษัท ไทยยูนิค จำกัด THAI UNIQUE CO., LTD.
 80-82 ถนนประชาภิไลย แขวงบางขุนพรหม เขตพระนคร กรุงเทพมหานคร 10200
 80-82 Prachathipalai Rd., Bangkokkhuphrom, Pranakorn, Bangkok 10200
 Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawai@thaiunique.com, Website : www.thaiunique.com

PREVENTIVE MAINTENANCE PROTOCOL
 FOR GAS CHROMATOGRAPH MASS SPECTROMETER

Model & Serial Number: 5A S/N GOS1903F021
 Customer: United Analyst and Engineering Consultant Co., Ltd.
 Date: 19 MAY 2022

GC System

- ☒ Clean all system
- ☒ Check circuit board connector and cable
- ☒ Check column oven heater feed - through, fan motor, mount and bearings
- ☒ Check all LED's and readout display
- ☒ Check operation of all heated zones
- ☒ Check flow rates, filters and gases
- ☒ Verify flow controller operation

MS System

- ☒ Check fan motor MS
- ☒ Check circuit board connector and cable
- ☒ Run electronic Diagnostics
- ☒ Check Gas Clean Filler
- ☒ Check for leak system
- ☒ Check turbo pump (system status)
- ☒ Check vacuum oil
- ☒ Check temperature zone
- ☒ Check air/water (mass 18:19:28)
- ☒ Check HMIN
- ☒ Clean Trap (Sanum, MS200, 4000 Series) or Ion source (1200L, 300, SQ, TQ Series)
- ☒ Check Electron multiplier (If close to 2,000 Volts, Change the multiplier)
- ☒ Check Cal Gas (FC-43)
- ☒ Sensitivity (EI Scan Mode S/N Ratio with for OFN)
- ☒ Check %RSD of Area (EI Scan Mode, for OFN)
- ☒ Check %RSD of RT (EI Scan Mode, for OFN)

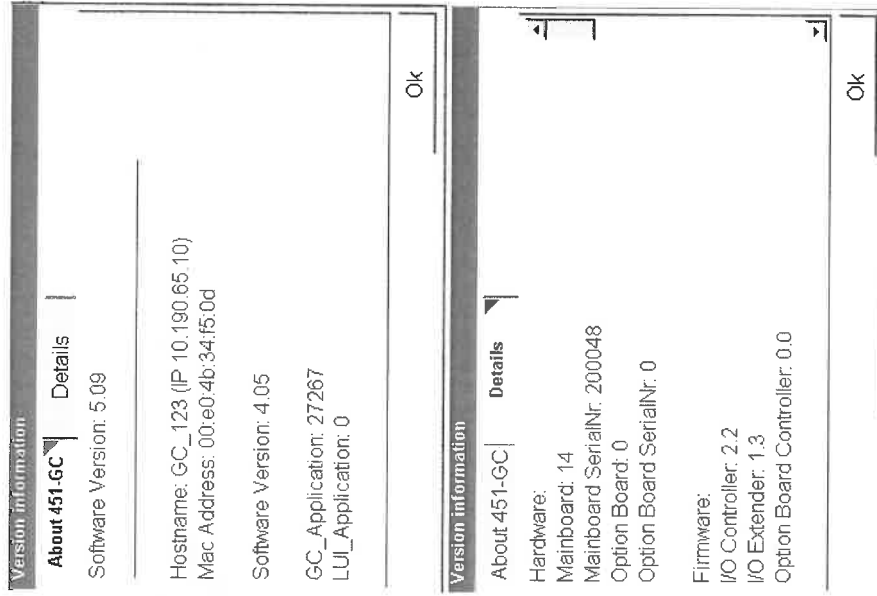
SIGN :

Engineer : Samlin P. Patongkorn Customer : (.....)

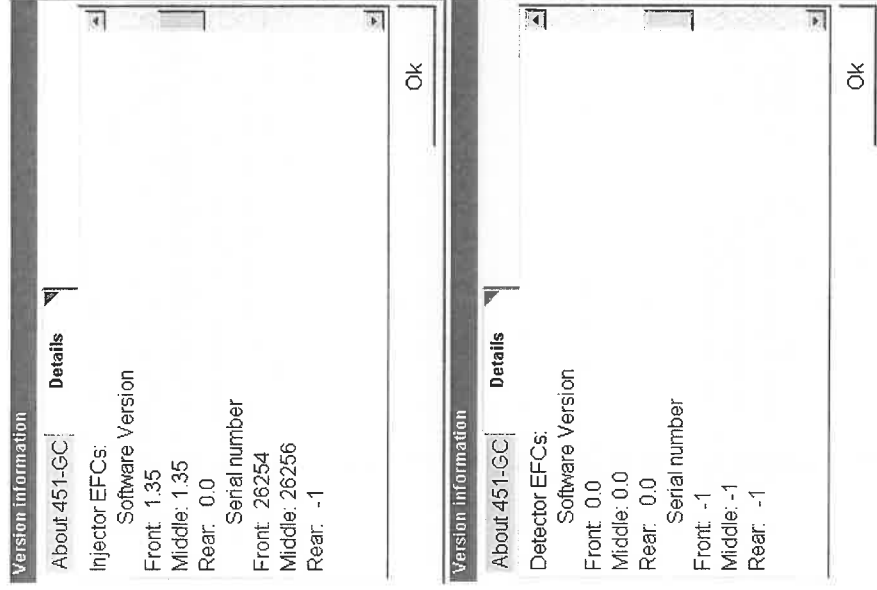
Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date
19 MAY 22	22	

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เอกสารไม่ควบคุม



เอกสารไม่ควบคุม



เอกสารไม่ควบคุม

Version information

About 451-GC|Details

Auxiliary EFCs:

Software Version

Front: 0.0

Middle: 0.0

Rear: 0.0

Serial number

Front: 0

Middle: 0

Rear: 0

Ok

Version information

About 451-GC|Details

Autosampler:

CP84xxMbus: 2.0

CP84xxTS1: 1.0

CP84xxTS6: 1.20

CP84xxTray: 1.20

CP84xxTower: 1.20

CP84xxSyringe: 1.21

CP84xxPlunger: 1.20

GC Application build info:

Ok

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Version information

About 451-GC|Details

CP84xxTray: 1.20

CP84xxTower: 1.20

CP84xxSyringe: 1.21

CP84xxPlunger: 1.20

GC Application build info:

User: autobuilder

IP address: 10.190.65.195

Mac address: 00:26:b9:86:6a:c4

Timestamp: 19-09-2011 18:25

Ok

451-GC Setup

Column Oven Zone: Temp Limit 250.0 C; No Lockout

Zone 1: Front S/S/L: Temp Limit 250.0 C; No Coolant

Zone 2: Mid PTV: Temp Limit 325.0 C; LN2 Coolant

Zone 3: Not Configured

Zone 4: Not Configured

Zone 5: Not Configured

Zone 6: Not Configured

Valve 01 is Unused

Valve 02 is Unused

Valve 03 is Unused

Valve 04 is Unused

Valve 05 is Unused

Valve 06 is Unused

Valve 07 is Unused

Valves 8-10 not installed; require option board

Front S/S/L Injector is associated with zone 1

Mid PTV Injector is associated with zone 2

Front Injector EFC Type: 21 Outlet; Vacuum; Unit: psi; Spillless Vent: 20 ml/min; Gas Saver: 0.00 ml/min; Backflush Disabled

Mid Injector EFC Type: 21 Outlet; Air; Unit: psi; Spillless Vent: 20 ml/min; Gas Saver: 0.00 ml/min; Backflush Disabled

Front Column (Type WCOT) is Configured with L=3000 cm, D=250 microns, He Carrier Gas DB624

Mid Column (Type WCOT) is Configured with L=3000 cm, D=250 microns, He Carrier Gas DB624

Rear Column (Type WCOT) is Configured with L=3000 cm, D=250 microns, He Carrier Gas DB624

Rear Column not Configured

8400 Autosampler connected to SID-2 is Configured with 10 ul Syringe; Inj Ports in Both Positions

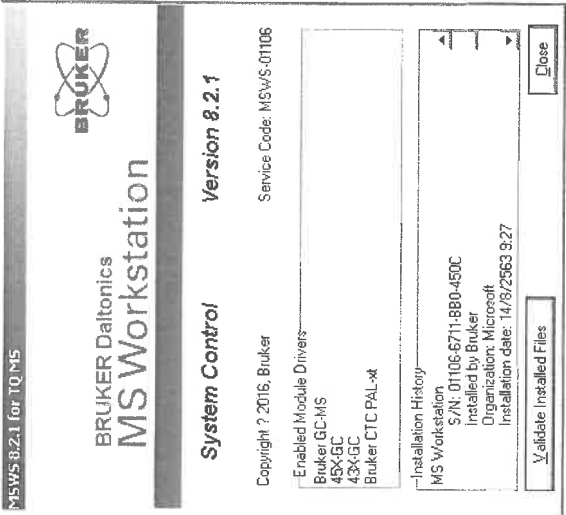
Nothing connected to SID-1

8400 Dual Mode Setup

Print

OK

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Addendum Procedure: 2. System description Page Number: 5

Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date
	19 MAY 22	

Addendum Procedure: 3. Test Result Page Number: 30

SCION MS system hardware test

Test date 5-18-2022

Main module test

Passed -> Power supply test
Passed -> Main user analog out test

CIDV module test

5-18-2022

vent valve can only be tested when vented
pressure sensor and pneumatics not tested in single quad system
Passed -> cidv module test

env module test

5-18-2022

Passed -> env module test

CIG Tests only performed on a CI system

EI module test

5-18-2022

Passed -> EI High voltage DC rail test
Passed -> EI Lens 1 test
Passed -> Lens 2 test
Passed -> Repeller test
Passed -> Electron energy test
Passed -> EI Source test

CI Tests only performed on a CI system

Det module test

5-18-2022

Detector module test

Passed -> Power supply test
Passed -> HV Power supply Type test
Passed -> HV Power supply Revision test
Passed -> Detector accelerator test
Passed -> Detector baseline dac test
Passed -> Detector Noise test
Passed -> Detector multiplier dac test
Passed -> Detector module test
Q0 module test

5-18-2022

Passed -> Q0 module test

Q1 module test

5-18-2022

Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date
17 MAY 22		

Passed -> Q1 module test

Main module test

5--18-2022

Passed -> LED Test
Passed -> Speaker Test
Passed -> Power supply test
Passed -> Main user analog out test
Passed -> Main module test

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เอกสารไม่ควบคุม

CIDV module test

5-18-2022

Passed -> CIDV Power supply test
Passed -> Turbo control test
vent valve can only be tested when vented
pressure sensor and pneumatics not tested in single quad system

Passed -> cidv module test

env module test

5-18-2022

Passed -> Power supply test
Passed -> Temp sensor test
Passed -> Valve current test
Passed -> env fan test
Passed -> heater current test

Passed -> env module test

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เอกสารไม่ควบคุม

EI module test

5-18-2022

Passed -> EI Power supply test
Passed -> EI High Voltage DC rail test
Passed -> EI Lens 1 test
Passed -> Lens 2 test
Passed -> Repeller test
Passed -> Electron energy test
Passed -> AMP test
Passed -> EI Filament test
Check maximum heater current and heater wattage
Max Heater Current = 1.27 Wattage = 29.46
Source Heater wattage measures OK
Passed -> EI Heater test
Passed -> EI Source test

Det module test

5-18-2022

Passed -> Power supply test
Passed -> HV Power supply Type test
Passed -> HV Power supply Revision test
Passed -> Detector accelerator test
Passed -> Detector baseline dac test
Passed -> Detector Noise test
Passed -> Detector multiplier dac test
Passed -> Detector module test

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

Q0 module test

5-18-2022

- Passed -> Power supply test
- Passed -> Q0 High voltage DC rail test
- Passed -> Q0 DAC test
- Passed -> Quad offset test
- Passed -> RF detector test
- Passed -> RF modulator test
- Passed -> RF current test
- Passed -> Heater current test

Passed -> Q0 module test

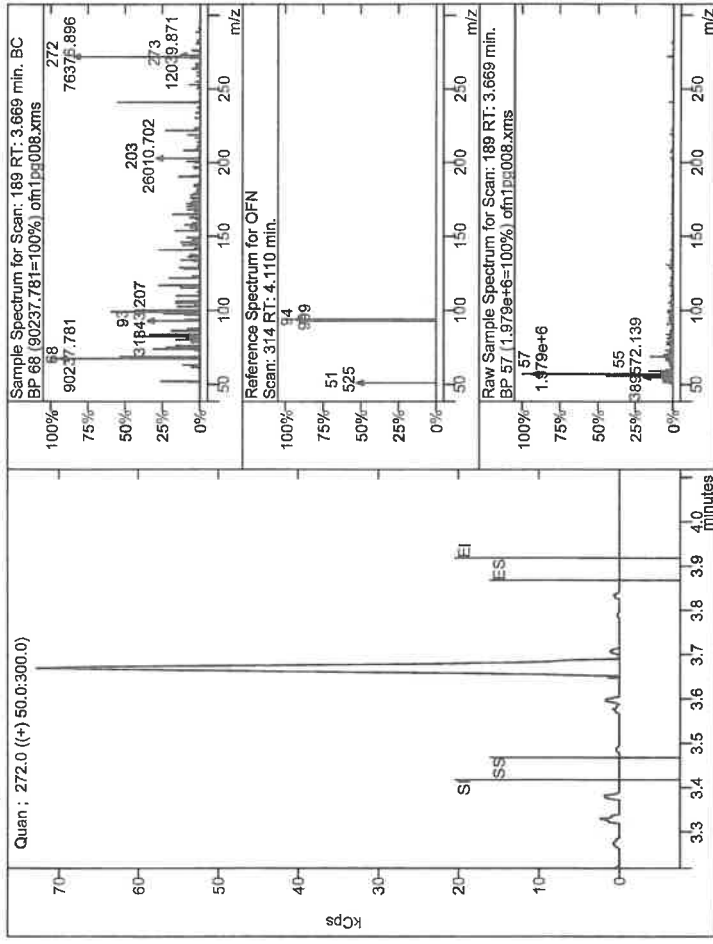
Sample ID:	dm1pg	Operator:	TU
Instrument ID:	Bruker GC/MS #1	Last Calibration:	26/11/2557 15:55
Measurement Type:	Area	Calibration Type:	External Standard
Acquisition Date:	19/5/2565 12:23	Data File:	...022\ofn1pg008.xmls
Calculation Date:	19/5/2565 12:28	Method:	...ds\pm2017\is_piv.mth
Sample Type:	Analysis		
Inj. Sample Notes:	None		

Compound Information

Peak Name:	OFN	CAS Number:	None	Identified
Result Index:	1			
Identification				
Parameter	Specification	Actual	Status	
Search Type	Highest			
Retention Time	3.668 +/- 0.200	3.670 min.	Pass	
Match Result		N/A		

Integration and Quantitation

Parameter	Specification	Actual	Status	
Quan Ions	272.0			
Calibration Equation	Average			
Area	>=10	74230	Pass	
Height		72761		
Amount (Conc.)	>= 0	74 Counts	Pass	



เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

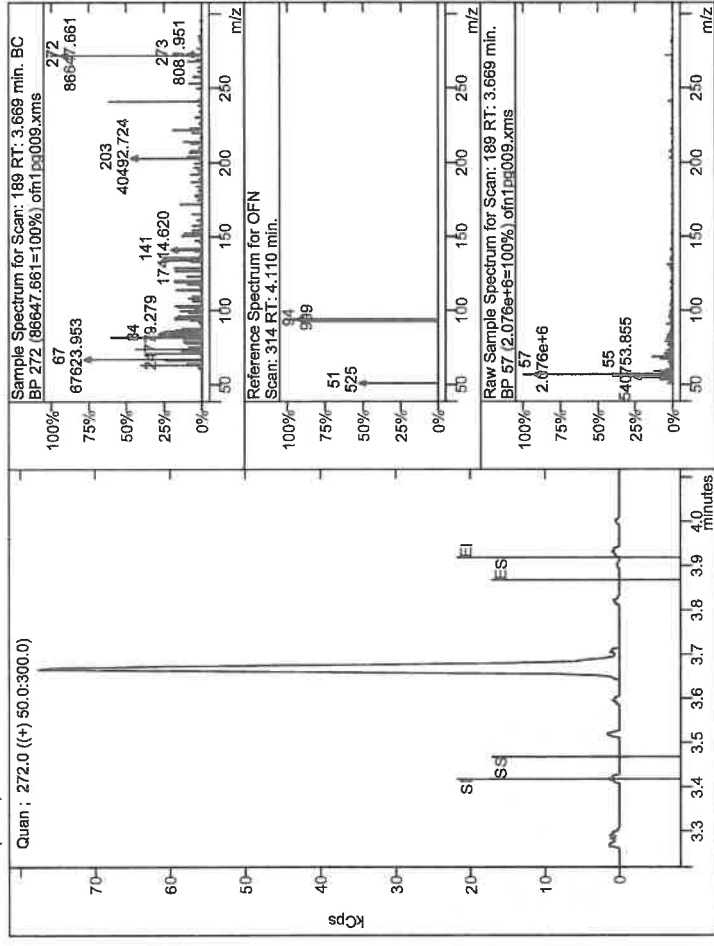
Sample ID:	0m1pg	Operator:	TU
Instrument ID:	Broker GC/MS #1	Last Calibration:	26/11/2557 15:55
Measurement Type:	Area	Calibration Type:	External Standard
Acquisition Date:	19/5/2565 12:36	Data File:	...022\0\0m1pg009.xms
Calculation Date:	19/5/2565 12:41	Method:	...ds\pm2017fs_ptv.mth
Sample Type:	Analysis		
Inj. Sample Notes:	None		

Compound Information

Peak Name:	OFN	Compound Number:	1	CAS Number:	None	Identified
Result Index:	1					
Identification						
Parameter	Specification	Status				
Search Type	Highest					
Retention Time	3.668 +/- 0.200	Actual	3.668 min.			Pass
Match Result			N/A			

Integration and Quantitation

Parameter	Specification	Status	
Quant ions	272.0		
Calibration Equation	Average		
Area	>=10		80953
Height			78589
Amount (Conc.)	>= 0		81 Counts



เอกสารไม่ควบคุม

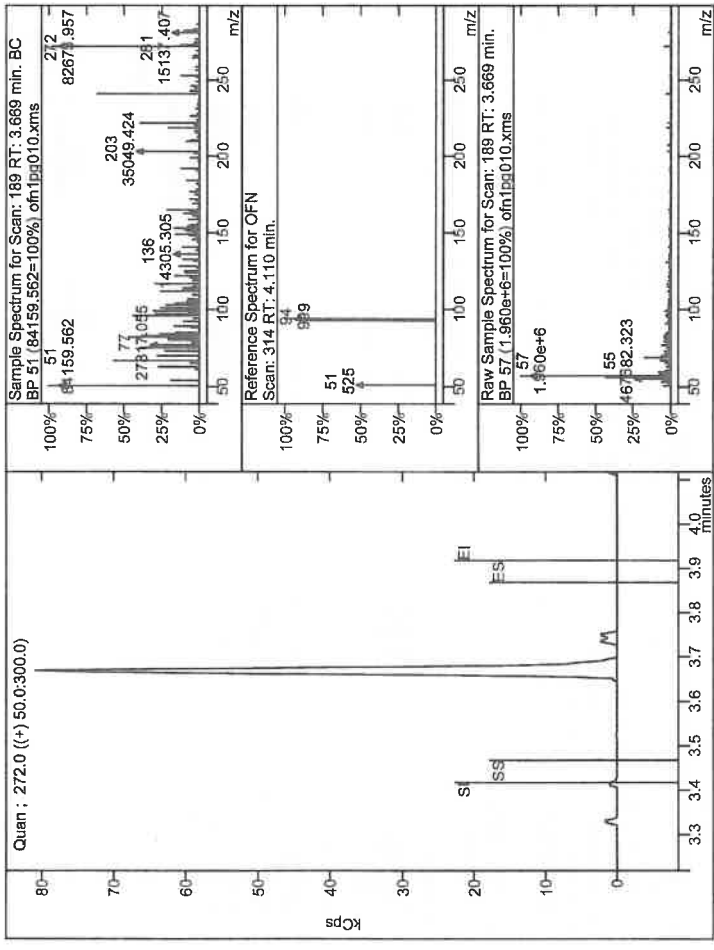
Sample ID:	0m1pg	Operator:	TU
Instrument ID:	Broker GC/MS #1	Last Calibration:	26/11/2557 15:55
Measurement Type:	Area	Calibration Type:	External Standard
Acquisition Date:	19/5/2565 12:49	Data File:	...022\0\0m1pg010.xms
Calculation Date:	19/5/2565 12:55	Method:	...ds\pm2017fs_ptv.mth
Sample Type:	Analysis		
Inj. Sample Notes:	None		

Compound Information

Peak Name:	OFN	Compound Number:	1	CAS Number:	None	Identified
Result Index:	1					
Identification						
Parameter	Specification	Status				
Search Type	Highest					
Retention Time	3.668 +/- 0.200	Actual	3.669 min.			Pass
Match Result			N/A			

Integration and Quantitation

Parameter	Specification	Status	
Quant ions	272.0		
Calibration Equation	Average		
Area	>=10		78832
Height			80882
Amount (Conc.)	>= 0		79 Counts



เอกสารไม่ควบคุม

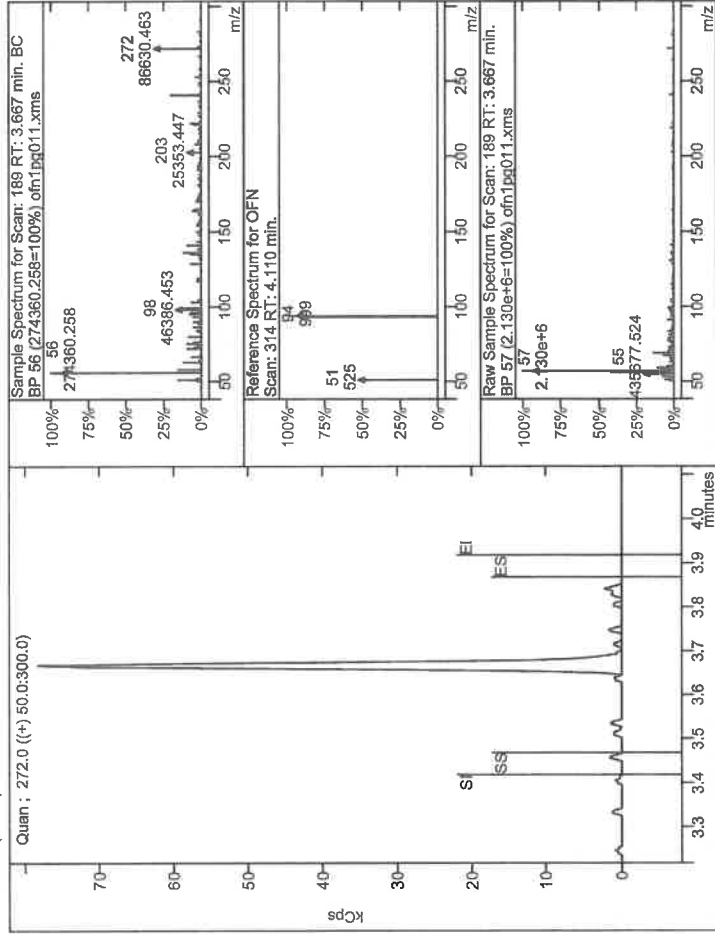
Sample ID:	0m1pg	Operator:	TU
Instrument ID:	Area	Last Calibration:	26/11/2557 15:55
Measurement Type:	Area	Calibration Type:	External Standard
Acquisition Date:	19/5/2565 13:03	Data File:	...022uqofn1pg011.xms
Calculation Date:	19/5/2565 13:08	Method:	...dsipm2017\is_piv.mth
Sample Type:	Analysis		
Inj. Sample Notes:	None		

Compound Information

Peak Name:	OFN	Compound Number:	1	CAS Number:	None	Identified
Result Index:	1					
Parameter	Specification	Actual	Status			
Search Type	Highest	3.667 min.	Pass			
Retention Time	3.668 +/- 0.200	N/A				
Match Result						

Integration and Quantitation

Parameter	Specification	Actual	Status
Quan Ions	272.0		
Calibration Equation	Average		
Area	>=10	75823	Pass
Height		78279	Pass
Amount (Conc.)	>= 0	76 Counts	Pass



เอกสารไม่ควบคุม

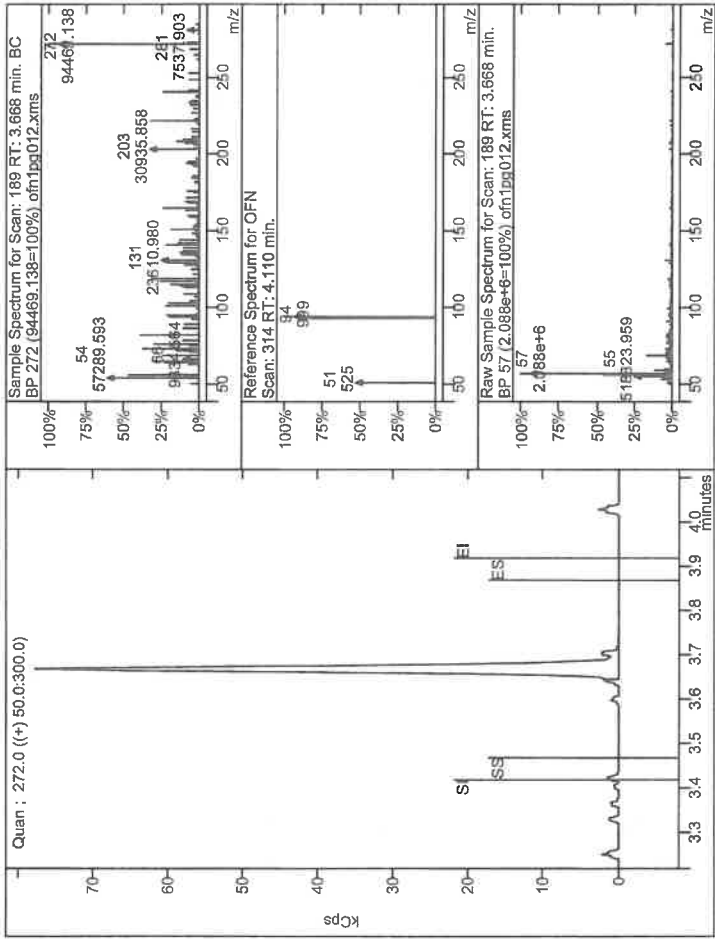
Sample ID:	0m1pg	Operator:	TU
Instrument ID:	Area	Last Calibration:	26/11/2557 15:55
Measurement Type:	Area	Calibration Type:	External Standard
Acquisition Date:	19/5/2565 13:16	Data File:	...022uqofn1pg012.xms
Calculation Date:	19/5/2565 13:21	Method:	...dsipm2017\is_piv.mth
Sample Type:	Analysis		
Inj. Sample Notes:	None		

Compound Information

Peak Name:	OFN	Compound Number:	1	CAS Number:	None	Identified
Result Index:	1					
Parameter	Specification	Actual	Status			
Search Type	Highest	3.668 min.	Pass			
Retention Time	3.668 +/- 0.200	N/A				
Match Result						

Integration and Quantitation

Parameter	Specification	Actual	Status
Quan Ions	272.0		
Calibration Equation	Average		
Area	>=10	79060	Pass
Height		77781	Pass
Amount (Conc.)	>= 0	79 Counts	Pass



เอกสารไม่ควบคุม

Sample ID:	ofn1pg	Operator:	TU
Instrument ID:	Bruker GC/MS #1	Last Calibration:	26/11/2557 15:55
Measurement Type:	Area	Calibration Type:	External Standard
Acquisition Date:	19/5/2565 13:29	Data File:	...022loqofn1pg013.xms
Calculation Date:	19/5/2565 13:34	Method:	...dsipm20171s_ptv.mth
Sample Type:	Analysis		
Inj. Sample Notes:	None		

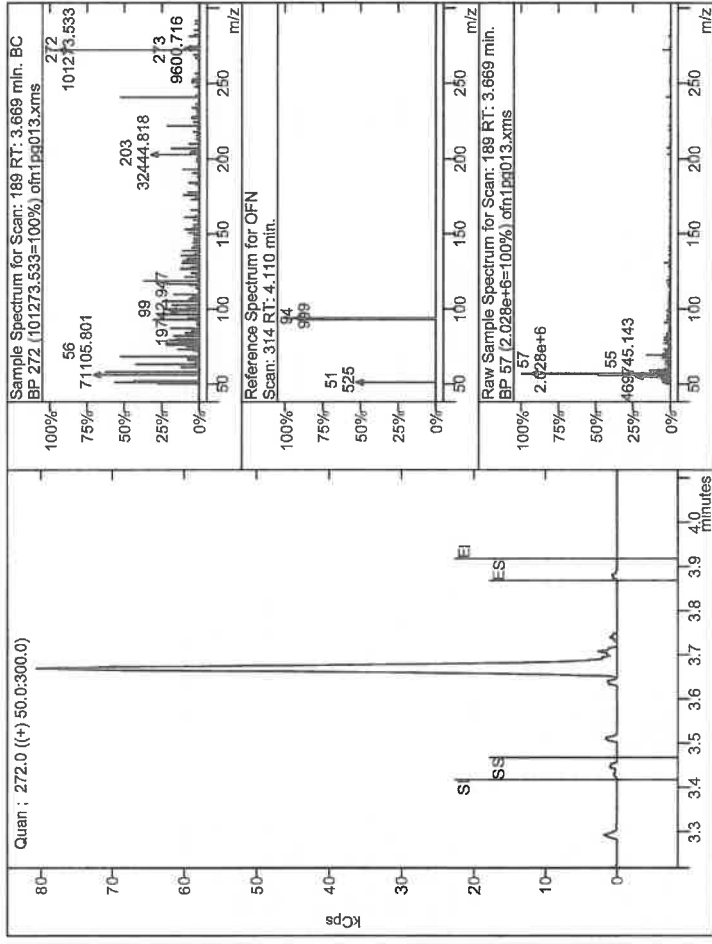
Compound Information

Peak Name:	OFN	CAS Number:	None	Identified
Result Index:	1			
Identification				

Parameter	Specification	Actual	Status
Search Type	Highest		
Retention Time	3.668 +/- 0.200	3.669 min.	Pass
Match Result		N/A	

Integration and Quantitation

Parameter	Specification	Actual	Status
Quan Ions	272.0		
Calibration Equation	Average		
Area	>=10	81481	Pass
Height		80643	
Amount (Conc.)	>= 0	81 Counts	Pass



เอกสารไม่ควบคุม

Sample ID:	ofn1pg	Operator:	TU
Instrument ID:	Bruker GC/MS #1	Last Calibration:	26/11/2557 15:55
Measurement Type:	Area	Calibration Type:	External Standard
Acquisition Date:	19/5/2565 13:56	Data File:	...022loqofn1pg014.xms
Calculation Date:	19/5/2565 14:06	Method:	...dsipm20171s_ptv.mth
Sample Type:	Analysis		
Inj. Sample Notes:	None		

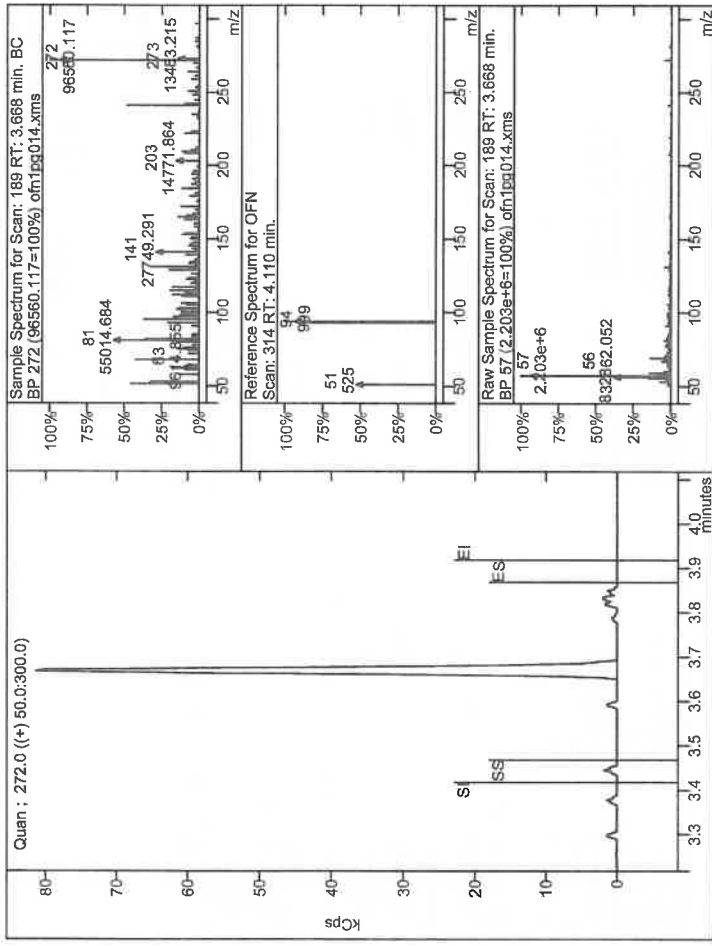
Compound Information

Peak Name:	OFN	CAS Number:	None	Identified
Result Index:	1			
Identification				

Parameter	Specification	Actual	Status
Search Type	Highest		
Retention Time	3.668 +/- 0.200	3.670 min.	Pass
Match Result		N/A	

Integration and Quantitation

Parameter	Specification	Actual	Status
Quan Ions	272.0		
Calibration Equation	Average		
Area	>=10	81684	Pass
Height		81381	
Amount (Conc.)	>= 0	82 Counts	Pass

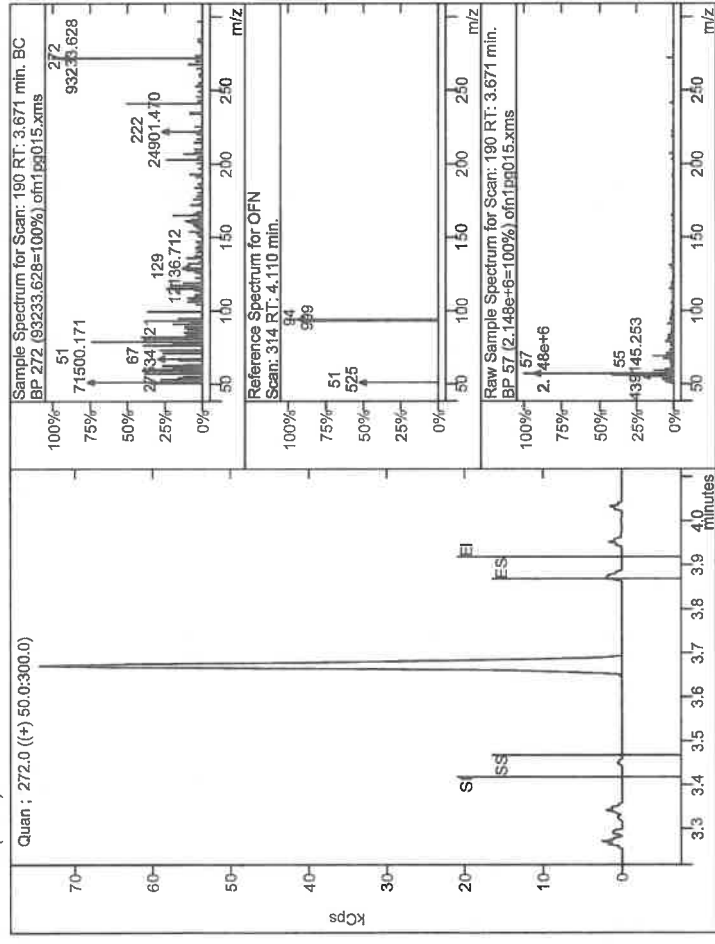


เอกสารไม่ควบคุม

Sample ID:	091pg	Operator:	TU
Instrument ID:	Bruker GC/MS #1	Last Calibration:	26/11/2557 15:55
Measurement Type:	Area	Calibration Type:	External Standard
Acquisition Date:	19/5/2565 14:09	Data File:	...0220q091pg015.xml
Calculation Date:	19/5/2565 14:14	Method:	...
Sample Type:	Analysis		
Inj. Sample Notes:	None		

Compound Information

Peak Name:	OFN	Compound Number:	1	CAS Number:	None	Identified	
Result Index:	1						
Parameter Search Type	Retention Time	Match Result		Actual		Status	
	3.668 +/- 0.200			3.671 min.		Pass	
Integration and Quantitation							
Parameter	Quant Ion	Specification		Actual		Status	
	272.0	Average		72531		Pass	
	Calibration Equation			74597		Pass	
	Area			73 Counts		Pass	
	Height						
	Amount (Conc.)			>= 0			

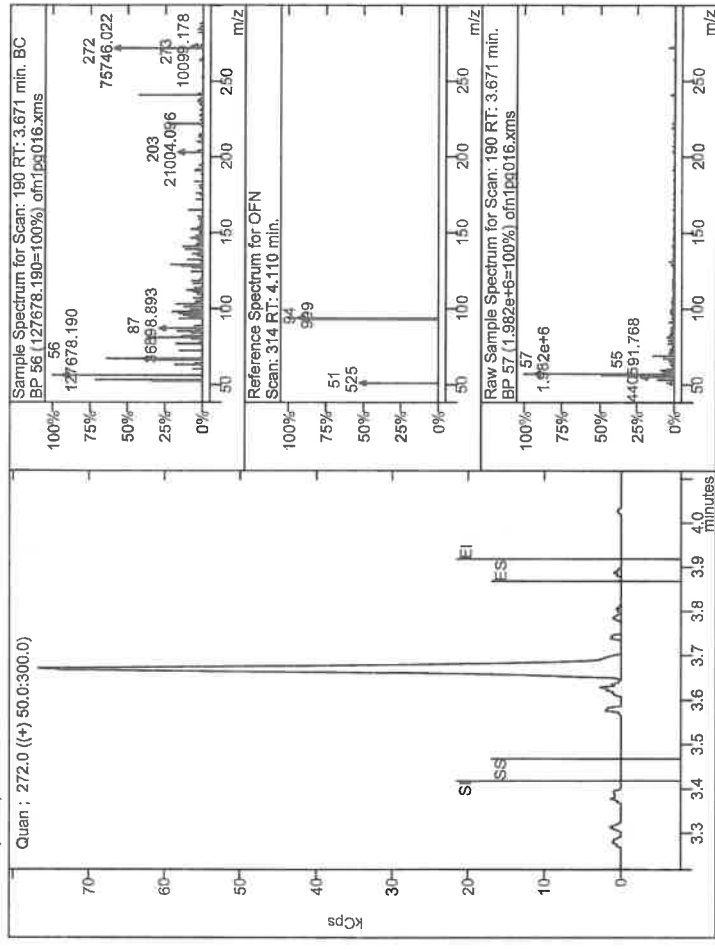


เอกสารไม่ควบคุม

Sample ID:	091pg	Operator:	TU
Instrument ID:	Bruker GC/MS #1	Last Calibration:	26/11/2557 15:55
Measurement Type:	Area	Calibration Type:	External Standard
Acquisition Date:	19/5/2565 14:22	Data File:	...0220q091pg016.xml
Calculation Date:	19/5/2565 14:27	Method:	...
Sample Type:	Analysis		
Inj. Sample Notes:	None		

Compound Information

Peak Name:	OFN	Compound Number:	1	CAS Number:	None	Identified	
Result Index:	1						
Parameter Search Type	Retention Time	Match Result		Actual		Status	
	3.668 +/- 0.200			3.670 min.		Pass	
Integration and Quantitation							
Parameter	Quant Ion	Specification		Actual		Status	
	272.0	Average		79852		Pass	
	Calibration Equation			76848		Pass	
	Area			80 Counts		Pass	
	Height						
	Amount (Conc.)			>= 0			

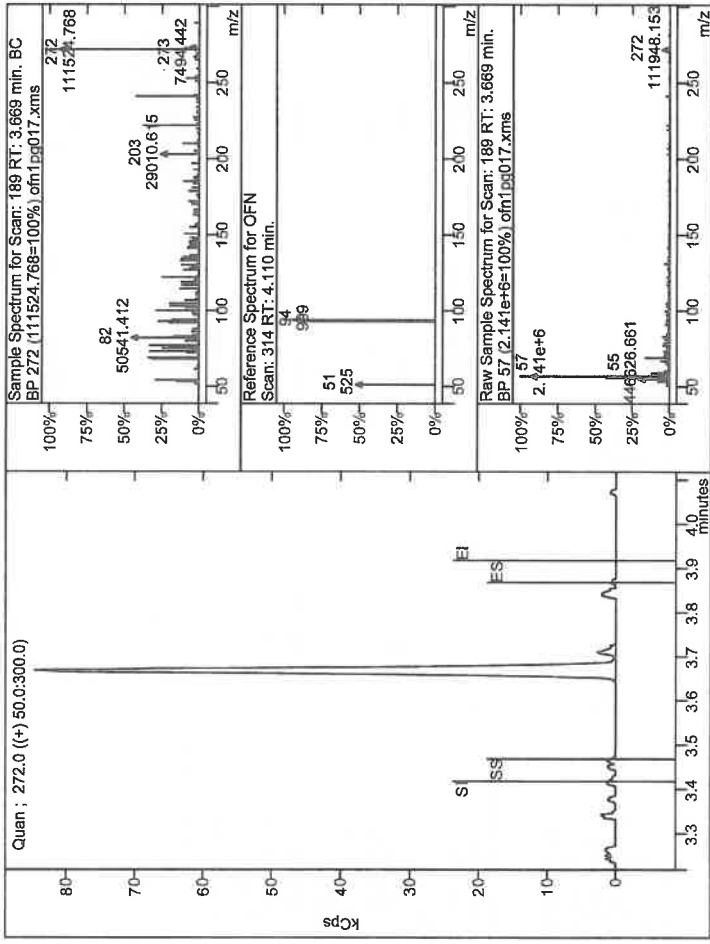


เอกสารไม่ควบคุม

Target Compound Report for #1 from 00m1pg017.xms

Sample ID:	00m1pg	Operator:	TU
Instrument ID:	Bruker GC/MS #1	Last Calibration:	26/11/2557 15:55
Measurement Type:	Area	Calibration Type:	External Standard
Acquisition Date:	19/5/2565 14:37	Data File:	...0220q00m1pg017.xms
Calculation Date:	19/5/2565 14:42	Method:	...dsipm2017\ts_pbv.mth
Sample Type:	Analysis		
Inj. Sample Notes:	None		

Compound Information			
Peak Name:	OFN	Compound Number:	1
Result Index:	1	CAS Number:	None
Identification		Actual	Status
Parameter	Specification		
Search Type	Highest	3.668 min.	Pass
Retention Time	3.668 +/- 0.200	N/A	
Match Result			
Integration and Quantitation		Actual	Status
Parameter	Specification		
Quant Ions	272.0	81366	Pass
Calibration Equation	Average	84532	
Area	>=10	81 Counts	Pass
Height			
Amount (Conc.)	>= 0		



Print Date: 19 May 2022 14:33:09

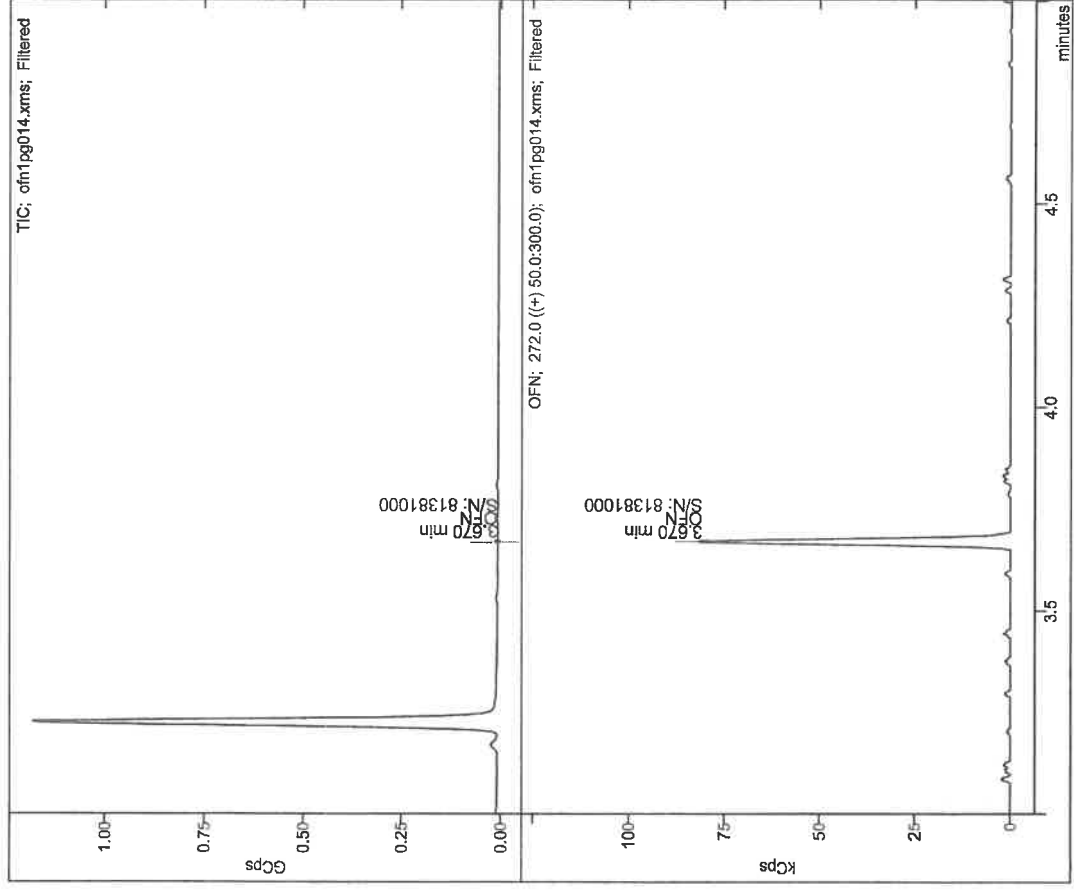
Chromatogram Plots

File: e:\tupm\2022\ofn1pg014.xmls

Sample: ofn1pg

Scan Range: 1 - 565 Time Range: 3.00 - 5.00 min.

Operator: TU
Date: 19/5/2565 13:56



เอกสารไม่ควบคุม

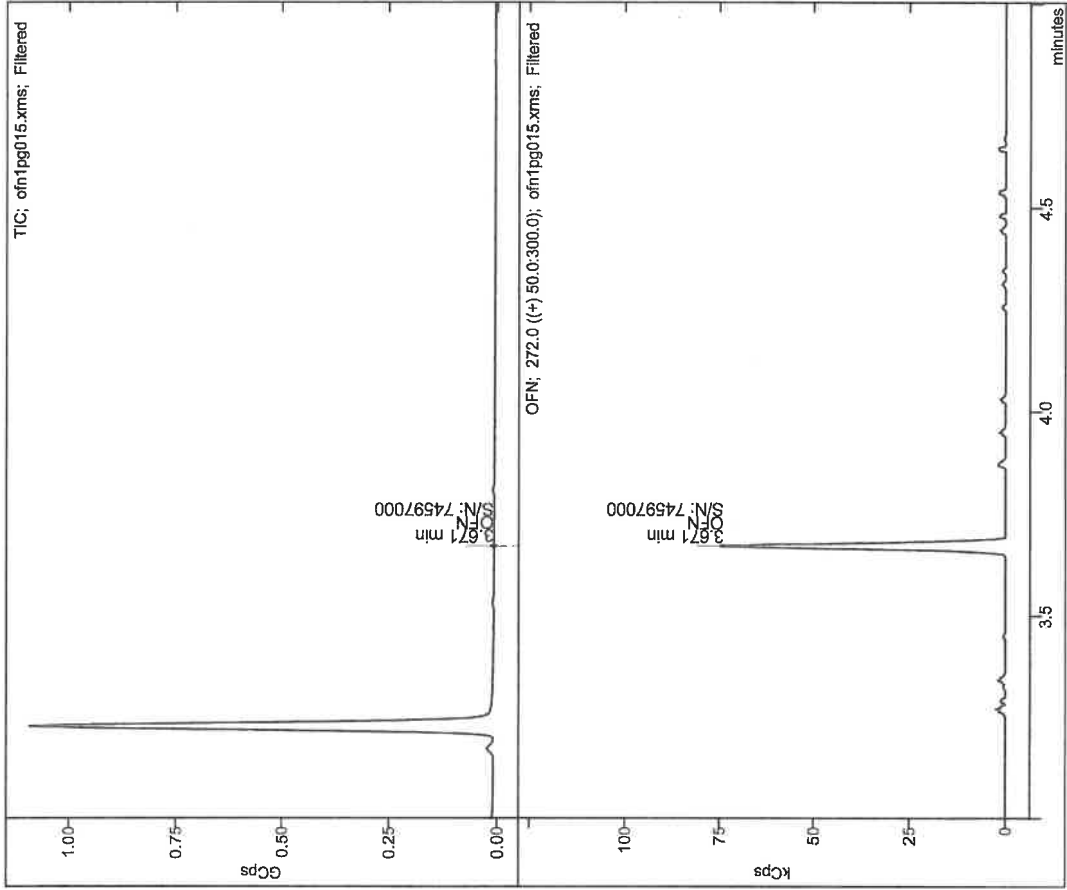
เอกสารไม่ควบคุม

Print Date: 19 May 2022 14:33:38

Chromatogram Plots

File: e:\tupm2022\oq\ofn1pg015.xms
Sample: ofn1pg
Scan Range: 1 - 566 Time Range: 3.00 - 5.00 min.

Operator: TU
Date: 19/5/2565 14:09



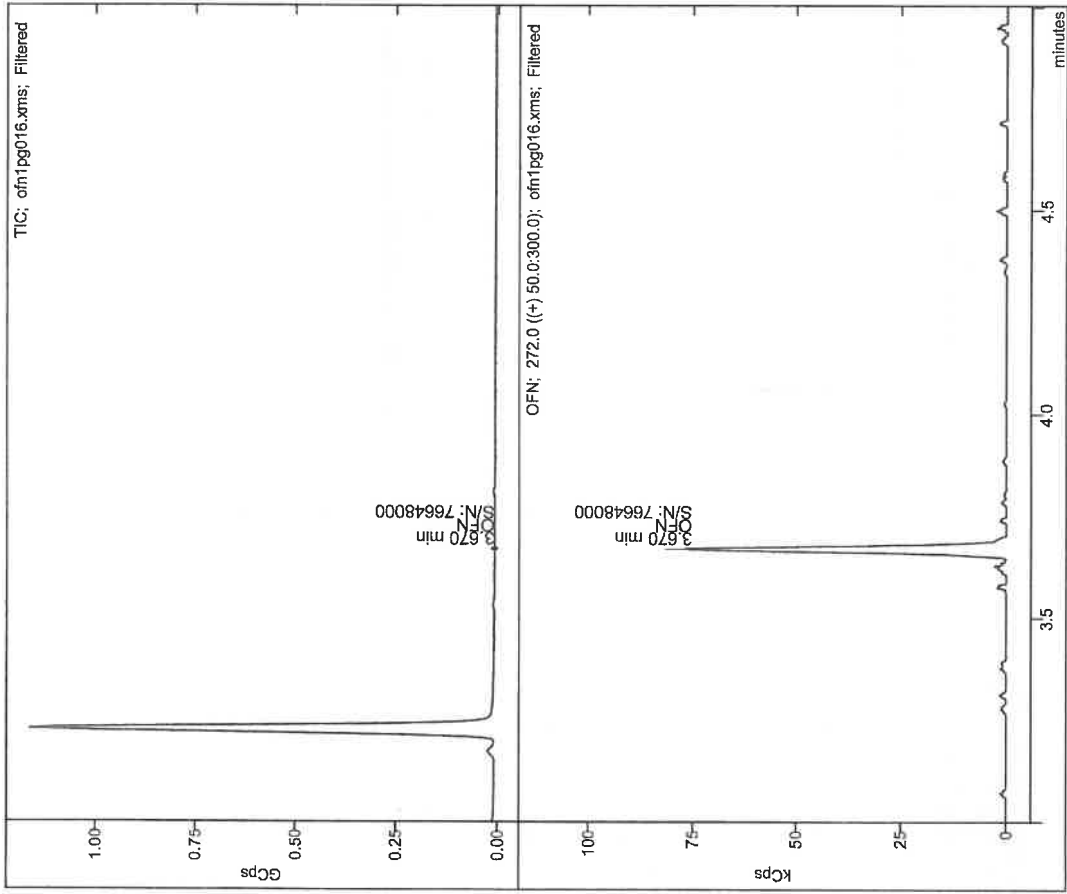
เอกสารไม่ควบคุม

Print Date: 19 May 2022 14:34:33

Chromatogram Plots

File: e:\tupm2022\oq\ofn1pg016.xms
Sample: ofn1pg
Scan Range: 1 - 566 Time Range: 3.00 - 5.00 min.

Operator: TU
Date: 19/5/2565 14:22



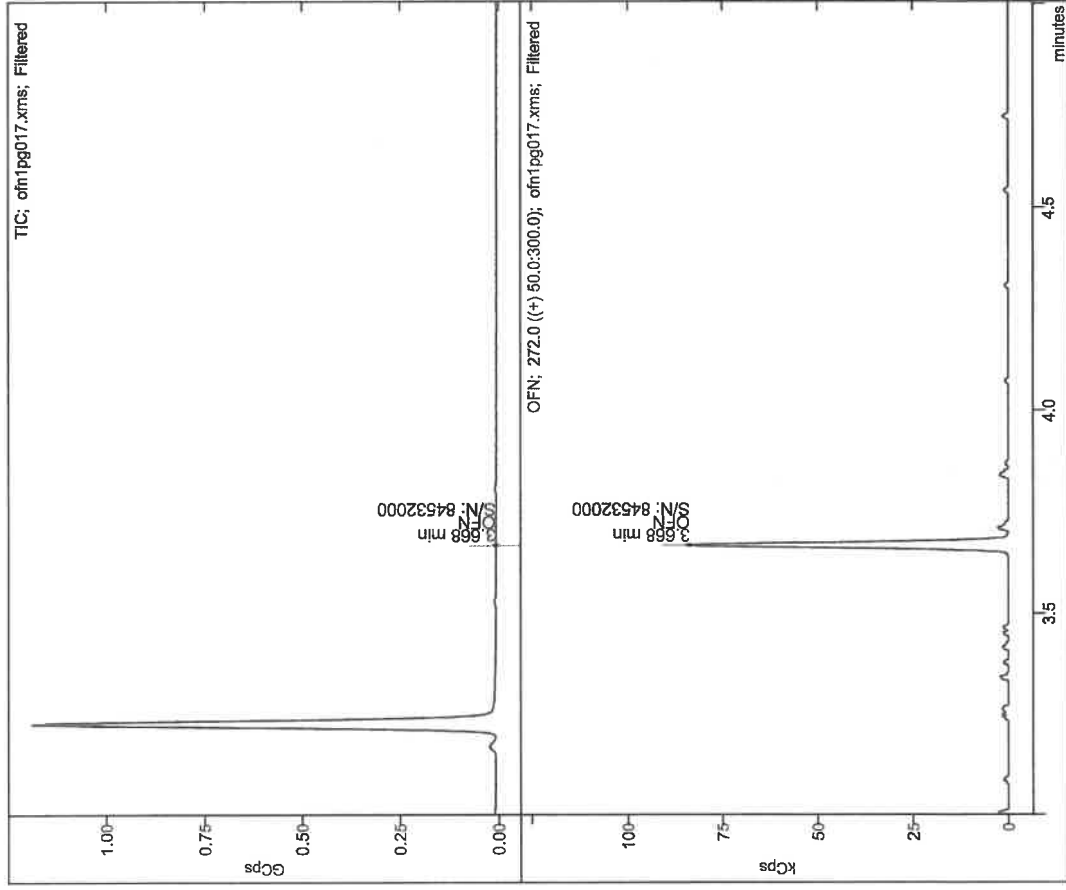
เอกสารไม่ควบคุม

Print Date: 19 May 2022 14:49:01

Chromatogram Plots

File: e:\tupm2022\oq\ofn1pg017.xml
Sample: ofn1pg
Scan Range: 1 - 565 Time Range: 3.00 - 5.00 min.

Operator: TU
Date: 19/5/2565 14:37

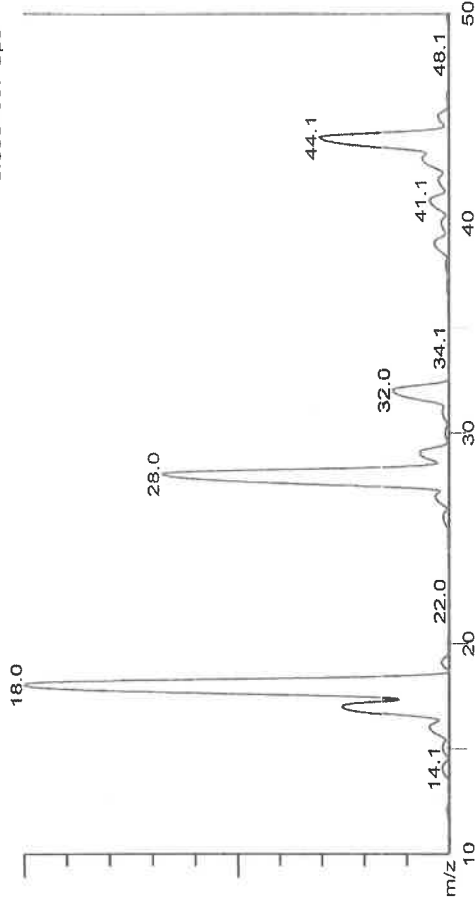


เอกสารไม่ควบคุม

scan 267853 (15 uscans) (Separated)
Notes:EI, EDR On (1)
Compounds:OFN
(+)10-50>

Date:19 MAY 22 9:17 AM

3.08e+007 Cps



28 absolute size (cps)

- Normal < 9.0e7

- Measured 2.12e7

28/32 Ratio

- Normal < 2.8:1 or > 4.2:1

- Measured 5.3:1

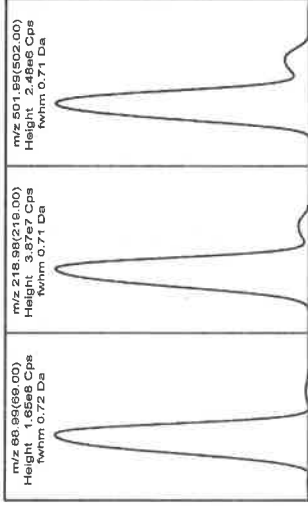
28/18 Ratio

- Normal < 2.0:1

- Measured 0.7:1

เอกสารไม่ควบคุม

Tune_EI_Q1_Pos_19 May 2022_ 9h30m EDR



Instrument: SCION SQ

Location:

Operator:
Date/Time: 19 May 2022 9:30:53

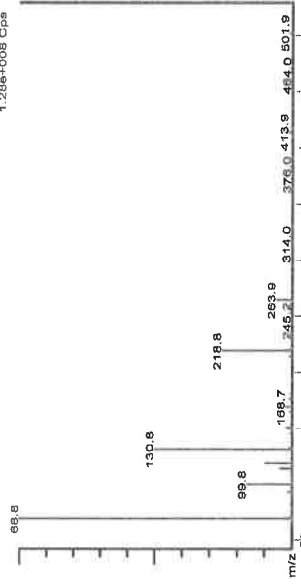
SCION Operational Qualification Protocol

Addendum Procedure: 1. Certificate Page Number: _____

scan 281147
Notes: EI, EDR On (1)
Compound: OFN
(+)-54-5072

Operator:

Date: 19 MAY 22 9:30 AM

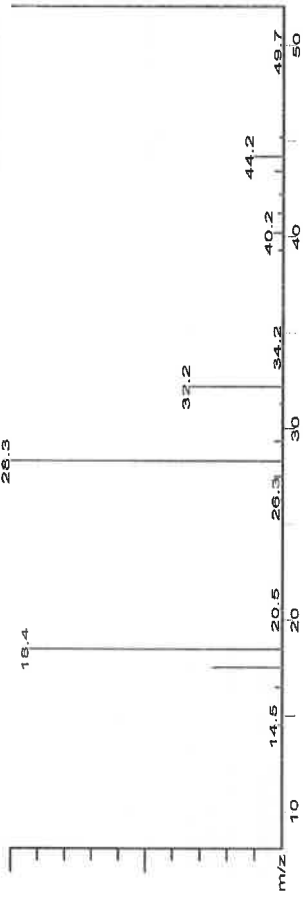


EI
Temperature 250C
Filament 2
Emission 40uA
Electron Energy 69eV
Q0 Helium On
Transferline 250C
Detector Max 1.78kV
Repeller Max 23V

scan 281153
Notes: EI, EDR On (1)
Compound: OFN
(+)-110-602

Operator:

Date: 19 MAY 22 9:31 AM



Qualification Rep. Initials	Reviewer Initials	QA/QC Initials
Date	Date	Date
	19 MAY 22	

Operational Qualification Protocol Certification

for

SCION

with the serial number

GQS1203F21

has successfully completed all criteria for hardware Operational Qualification Protocol
as detailed in this document.

Scion Certified Engineer

SOMCHAI POTHONGKAM

Name (please print)

Somchai P.

Signature

19 MAY 22

Date

Authorized Customer Representative

Name / Function (please print)

Signature

Date

Customer Address

United Analyst and Engineering Consultant Co., Ltd.